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The Way It Was

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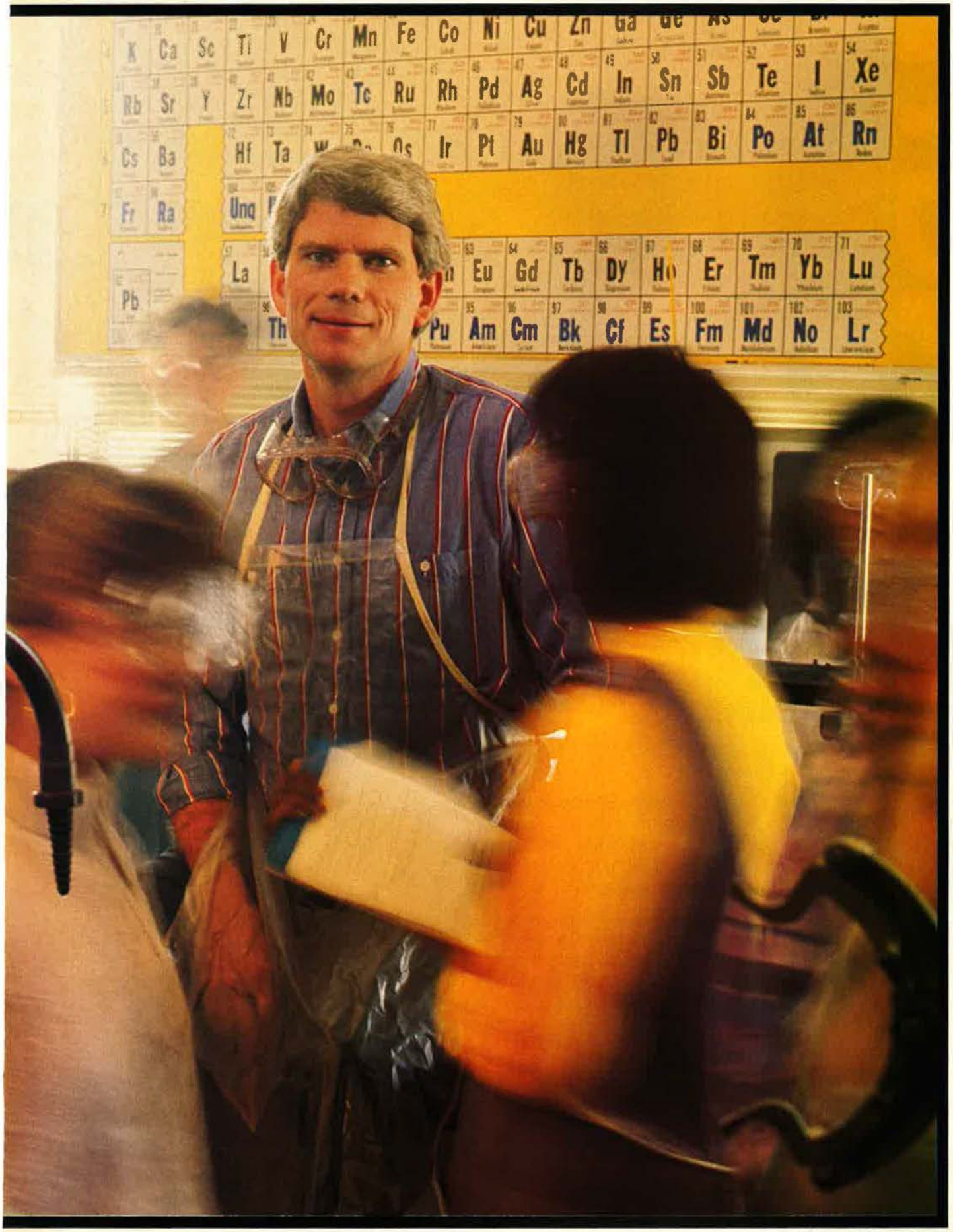

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September 1990, Vol. 73, No. 9

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

Departments

About the cover: This intrepid aviator originally appeared on a poster urging citizens to buy war bonds. For more on the tenor and tempo of life during World War II, see p. 46.

The Way It Was

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COLLINS AVIONICS

Editorial

By John T. Correll, Editor in Chief

In marathon sessions planned for early September, White House and congressional negotiators will grapple again with the most difficult problem in Washington: the federal deficit, which in 1991 promises to hit $164 billion or $232 billion—or $305 billion—depending on how one chooses to count.

If the government cannot, by action or artifice, get the number close to the legal ceiling of $64 billion by the middle of October, the Gramm-Rudman-Hollings deficit reduction act will take over and begin assessing the cuts automatically.

So far, the only strong action has been to cut defense. The 1991 reductions, nominally based on diminishing military requirements, are in fact driven by financial pressures. The nation believes that the present defense program is unaffordable and that it offers a relatively painless solution to the deficit.

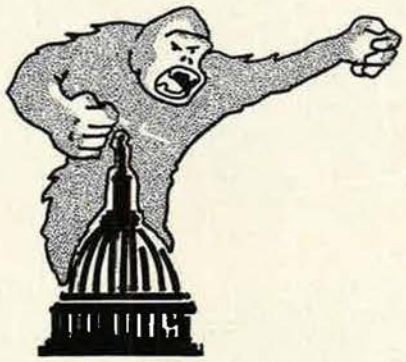
Rep. Les Aspin (D-Wis.), chairman of the House Armed Services Committee, predicts that "the budget negotiations are going to come up with a number for defense that is not in any way related to the threat but is related to the politics of the budget resolution."

The political consensus is that 1991 defense cuts are the first big installment toward a twenty-five percent force reduction over five years.

The Deficit. In July, the Congressional Budget Office raised its "baseline" deficit projection—the outcome if spending and revenue plans are unchanged—to $164 billion. If money the Resolution Trust Corp. needs for the savings and loan bailout is counted toward the deficit, the total rises to $232 billion. If a Social Security trust fund "surplus" is factored out of the accounting, the deficit is $305 billion.

By law, the deficit is measured in outlays, or funds that the government actually expends during the year in question. The authorization bill adopted by the House Armed Services Committee—reducing troop levels by 129,000 next year and terminating eighteen weapon programs—would save $7.8 billion in 1991 outlays. A somewhat less severe Senate bill saves $6.3 billion. These are small drops in a very large bucket.

Applying the Proceeds. Defense has been cut every year since 1986, but the savings were not applied to the deficit. Congress simply transferred the money into other spending categories. This habit shows every sign of continuing.



In July, the House Appropriations Committee—humming, then singing "The Battle Hymn of the Republic"—added $4.4 billion to the budget request of $166.23 billion for education, human services, health, and labor programs in 1991. That bill, along with three others from this committee, would appropriate $13.24 billion not requested in the budget proposal.

Defense and the Deficit. Despite the popular belief that defense caused the deficit, the trend lines head in diverging directions. The deficit is going up while defense is going down.

In 1990, defense spending will be 5.5 percent of the Gross National Product—substantially less than in the 1950s and 1960s. The House Armed Services Committee cuts would take it down to 4.8 percent in 1991.

By contrast, entitlement and benefit programs rose to 11.1 percent of GNP in 1990 and will be 11.8 percent in 1991. This is the only category in which federal spending grows faster than GNP.

The House authorization bill proposes 1991 defense outlays of $295.5 billion. In its baseline-plus-bailout configuration, the deficit pulls within hailing distance of that number and, without the screen of a trust fund offset, would exceed it.

Income and Outgo. Federal revenues in 1991 are estimated at 19.3 percent of GNP. This approximates the pattern of the past twenty years, when overall revenues averaged 18.64 percent. The internal breakout, however, has changed significantly.

As a percentage of government revenue, social insurance taxes are now approximately twice their share in the early 1960s. "Growth in social insurance taxes has roughly coincided with expansion of benefits under the entitlement programs for which they are earmarked," the Congressional Budget Office says.

The Double Balk. The basic problem is that, while revenues are 19.1 percent of GNP, outlays are 22.6 percent. Over the next five years, the gap will narrow, but an appreciable gap remains.

President Bush said June 26 that a deficit solution must include "tax revenue increases" and alteration of entitlement programs. He was promptly clobbered for reneging on his "read my lips" pledge not to raise taxes and for explicitly targeting entitlement benefits. The President retreated to a less embattled position.

Profiles in Affordability. The nation that spent 8.2 percent of GNP on defense in 1960 and 7.8 percent in 1970 is not beggared by 5.5 percent in 1990. Nonaffordability is a bogus issue.

Perhaps we can spend less on defense, but that will not erase the deficit. That isn't where the money—or the problem—is. If entitlement programs and the tax structure are untouchable, the deficit has a long future.

Meanwhile, as an indicator of relative affordability, the budget-busting package reported out by the House Appropriations Committee in July includes development money for a "magnetic levitation train" to replace old-timey trains that run on wheels and tracks. ■

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Letters

Essential Force-Multiplier

James Canan's article on the control of military forces *[see "To Command, You Must Control," July 1990 issue, p. 40]* was right on the mark but for one small point, unfortunately highlighted. There is no question that we need Joint STARS. Our national military strategy is Flexible Response—the ability to respond to any level of Soviet aggression without resort to massive use of nuclear weapons. There are fundamental forces at work in Europe that will make this more difficult in the future. NATO nations will predictably be even more reluctant to use nuclear weapons on the territory of east European nations—now viewed as friendly to the West, not as Soviet allies. Conventional weapons must serve former nuclear roles in defeating force projection. Soviet force withdrawal will be encouraged by reciprocal Alliance concessions, likely including withdrawal of many forces from Europe. We must do better with less.

The withdrawal of Soviet forces from fixed bases in Europe will provide greater warning time of invasion, but the withdrawals place at greater range the targets we must destroy to stop that invasion. Those targets will likely be mobile, less predictable, and less amenable to preplanning. We must have a capability to strike unpredicted targets at long range.

It is not likely that we will wind up in a war with a Soviet Union controlled by Mr. Gorbachev or Mr. Yeltsin, but we should not dismiss the possibility of a war with a reactionary leader who has overthrown the existing government. It will take longer than it does today for the Soviets to transport troops forward—but not nearly so long as for the US to resurrect decommissioned forces.

We may draw four conclusions:

- Future Allied forces opposing a Soviet invasion of NATO must be rapidly retargetable based on information available only as the combat unfolds.
- Future theater nuclear forces must have long range to strike Soviet forces in the Soviet Union.
- Long-range conventional capability, not just nuclear, is needed to permit the engagement of Soviet forces as they traverse east Europe. This could both provide greater battle space in which Soviet forces can be engaged and reduce (eliminate?) Allied need to resort to nuclear weapons.

• Long-range targeting of relocatable or truly mobile forces will be essential.

Joint STARS is thus a perfect fit with our national and Alliance military strategy and is an essential force-multiplier—more essential in the new environment than it was when it was conceived.

Edward J. Ohlert
Alexandria, Va.

Not Quick Look

The article "To Command, You Must Control" did an excellent job in communicating the need for integrated command and control in the Air Force's battle management role. Its assessment that AWACS and Joint STARS are critical components in performing that role was right on target. I wish to point out an error in the article, however, regarding the AWACS upgrade, which appears on p. 43, specifically the paragraphs relating to the Electronics Support Measures (ESM) system.

The ESM system developed for AWACS (AN/AYR-1) is not the Army Quick Look system (AN/ALQ-133), nor is it a derivative of the Quick Look system, although both were designed and developed by UTL Corp. of Dallas. Your assessment that the inclusion of the ESM on the E-3 will "move AWACS way up in class as an air-battle manager" is quite correct, although the requirement and its attendant design solutions have been anything but "uncomplicated," as the article states.

The initial full-scale development system has recently been delivered to the prime contractor, with all twenty-three line replaceable units having undergone systems integration and testing at UTL's facilities in Dallas. . . . The system is a wholly new design, embodying the latest technologies and twenty-plus years of UTL's experience in the tactical surveillance business. Comments on specific performance characteristics of the AN/AYR-1 compared to the ALQ-133 would be classified; however, it can be stated that the system will provide a significantly enhanced capability to the battle management role of AWACS. This capability would also be a significant enhancement to other C³I platforms, such as Joint STARS, in providing real-time threat/target data to US and allied forces.

Robert L. Blanchard
UTL Corp.
Dallas, Tex.

Long-Gone Fig Leaf

Mr. Correll's editorial "Our Fig Leaf Is Slipping" *[see July 1990 issue, p. 7]* is especially disturbing to many of us young Americans who will ultimately inherit the effects of today's budgetary and policy blunders. Unfortunately, he offered as a solution only that Gramm-Rudman-Hollings has not worked and that "It's time we tried a more realistic approach." Mr. Correll mentioned that Sen. Edward M. Kennedy (D-Mass.) charged in February that "America paid a high price here at home" for defense spending in the 1980s and that it was high time to cut defense in favor of our "enormous unmet national needs."

I wonder if Senator Kennedy also mentioned that if it weren't for defense and related spending in the 1980s, his home state would not have enjoyed the job growth and prosperity it did. The growing economic problems of Massachusetts and the rest of the northeast, largely resulting from defense budget cuts, may actually become an unmet national need. The already behemoth banking-industry crisis that started in the west is shifting to the east partly because of an economic downturn caused by increased cuts in defense.

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Letters

This is a time for the US to expand high-technology industries for the purpose of regaining world technological and economic leadership. We should not smother what may be one of our last hopes to regain international competitiveness. Cutting back on defense while failing to develop a coherent industrial policy to use these technological resources for commercial and trade exploitation is a recipe for disaster. The tens of thousands of jobs that have been lost, or will be lost, will only increase unemployment and related entitlement/social programs that support people displaced from the work force. A self-perpetuating, ever-expanding pattern forms, with little hope for an escape.

The time has come for politicians to begin acting like the statesmen and leaders they claim to be at the ballot box. It is time for them to begin to concentrate selflessly on the needs of the nation more than on the needs of their careers. It is time for them to take and use the responsibility that accompanies the power they have been given and to exercise the leadership they claim to possess.

If they choose not to do so and continue to sidestep responsibility with measures like the formula-driven Gramm-Rudman-Hollings Act, to blame the problem on the Pentagon and others, and to use such accounting "magic" as stealing surpluses from the Social Security trust fund in an attempt to make the deficit seem smaller than it actually is, our nation will continue to slip further into debt while sacrificing its already declining international competitive position. The time has come for the US to develop a compatible, long-term economic and security policy and stop fooling itself with "quick fix" schemes. The future of our nation depends on it.

2d Lt. Michael C. Golden,
AFRES
Goshen, Vt.

What Did *Nitemare* Sink?

I have a comment or two about Jack Samson's article "*Nitemare*'s Secret Score" *[see April 1990 issue, p. 102]*. I was interested enough to do a little research to try to determine the identity of the ship sunk that night.

Since the war, the Japanese Defense Agency, War History Section, has compiled a list of every Japanese warship that served in the conflict, along with the date and method of destruction or final disposition. These data have been published in several books, including Paul S. Dull's *The Imperial Japanese Navy 1941–1945* (Naval Institute Press, Annapolis, 1978). There is no record of a cruiser being sunk by aircraft in the Pacific theater on or about August 19, 1944. The only Japanese cruiser lost that month was the *Natori,* sunk by the submarine USS *Hardhead* off Luzon on August 18th. This suggests that Lt. LeVan's crew may have only damaged a warship or sunk an armed merchant ship, a gallant feat nevertheless!

Mark Bogosian
Cincinnati, Ohio

• *Fourteenth Air Force records credit Capt. Jay LeVan's crew with sinking a Japanese cruiser on the night of August 19, 1944, but we can find no corresponding warship in the Japanese records at our disposal. Perhaps one of our readers can help clear up this discrepancy.*—THE EDITORS

In the Air at Asche

Let's get a little more light on the subject. I refer to John L. Frisbee's article "A Very Special Ace." *[See "Valor," June 1990 issue, p. 57.]* This is not to detract in the least from Lt. Bill Whisner's exploits on January 1, 1945, the Monday the Luftwaffe struck Y-29 (Asche, Belgium).

However, the 366th Fighter Group, which was sharing Y-29 with Col. J. C. Meyer's group (352d), already had eight P-47s from the 390th Fighter Squadron in flight. The two flights engaged a mixed force of fifty to sixty Me-109s and FW-190s several minutes before that force struck Y-29, destroying any hopes the Germans had for surprise and in turn allowing the twelve Mustangs of the 487th Squadron, including Lieutenant Whisner's, to launch their attack safely. The eight pilots from the 390th Fighter Squadron could claim twelve enemy aircraft destroyed, two probable, and six damaged when the attack terminated.

Col. W. Ray Goodrich,
USAF (Ret.)
Oceanside, Calif.

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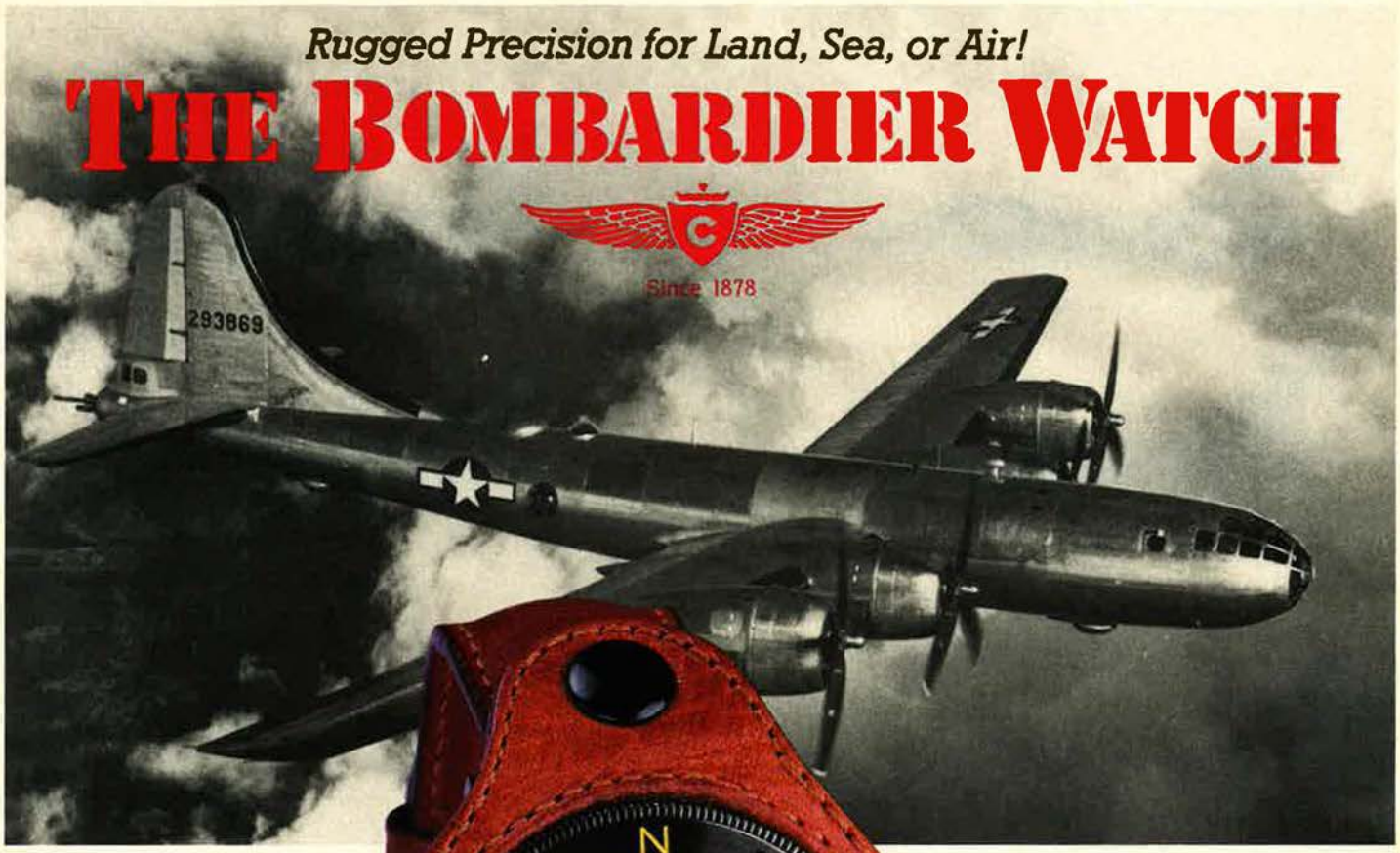

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GTE Government Systems

By **Brian Green,** Congressional Editor

The Senate's Mark

The FY 1991 authorization bill tracks closely with Sam Nunn's alternative defense strategy. The Air Force would absorb about half of the $18.4 billion budget reduction.

The Senate Armed Services Committee (SASC) completed work on its version of the Fiscal Year 1991 defense authorization bill—one that hits the Air Force hard, closely tracks with the priorities of SASC Chairman Sen. Sam Nunn (D-Ga.), and reveals sharp differences between SASC Democrats and the Republican minority.

The SASC proposal would cut the defense budget by $18.4 billion, from $306.9 billion to $288.5 billion, in budget authority (the amount that the Pentagon and other agencies are permitted to obligate). The Air Force would absorb about half the cuts.

The bill is underpinned by priorities set by Senator Nunn that include:

- Nuclear deterrence at lower levels of weaponry and a higher degree of stability. The bill provides funding for the reduced Administration request of $2 billion for two B-2 bombers and an additional $1.8 billion for B-2 R&D and eliminates procurement money for rail-garrison Peacekeeper ICBM launchers.
- A reinforcement strategy, based on the reduced threat in Europe, the ability of the South Korean military to defend against North Korean threats, and the unlikelihood of a major intervention of US forces in southwest Asia or the Middle East. The SASC mark-up calls for reducing US troop strength in Europe by 50,000 and aiming at a residual strength of 75,000 within five years. While mobility forces will be emphasized in this strategy, the Committee deleted procurement funding for the C-17 airlifter due to development problems and "excessive concurrency."
- Greater utilization of reserve forces. The Committee added $878 million to the Administration's request for equipment for the Reserve and National Guard components.
- Application of "flexible readiness," wherein high-priority forces are maintained at high levels of readiness and operating tempos for "lower priority forces" can be reduced. The Committee cut $400 million from the training and operating tempo request and added $171 million for advanced simulators.
- "Thinking smarter, not richer" by stressing product improvement over new starts and technological superiority. In this vein, the Committee eliminated full-scale development funding this year for the Advanced Tactical Fighter (ATF) and added $100 million "to protect an option for an F-15XX alternative to the ATF." The Committee expressed concern that the recent Major Aircraft Review, which reaffirmed the need for the ATF, was too tightly focused on ATF performance and requirements and did not consider broader tactical air modernization issues. While conceding that the F-15XX would not match ATF performance, the Committee suggested that modernizing air superiority, close air support, and multirole aircraft might cost about the same as the ATF. It directed DoD to conduct a more comprehensive analysis of tactical air needs.

The Committee also increased funding for the defense technology base program by five percent over FY 1990 funding but reduced SDI funding from $4.7 billion to $3.7 billion.

Other key program actions by the Committee include halving the request for the AIM-120A Advanced Medium-Range Air-to-Air Missile (AMRAAM), from 1,800 missiles to 900 missiles, due to reliability problems, and terminating the Milstar communications satellite program due to delays and rising costs and because command, control, communications, and intelligence capabilities are "sufficiently robust." Air Force Secretary Donald Rice objected vigorously to the Committee actions on Milstar, C-17, and ATF.

A strong statement signed by all but one of the Committee Republicans argued that US strategic forces should be reduced in the context of the Strategic Arms Reduction Talks (START) and that force planning should not reflect anything below levels now projected by START negotiations. The minority also contended that the Committee's assessment of the threat in Europe and elsewhere was either too rosy or too narrowly focused to be realistic.

The SASC bill may be optimistic. The House Armed Services Committee approved an authorization bill of $283 billion in BA on July 31, and the budget summit between Administration and congressional leaders was widely expected to produce a defense figure lower than the Administration's January budget.

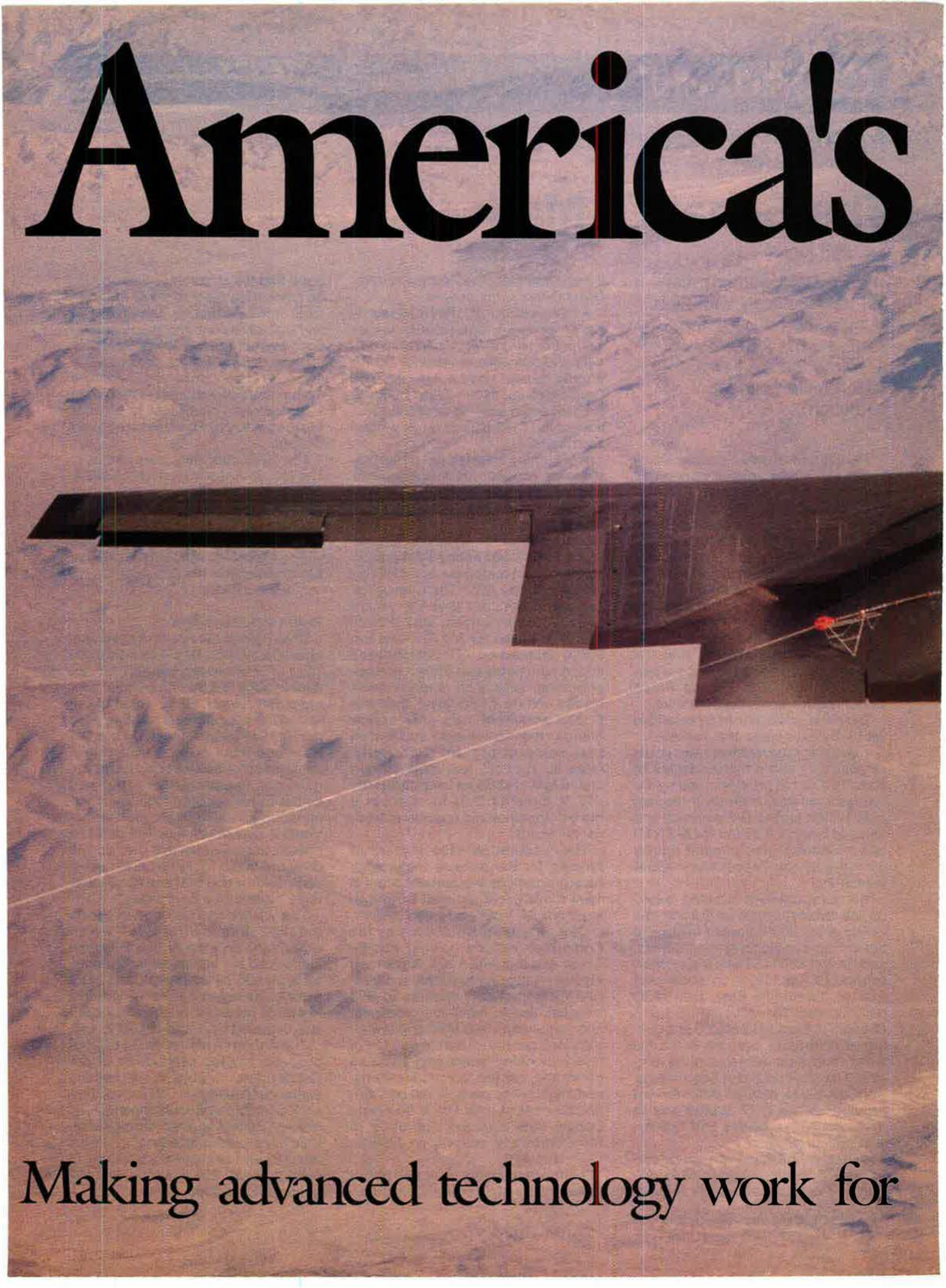
Aspin Opposes B-2

Chairman of the House Armed Services Committee Rep. Les Aspin (D-Wis.) announced his support for terminating the B-2 Stealth bomber program. On July 31, HASC voted to delete all B-2 procurement funding from the FY 1991 budget, meaning that the B-2 issue must now be settled in a conference of Senate and House negotiators. Representative Aspin said he based his decision to support termination on rising unit cost, the fact that B-2 capabilities have not yet been proven, and his belief that the bomber does not make "a unique and necessary contribution over and above strategic systems we have today."

The Wisconsin Democrat supports the "B-2 Termination Bill," which would fund only the fifteen B-2s now authorized but would provide money for research, development, and flight testing. He voted against a virtually identical measure last year when it was defeated by a vote of 279 to 144.

The Air Force contends that "[The] proposal to stop production of the B-2 bomber . . . puts at risk needed military capability and US technological leadership while wasting precious defense dollars and weakening America's arms-control position. . . . [It] is wasteful and strategically unsound. It epitomizes all that is wrong with the defense acquisition process." ■

America's



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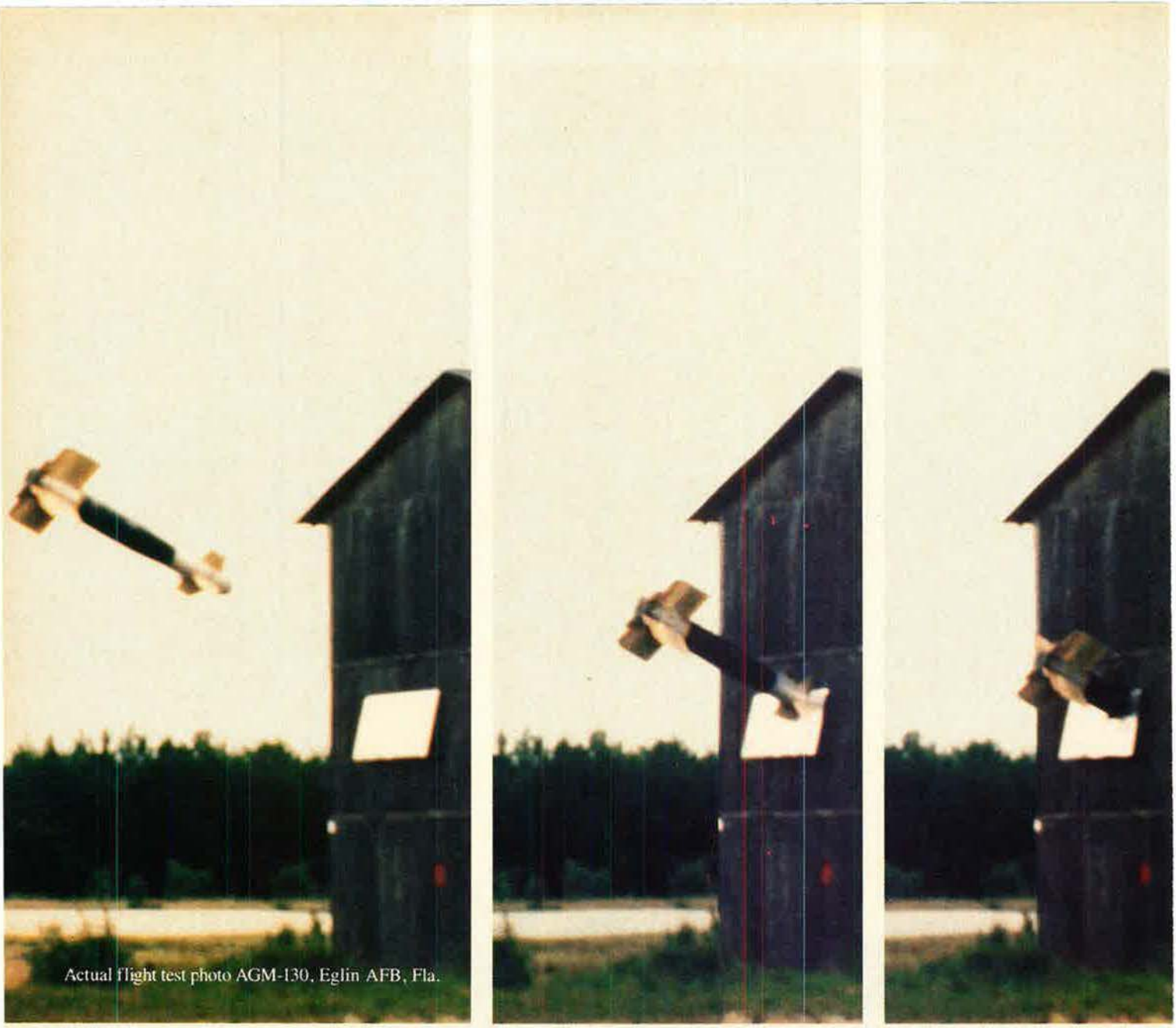

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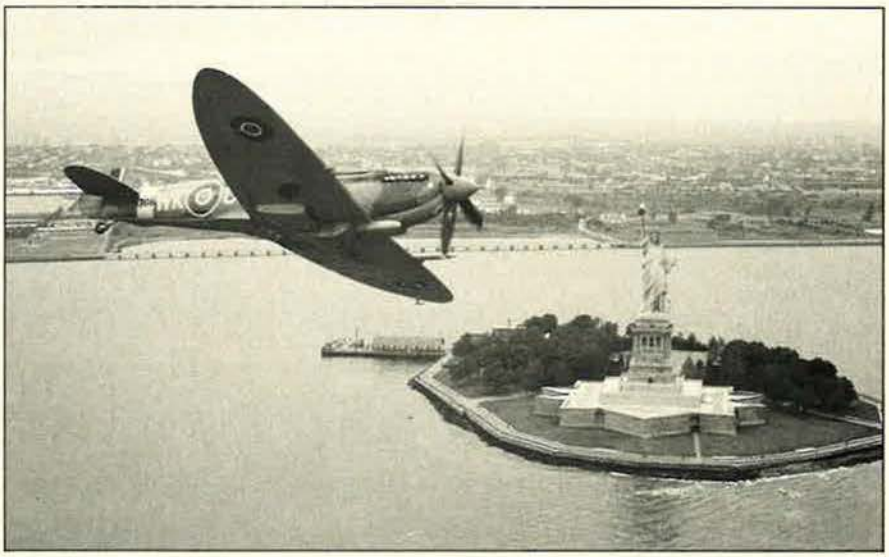
Aerospace World

By Jeffrey P. Rhodes, Aeronautics Editor

★ This could be called the summer of NASA's discontent, as the nation's space agency discovered a major problem with the Hubble Space Telescope, the space shuttle fleet was grounded, and two astronauts were suspended.

A two-micron-wide (less than the width of a human hair) spherical aberration was discovered on the HST when repeated attempts failed to get the telescope to focus on a distant star. Preliminary tests indicate that the aberration is on the 94.5-inch-diameter primary mirror. The problem can likely be traced to the grinding and polishing of the mirror at the Hughes Danbury Optical (formerly Perkin Elmer) plant in Danbury, Conn., during the early 1980s.

The mirrors were all tested independently, but no end-to-end test was performed. Officials at the company said that such a test would have been prohibitively expensive. A full-scale investigation into the Hubble's troubles was launched on July 2, with Jet Propulsion Laboratory Director (and former Air Force Chief of Staff) Lew Allen, Jr., acting as chairman.



Anglo meets American as this Spitfire Mk. IX is flown past the Statue of Liberty. The July 16 flight was made in commemoration of the fiftieth anniversary of the Battle of Britain and was sponsored by Jaguar Cars Inc., the US subsidiary of the famous British auto manufacturer. The airplane, built in the Jaguar factory at Castle Bromwich, England, was modified in 1950 with a second cockpit and used for flight training. Later it served as a camera ship for the 1968 movie "Battle of Britain."

The Rockwell AGM-130A, the rocket-propelled version of the GBU-15 glide bomb (shown here on an F-15E), was recently cleared for production. Failures in early tests nearly led to termination of the standoff weapon program. The Air Force is seeking funding for 960 TV-guided and 3,088 infrared-guided AGM-130s. Air Force Systems Command's Munitions System Division (now the Air Force Development Test Center) at Eglin AFB, Fla., oversaw AGM-130 development.

Even with its focusing problems, the Hubble is as good an observatory as a very sharp Earth-based telescope on a good-weather day. Interim fixes for the Hubble include flexing the mirror with the on-board actuators (to improve the focus slightly) and using the same computer enhancement techniques used on the pictures sent back from the Pioneer and Voyager interplanetary probes.

A permanent fix—replacing the HST's main instrument, the wide field/planetary camera (already planned before the problems arose)—will be accomplished on a space shuttle mission in 1993. The new camera will feature "corrective" lenses to minimize the aberration.

The space shuttle fleet, meanwhile, has been grounded because of a vexing hydrogen leak that affected both *Columbia* and *Atlantis* while the spaceships were on the launchpad. *Columbia* was to be used on STS-35, a scientific mission with the four-tele-

September Anniversaries

• *September 2, 1910:* Blanche Scott becomes the first American woman to solo, as she flies a Curtiss Pusher at the Curtiss company field in Hammondsport, N. Y. She was not granted a pilot's license, however.

• *September 3, 1925:* The first Navy dirigible, USS *Shenandoah* (ZR-1), breaks up in a storm over Ava, Ohio. Fourteen of the forty-three crew aboard are killed.

• *September 17, 1940:* Adolf Hitler announces that Operation Sea Lion, the German invasion of Great Britain, "has been postponed indefinitely." This effectively marks the end of the Battle of Britain, although fighting would continue.

• *September 2, 1945:* Japanese Foreign Minister Mamoru Shigemitsu and Chief of Staff Gen. Yoshijiro Umezu sign the instruments of surrender ending World War II on board USS *Missouri* (BB-63) at 9:04 a.m. local time. The next day, USAAF Maj. G. E. Cain, flying a Douglas C-54, sets a Tokyo-to-Washington, D. C., speed record of thirty-one hours and twenty-five minutes in getting film of the surrender ceremony to the US.

• *September 29, 1945:* Dr. Wernher von Braun and other leading German rocket scientists arrive in the US to begin translating documents captured at the Peenemünde test center. These "Project Paper Clip" engineers would later be instrumental in the US guided missile and manned space programs.

• *September 22, 1950:* Air Force Col. David Schilling makes the first nonstop transatlantic flight in a jet aircraft, flying a Republic F-84E from Manston, England, to Limestone (now Loring) AFB, Me., in ten hours and one minute. He makes three in-flight refuelings en route. Lt. Col. William Ritchie, his wingman, has to bail out over Newfoundland, but is later rescued.

• *September 11, 1955:* Richard T. Whitcomb of NACA's Langley Memorial Aeronautical Laboratory in Hampton, Va., publicly announces the area rule concept of airplane design, which sharply reduces the increase in drag on an aircraft at supersonic speeds. The concept, formulated in 1953, found its first use in the Grumman F11F and Convair F-102 designs.

• *September 30, 1955:* North American Aviation is selected to build the X-15 high-altitude, high-speed research aircraft.

• *September 21, 1960:* Tactical Air Command formally accepts the first Republic F-105D Thunderchief all-weather fighter in ceremonies at Nellis AFB, Nev. The aircraft would not officially enter service until the following year, when deliveries to Seymour Johnson AFB, N. C., began.

• *September 9, 1975:* The Viking 2 mission to Mars is launched from Cape Canaveral AFS, Fla., atop a Martin Marietta Titan III/Centaur booster. The spacecraft enters Mars orbit on August 7, 1976, and the lander touches down on September 3, 1976. The lander would be shut down in 1980.

• *September 17, 1980:* "Glory Trip 77," a Boeing LGM-30G Minuteman III intercontinental ballistic missile operational test, becomes the longest Minuteman flight ever. After a 5,600-mile flight from Vandenberg AFB, Calif., the missile's unarmed reentry vehicles strike an area of the Pacific Ocean beyond Kwajalein.

• *September 13, 1985:* The first test of the LTV-Boeing ASM-135A air-launched antisatellite weapon against a target is successfully carried out over the Western Missile Test Range. Launched from an F-15, the missile destroys a satellite orbiting at a speed of 17,500 mph approximately 290 miles above Earth.

scope, pallet-mounted Astro-1 observatory, while *Atlantis* was to be flown on STS-38, a classified Department of Defense mission.

Liftoff of STS-35 had already been delayed because a cooling valve had to be replaced. However, six hours prior to liftoff on May 30, the leak was discovered as *Columbia* was being fueled. A seventeen-inch fuel disconnect valve that feeds liquid hydrogen from the external tank to the orbiter's engines was suspected to be the cause of the problem.

Columbia was rolled back to the Vehicle Assembly Building (VAB) on June 12. NASA then sent the disconnect valve back to Rockwell for testing, and the valve installed in the replacement orbiter *Endeavour* was removed and sent to the Kennedy Space Center to be fitted in *Columbia*. A similar leak was then discovered on *Atlantis* during a tanking test on June 29, and the orbiter fleet was effectively grounded.

Further tests indicated that the problem was not in the disconnect itself, but in the flanges at its ends. (*Columbia*'s leak seemed to be on the external tank side, while *Atlantis*'s problems seemed to be on the orbiter side.) Tightening the bolts on the flanges failed to stop the leaks on *Atlantis* during a July 25 test. At the end of July, it appeared that *Atlantis* would also have to be rolled back to the VAB.

If these problems were not enough, on June 5, in the Orbiter Processing Facility, a personnel bridge suspended over the payload bay of *Discovery* moved, caught the right payload bay door, and flexed it upward. No damage was done, but checking the door slowed processing of the Ulysses solar probe. If this probe is not launched during an October "window," the mission will be delayed at least a year.

Two veteran astronauts, Navy Cmdr. Robert L. Gibson and Navy Capt. David M. Walker, were suspended from flight assignments on July 9 for violating flight crew operations guidelines.

Commander Gibson was relieved of command of STS-46 and removed from T-38 trainer status for one year because of his participation in an airplane race at a civilian air show in Texas, in which another pilot was killed after a collision with the astronaut's aircraft. Commander Gibson had flown on Missions 41-B, 61-C, and STS-27. No replacement astronaut for his mission was named.

Captain Walker was removed from STS-44 and suspended from T-38 flying for sixty days for flying too near a Pan American commercial airliner in May 1989. He had flown on Missions 51-A and STS-33. He was replaced by Air Force Col. Frederick D. Gregory on the planned March 1991 Department of Defense flight.

★ **VCR ALERT**—The award-winning Public Broadcasting System documentary series **"Nova" will have several episodes of particular interest** this fall. "To Boldly Go . . ." (October 16) profiles the Voyager missions to the outer planets. "Poisoned Winds of War" (October 23) covers the proliferation of chemical weapons. "The Blimp is Back!" (October 30) details the history and future of airships. "Killing Machines" (November 13) discusses the emerging world of smart weapons. Finally, "Top Gun and Beyond" (December 11) looks at how planes and pilots are adapting to high technology.

★ **APPOINTED—Brig. Gen. (Maj. Gen. selectee) John J. Closner III** has been nominated to become the new **chief of the Air Force Reserve and commander, Hq. Air Force Reserve.** If confirmed by the Senate, his four-year tour will begin November 1. He has previously served as deputy to the AFRES chief and commander of Tenth Air Force. A 1962 graduate of Texas A&M, he is a command pilot with more than 5,000 flight hours, all in fighters.

CMSgt. Gary R. Pfingston, currently the Pacific Air Forces senior enlisted advisor, has been **selected as the tenth Chief Master Sergeant of the Air Force.** He joined the Air Force in

1962 and has spent most of his career in aircraft maintenance. He has also served as a military training instructor (and later first sergeant) at Lackland AFB, Tex., and as senior enlisted advisor at the 831st Air Division and Twelfth Air Force.

Dr. Henry F. Cooper, former US chief negotiator for the Defense and Space Arms Talks with the Soviet Union, has been **selected as the new director of the Strategic Defense Initiative Organization.** He has also served as assistant director of the US Arms Control and Disarmament Agency and Deputy Assistant Secretary of the Air Force for Research, Development, and Logistics. He holds advanced degrees from Clemson and New York universities. He is the third director of SDIO and the first civilian to hold the post.

★ **HONORS—Capt. Brian D. MacLeod,** an A-7D pilot with the Air National Guard's 178th Tactical Fighter Group at Springfield, Ohio, has been selected as **1989's Koren Kolligian, Jr., Trophy winner.** In November 1989, then-Lieutenant MacLeod was preparing to land when his aircraft was struck by lightning. The bolt passed through the canopy and the pilot's helmet, head, and body before exiting though the metal clips of his survival seat kit attachments. Stunned and temporarily blinded, he nevertheless maintained control until his flight leader was able to join up. Lieutenant MacLeod flew on the lead's wing to make his approach and was able to make a single-ship landing. He was then able to turn off the runway and shut the aircraft down, although he needed assistance to get out of the cockpit. The trophy, presented annually since 1958, is awarded to the aircrew member who best copes with an in-flight emergency.

The National Aeronautic Association has named **John T. Griffin, Sr., Everett W. Langworthy, Milton O. Thompson,** and **Spann Watson** as the **Elder Statesmen of Aviation honorees for 1989.** Established in 1954, the Elder Statesmen awards are presented to those who have made a lifetime of significant contributions to the development of aviation in the US.

★ **PURCHASES—Loral** received a $71.5 million Air Force Systems Command Aeronautical Systems Division (ASD) contract on July 23 **to develop and operate the Special Operations Forces aircraft aircrew training system.** The SOF ATS will consist of simulators and related hardware, coursework, and academic materials for crew training. Equally important will be the system's capability for near-real-time full mission rehearsal. The contract calls for the development of an ATS for MC-130E/H Combat Talon I and II crews. It is first expected to be operational at Kirtland AFB, N. M., in 1993. The contract includes multiple development and production options for training AC-130H/U gunship and HC-130 tanker crews, as well as MH-53J Pave Low III and MH-60G Pave Hawk helicopter crews.

Kollsman received a $4 million ASD contract on July 18 for **design, manufacture, installation, and test of the Bomber Airborne Instrumentation System** (BAIS) for Strategic Air Command B-52G/H and B-1B aircraft.

Prior to his June 19 flight in the two-seat AMX light attack aircraft, NATO General Secretary Manfred Wörner (left) goes over the cockpit layout with Aeritalia's chief test pilot, Napoleone Bragagnolo. Secretary Wörner flew the AMX-T for just over one hour at the consortium's Turin, Italy, plant. The AMX is a joint venture between Aeritalia and Aermacchi in Italy and Embraer in Brazil.

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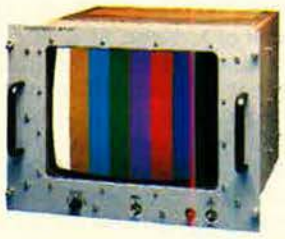

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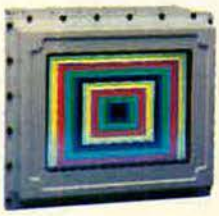

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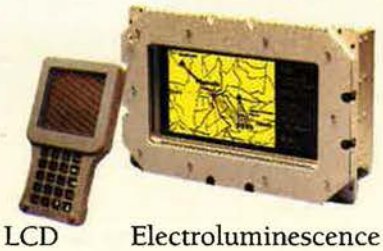

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BAIS will consist mainly of internally mounted equipment that will be a variation of the Aircraft Instrumentation Subsystem of the Air Combat Maneuvering Instrumentation (ACMI) system used on electronically scored ranges, such as at Red Flag. The new system will accept, process, and transmit aircraft inertial and weapons data via the other in-place ACMI subsystems. BAIS will allow bomber crews to conduct training with a variety of air-to-air and air-to-ground weapons. The company will deliver four prototype sets in 1992, and the contract includes options for up to 120 units.

Rockwell received a $59.6 million ASD contract on June 20 **to operate, maintain, and support the government's space surveillance site** in Maui, Hawaii. The site includes the Maui Optical and Tracking Identification Facility (MOTIF) and the Air Force Maui Optical Station (AMOS). In addition to the primary functions, the company will perform research and development experiments at AMOS, which provides measurement support to various government agencies and the scientific community. Rockwell will run the tracking function of MOTIF, the primary sensor of the Air Force space track network. The contract runs for one year with four one-year options.

Litton received a $1.4 million General Dynamics development contract on June 26 **to provide on-board oxygen generating systems** (OBOGS) **for F-16 aircraft.** An OBOGS uses engine bleed air to provide a continuous supply of breathing oxygen for the aircrew. All F-16s currently use a liquid oxygen system, and an OBOGS would break the logistical chain needed to support the liquid oxygen equipment. The contract calls for delivery of five units by mid-1992. Contract options call for the production of up to 2,500 OBOGS units.

Silicon Graphics received a $32.8 million NASA contract on June 21 **to provide scientific visualization capabilities for the Numerical Aerodynamic Simulation** (NAS) **Processing System Network** (NPSN) main facility at the Ames Research Center in Mountain View, Calif. The NSPN is a premier supercomputer center providing computational and visualization tools to wide range of users. The facility is tailored to the processing of computational fluid dynamics and other large-scale scientific simulation and modeling applications. The initial order is for thirty graphics systems.

Ford Aerospace received a $55.2 million Air Force Space Command contract on June 14 for **operation, maintenance, and logistic support of the Air Force Satellite Control Network.** The network, managed by the 2d Satellite Tracking Group at Onizuka AFB, Calif., commands and tracks weather, navigation, communications, and reconnaissance satellites from Onizuka and eight remote tracking stations around the world. The contract runs for one year and includes four one-year options.

The **Navy terminated full-scale engineering development of the P-7A antisubmarine warfare aircraft** on July 20. The Navy said that the contract was terminated because of Lockheed's failure to make adequate progress toward completion of all contract phases within the contract schedule, failure to make progress toward delivery of an aircraft that meets the contract performance requirements, and inability and/or unwillingness to meet other requirements of the contract. Extensive discussions

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were held between the Navy and Lockheed over the last several months to try to resolve the problems, but the effort was not successful. Lockheed was to build two prototype P-7As, which would have replaced the Lockheed P-3 Orion, and up to 123 production aircraft. The Navy said that the P-3C Update II force will be upgraded with the Update IV avionics suite starting in 1993, and this will provide the needed ASW capability until an alternative to the P-7A can be determined.

★ **DELIVERIES**—The **fifty-ninth and final Lockheed F-117A Stealth fighter was delivered** to the Air Force in ceremonies at the company's Palmdale, Calif., facility on July 12. The aircraft was delivered two months ahead of schedule. Lockheed produced eight aircraft per year over seven full years of production and completed delivery of the fleet under budget. Work on the top-secret F-117 began in 1978, and the plane first flew in 1981. Lockheed test pilot Hal Farley (not Bill Park, as reported in the July issue) made the first flight. The fifty-six remaining F-117s are flown by the 37th Tactical Fighter Wing, based at the Tonopah Test Range in Nevada. Three F-117As have been lost in separate accidents, all prior to 1987.

Contel transferred title of the Tracking and Data Relay Satellite System (TDRSS) **to NASA** on July 1. Under the agreement signed in late June, Contel transferred ownership of the communications system forty-two months earlier than called for in the original contract but will continue to run the three-satellite system (two operational and one on-orbit spare) and the ground terminal at White Sands, N. M., until 1995. The TRW-built TDRSS satellites are used to relay telemetry and voice communications from space shuttles (and other spacecraft) to ground controllers, eliminating the need for a number of ground stations. The early title transfer is expected to save the government approximately $16 million.

Loral delivered the first production AN/ALR-56M radar warning receiver to the Air Force in ceremonies at the company's plant in Yonkers, N. Y., on July 20. The ALR-56M is based on the ALR-56C used in the F-15 and provides programmable, continuous protection for the aircraft from pulse, continuous wave, and pulse-Doppler emitters from the air, on the ground, or at sea. It is fully compatible with other on-board avionics, jammers, and radar systems. The first unit will be installed on a General Dynamics F-16 Block 50 aircraft, as will most of the other ALR-56Ms. Other applications for the receiver include the new AC-130U gunships and RF-4C reconnaissance aircraft. The company will deliver eighteen additional ALR-56Ms by next April and is under contract for 101 systems under the first production option.

★ **MILESTONES—When the Boeing EC-135C Airborne Command Post aircraft landed** at Offutt AFB, Neb., at 2:28 p.m. CDT July 24, **it marked the end of twenty-nine years and nearly six months of continuous airborne alert** for the Strategic Air Command aircraft. Dubbed "Looking Glass," the planes and their equipment provided a backup means of controlling manned bombers and launching land-based intercontinental ballistic missiles in case a nuclear attack wiped out the conventional command and control system. The flights normally carry a flight crew of four, a SAC general officer, and a battle staff

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Grumman's Boost Surveillance and Tracking System is a high-performance satellite system for early warning and ballistic missile attack assessment. Its unique mosaic array of IR sensors, which "stares" at rather than scans its field of view, delivers uninterrupted coverage and unmatched reliability. The Grumman BSTS team – including Ford Aerospace, Rockwell International, Litton Itek and Raytheon – has developed a national surveillance asset the Air Force can rely on well into the 21st century.

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The Grumman Team

of eighteen. Gen. John T. Chain, Jr., the commander in chief of SAC, served as mission commander on the last of the continuous flights. The first mission took off on February 3, 1961, and there has been at least one EC-135 airborne ever since. Nine EC-135Cs are used in the "Looking Glass" mission, and the aircraft will continue to be flown on random sorties. The remainder of the time, the aircraft will remain on quick-reaction ground alert status.

The **US began the removal of chemical weapons from West Germany** on July 26. Operation Lindworm, the three-step removal process, began at the town of Clausen, where 100,000 chemical artillery shells were trucked out in vapor-proof steel containers. The containers were placed on twenty trucks that were part of a heavily guarded eighty-vehicle convoy that moved through several small villages and then to a closed Autobahn. The shells were first taken to the rail depot at Miesau, then shipped to the port of Nordenham, where they were loaded aboard two US Navy ships. The rounds will be taken to Johnston Atoll in the South Pacific, where they will be destroyed at new US facilities there. The shells are filled with sarin and VX, both of which paralyze the respiratory system and distort nerve impulses. Unlike newer binary chemical weapons, in which the agents are not mixed until launched or released, the sarin and VX in this shipment of shells were premixed and "live."

A joint USAF-Army exercise started on July 23 in the United States and in Germany and ran for two weeks, but participants stayed at their home stations. Dubbed **Warrior Flag,** this exercise was **the first dual-hub distributed war-gaming exercise in American history.** Personnel from the 4441st Tactical Training Group (Blue Flag) at Hurlburt Field, Fla., and their counterparts at the Warrior Preparation Center in Einsiedlerhof, West Germany, linked up via satellites and computers to conduct the joint task force exercise involving US military support to a fictitious Third World ally. Blue Flag personnel conducted the air war, while Warrior Preparation Center personnel controlled the ground and naval forces. Distributed war-gaming is based on integrated models and simulations and uses the latest intelligence available to mimic current international situations. The war games provide excellent training at low cost, as no travel is involved and there are opposing commanders with unscripted results. Secure voice, facsimile, data, and video transmissions are used throughout the system, which will be expanded to other US facilities.

On June 21, the **McDonnell Douglas F-15 SMTD** (short takeoff, landing, and maneuvering technology demonstrator) **became the first aircraft ever to employ thrust reversing to decelerate from supersonic flight** during a sortie over Edwards AFB, Calif. The maneuver began when Air Force Lt. Col. Greg Lewis and company pilot Larry Walker set the NF-15B's Pratt & Whitney–built, two-dimensional nozzles to the maximum reverse thrust configuration (main exhaust completely closed with the efflux forced out of louvers at the top and bottom of the nozzle) while cruising at Mach 1.4 at 40,000 feet. Less than thirty seconds later, the aircraft stabilized at Mach .8. At the same time, a chase pilot flying a conventional F-15A used speed brakes and idle thrust to slow down and was more than a mile ahead of the STOL Dem-

onstrator when his aircraft stabilized at Mach .8. This was the STOL Demonstrator's thirty-fourth flight with the nozzles installed. It was also recently announced that the program has received additional funding and will continue until the spring of 1991.

The **329th and last example of the Saab Viggen (Thunderbolt) fighter/attack/reconnaissance/interceptor aircraft line was delivered** to the Swedish Air Force in ceremonies at the company's Linköping, Sweden, facility on June 29. Work on the Viggen, which has canards and a delta wing, began in 1961. First flight came on February 8, 1967, when company pilot Erik Dahlström flew the prototype for forty-three minutes. The Viggen became operational in 1972. Production of the prototypes and AJ 37 (fighter/attack), SF anc SH 37 (reconnaissance), and Sk 37 (two-seat trainer) versions totaled 180 aircraft. The final version, the JA 37, is the single-seat interceptor.

Two teams flying **the McDonnell Douglas F-15E finished first and second** in Tactical Air Command's **Long Rifle gunnery competition.** It was the F-15E's first competition against other aircraft. A team from the 4th Tactical Fighter Wing at Seymour Johnson AFB, N. C., won the meet, scoring

2,586 of a possible 3,200 points. A team from the 405th Tactical Training Wing at Luke AFB, Ariz., was second. A 4th TFW crew, Capt. Mark Stevens and Capt. Kevin Thompson, claimed best overall aircrew. The F-15Es competed against F-4s, F-16s, F-111s, and A-10s in the annual meet, which tests the ability of Ninth Air Force and Twelfth Air Force crews to plan missions on short notice and hit multiple ground targets accurately on a single flight after flying long distances.

An **F-111D** (serial number 68-0165) from the 27th Tactical Fighter Wing at Cannon AFB, N. M., recently became the **first of the General Dynamics swingwing deep strike aircraft to pass the 5,000-flight-hour plateau.** The aircraft was crewed by Col. John Osborn, the 524th Tactical Fighter Training Squadron commander, and Capt. Thomas B. Wade on the milestone flight. This particular F-111 was also the first D model to pass 2,000 flight hours (in 1980) and 4,000 flight hours (in 1986).

★ **NEWS NOTES**—Under a reorganization announced on July 13, **Alaskan Air Command ceased to exist** on August 9. The former command now becomes a numbered air force (Eleventh) under Pacific Air Forces. The conversion brings the Air Force command structure in Alaska in line with other Alaskan Command service components. The total number of Air Force personnel in Alaska will not change, but approximately 130 AAC headquarters personnel will be transferred to other base-level units.

On June 28, **Secretary of Defense Richard Cheney approved a Joint Chiefs of Staff recommendation to eliminate seventy-eight general and flag officer positions** over the next four years. The seven percent reduction will eliminate thirty-three general-officer slots (out of 407 generals) from the Army, twenty-seven (of 338) from the Air Force, three (of seventy) from the Marine Corps, and fifteen (of 258) Navy flag officers. Twenty slots are to be eliminated by 1991.

First Lady Barbara Bush christened Navy's newest aircraft carrier, **USS *George Washington,*** (CVN-73) in ceremonies at the Newport News (Va.) Shipbuilding & Drydock Co. on July 21. The 91,000-ton nuclear-powered ship is the sixth *Nimitz*-class carrier, and, like its sister ships *Nimitz, Dwight D. Eisenhower, Carl Vinson, Theodore Roosevelt,* and *Abraham Lincoln,* is 1,092 feet long. It has a 4.5-acre flight deck and will accommodate eighty aircraft. The ship will have

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

LTV Aircraft Products Group **FMA**

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a complement of 6,000 crewmen. Capt. Robert Nutwell is the prospective commanding officer. Newport News Shipbuilding is also working on the seventh and eighth *Nimitz*-class carriers, USS *John C. Stennis* (CVN-74) and USS *United States* (CVN-75).

In early summer, **Rockwell successfully tested its AGM-114 Hellfire antiarmor missile in an air-to-air mode** at the Army's Yuma Proving Ground in Arizona. The missiles were fired by Army crews flying McDonnell Douglas AH-64A Apache helicopters in the lock-on-before-launch mode at various ranges. The missiles scored several direct hits against fixed-wing target drones flying at a speed of approximately sixty knots and an altitude of nearly 600 feet. The launches were conducted against blue sky and clutter backgrounds. The objective of the air-to-air Hellfire program is to evaluate the missile's inherent air-to-air performance and provide data for future systems.

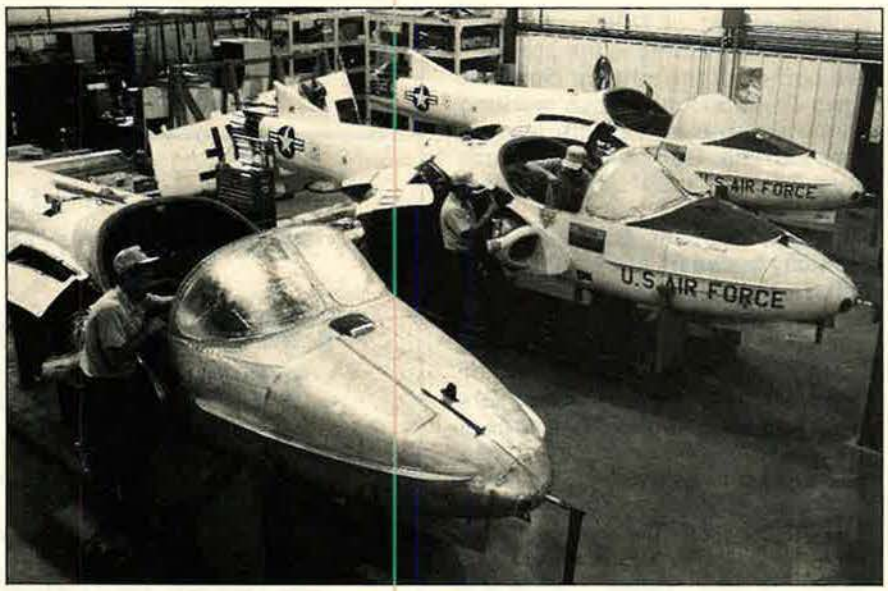
The **National Aviation Hall of Fame** in Dayton, Ohio, launched a $12 million fund-raising campaign on June 29 **to build a permanent museum.** The new building, a 52,000-square-foot glass-and-steel structure, will be built in downtown Dayton and will feature a 100-foot-tall obelisk symbolizing man's reach for the sky. The new museum, designed by the firm of Lorenz & Williams, is scheduled to open in early 1993 and will contain hands-on exhibits and displays and will host scientific demonstrations and theatrical presentations. The structure will be built at a cost of $6.5 million, with $3.5 million earmarked for programs and exhibits. The final $2 million will be designated as a contingency fund. The Hall of Fame was established in 1962 and chartered by Congress in 1964.

A fifty-five-year mystery was solved on June 24, when **the remains of the Navy dirigible USS *Macon* (ZRS-5) were found** in 1,500 feet of water off the California coast near Point Sur. On February 12, 1935, the *Macon*'s tail fin snapped off in a storm. The damaged structure punctured three of the 785-foot-long dirigible's helium cells, and the airship and four of its Curtiss F9C-2 Sparrowhawk parasite fighters settled into the sea. All but two of the crew of eighty-three were later rescued. This accident, however, effectively killed the Navy's giant airship program. The wreckage was found by the crew of the Navy submersible USS *Sea Cliff* (DSB-4), considerably north of where the *Macon*'s remains had been predicted to settle. Two of the Sparrowhawks are believed to be in salvageable condition.

★ UPDATE—The F-15 pilot who inadvertently fired a live AIM-9 Sidewinder missile at another F-15 during maneuvers over Alaska *[see "Aerospace World," June 1990]* **apparently did not realize his airplane was carrying live ordnance.** The two F-15s were flying from Elmendorf AFB to King Salmon Airport (a forward operating location), and the flight was a combined training mission and ferry flight. The airplane of 1st Lt. Michael Lynch (the shooter) was carrying back to King Salmon a live Sidewinder that had been repaired. During air-combat maneuvering, Lieutenant Lynch pressed the pickle button to determine if he had radar lock, and the plane's computer cycled through, realized there was a live round, and launched it. The plane's log clearly showed there would be a live round on the mission, and the live rounds are painted with a yellow band, but this seemingly escaped Lieutenant Lynch's notice. The other F-15 pilot tried evasive maneuvers, but the missile did $992,058 worth of damages. Lieutenant Lynch was grounded pending a review of the accident, and steps have been taken to prevent a recurrence. ■

—NebANG photo by Amn. Spencer Hansen

The Nebraska Air Guard's 173d Tactical Reconnaissance Group spent a recent drill weekend working on survival techniques. Here, Capt. Garry Wells, an RF-4C backseater, gets pulled aboard a Nebraska Army Guard UH-1H helicopter.



Sabreliner is designing and manufacturing service life extension program (SLEP) kits that it will install on these three Cessna T-37B trainers for flight, static, and fatigue testing. The company, based in St. Louis, Mo., will also deliver up to 644 modification kits for the T-37 fleet. The SLEP kits, which will extend the useful life of the aircraft by some 8,000 hours, will be installed by the Air Force.

Senior Staff Changes

RETIREMENTS: B/G Noah E. **Loy;** B/G William T. **Williams** IV.

PROMOTIONS: To be **AFRES Major General:** John J. **Closner** III.

To be **ANG Major General:** Russell C. **Davis;** Richard W. **Godfrey;** Jerald D. **Slack;** Gerald W. **Swartzbaugh.**

To be **ANG Brigadier General:** John O. **Ahnert,** Jr.; Charles M. **Butler;** Robert D. **Cardwell,** Jr; Paul G. **Cohen;** Ronald E. **Farrell;** Hugh P. **Goettel;** Wallace M. **Green,** Jr.; Don V. **Hubbard;** Jan P. **Johnson.**

Neil D. **Kennedy;** Lawrence A. **Maciariello;** Lester L. **McIntyre;** John A. **Molini;** Herbert J. **Spier,** Jr.; Errol G. **Stump;** John M. **Wallace;** David E. B. **Ward;** Jerry W. **Whitman;** Philip A. **Williams.**

CHANGES: B/G Harold B. Adams, from Dep. Dir., Force Structure and Resources, J-8, JCS, Washington, D. C., to Vice Dir., NORAD Cmbt. Ops. Staff, J-31, Hq. NORAD, Cheyenne Mountain AFB, Colo., replacing B/G Charles E. Fox, Jr. . . . **M/G Edward R. Bracken,** from Dir., Log. Prgms., DCS/L&E, Hq. USAF, Washington, D. C., to C/S, Hq. AFLC, Wright-Patterson AFB, Ohio, replacing M/G Dale W. Thompson, Jr. . . . **B/G (M/G selectee) John J. Closner III,** from Dep. Chief, Hq. AFRES, Washington, D. C., to Chief, Hq. AFRES, Washington, D. C., replacing retiring M/G Roger P. Scheer.

B/G Charles E. Fox, Jr., from Vice Dir., NORAD Cmbt. Ops. Staff, J-31, Hq. NORAD, Cheyenne Mountain AFB, Colo., to Dep. Cmdr., Canadian NORAD Region, NORAD; and Cmdr., 4722d Support Squadron, TAC, CFB North Bay, Ontario, Canada, replacing retired B/G William T. Williams IV . . . **B/G Buster C. Glosson,** from Dep. Ass't Sec'y Defense, Legislative Affairs, OSD, Washington, D. C., to Dep. Cmdr., Joint Task Force Middle East, USCENTCOM, Navy Mobile Units, replacing B/G Harold H. Rhoden . . . **Col. (B/G selectee) Marcelite J. Harris,** from Cmdr., 3300th Technical Training Wing, ATC, Keesler AFB, Miss., to Vice Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., replacing retiring B/G John P. Allen, Jr.

M/G James W. Hopp, from Cmdr., Ogden ALC, AFLC, Hill AFB, Utah, to Dir., Log. Prgms., DCS/L&E, Hq. USAF, Washington, D. C., replacing M/G Edward R. Bracken . . . **B/G Garry A. Schnelzer,** from Prgm. Exec. Officer (PEO), Space Programs, AFPEO/SP, Los Angeles AFB, Calif., to Prgm. Exec. Officer (PEO), Space Programs, AFPEO/SP, Hq. USAF, Washington, D. C. . . . **M/G Dale W. Thompson, Jr.,** from C/S, Hq. AFLC, Wright-Patterson AFB, Ohio, to Cmdr., Ogden ALC, AFLC, Hill AFB, Utah, replacing M/G James W. Hopp.

SENIOR ENLISTED ADVISOR (SEA) RETIREMENT: CMSAF James C. **Binnicker.**

SEA CHANGES: CMSgt. Richard A. Moon, to SEA, Air National Guard, Andrews AFB, Md., replacing CMSgt. Richard M. Green. . . **CMSgt. Gary R. Pfingston,** from SEA, PACAF, Hickam AFB, Hawaii, to CMSAF, Hq. USAF, Washington, D. C., replacing retired CMSAF James C. Binnicker. . . **CMSgt. Thomas H. Sanford,** to SEA, AFDW, Bolling AFB, D. C., replacing retired CMSgt. Francis A. Rago, Jr.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENTS: Carlo P. **Crocetti;** William E. **Daley.**

SES CHANGES: Dora G. Alcala, from Dep. Commandant, Air Force Professional Manpower and Personnel Management School, Gunter AFB, Ala., to Dep. for Equal Opportunity, SAF/MIE, Hq. USAF, Washington, D. C., replacing Estella G. Guerra . . . **William A. Davidson,** from Dep. for Security and Administrative Prgms., Washington, D. C., to Dep. Adm. Ass't, SAF/AA, Hq. USAF, Washington, D. C., replacing Steve Thompson . . . **William G. Norton,** from Dir., Office of Executive Administration, OPM, Washington, D. C., to Dep. Ass't Sec'y, Manpower and Personnel, SAF/MIM, Hq. USAF, Washington, D. C., replacing Virginia L. Brassfield . . . **Gary S. Thurber** resigned as Ass't for Contract Administration Services, Air Force Contract Management Div., Kirtland AFB, N. M. ■

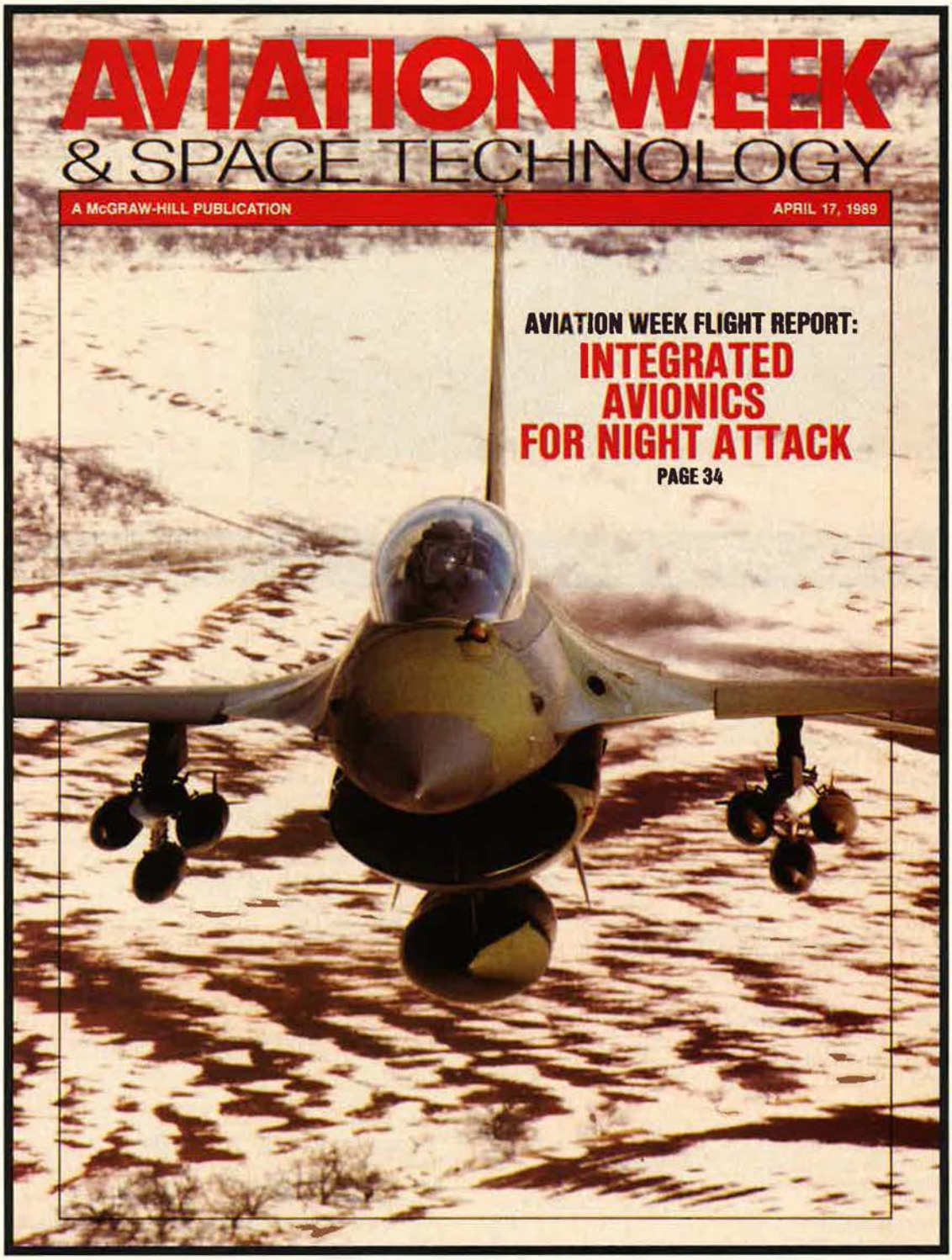
A quick comparison of head-steered FLIRs built by major FLIR vendors for fighter aircraft

A Quick Comparison

	Martin Marietta	Texas Instruments	Westinghouse
Demonstrated/ Flight Tested Hardware:	none	 Falcon Eye FLIR	none
Demonstrated Benefits:	none	1. Improved situation awareness 2. Enhanced lethality	none
Flight Tests Completed:	none	73 flights 100+ flight hours	none
Number of Pilots:	none	17 pilots	none
Host Aircraft:	none	F-16 B2 test bed, AFT/F-16 (under contract)	none
Demonstrated Operating Conditions:	none	Mach 0.9 @ 300 feet 150 -36,000 feet altitude, 7Gs	none
Demonstrated Mission Area Compatibility:			
■ CAS	none	✓	none
■ BAI	none	✓	none
■ Recce	none	✓	none
Preplanned Growth Options:	none	1. "Pilot friendly" Maverick interface 2. Laser hardening 3. Advanced window technology (partial list)	none

We put the eye on the Falcon!

Texas Instruments — Inventor of the FLIR



To read more about our CAS flight test results, please see the pilot report in the April 17, 1989, issue of *Aviation Week and Space Technology* magazine.

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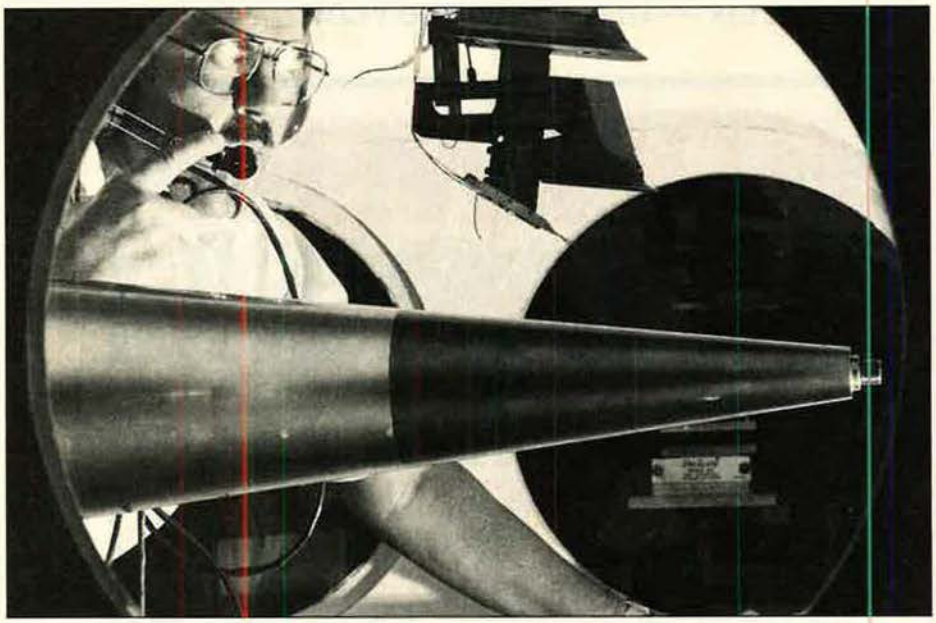
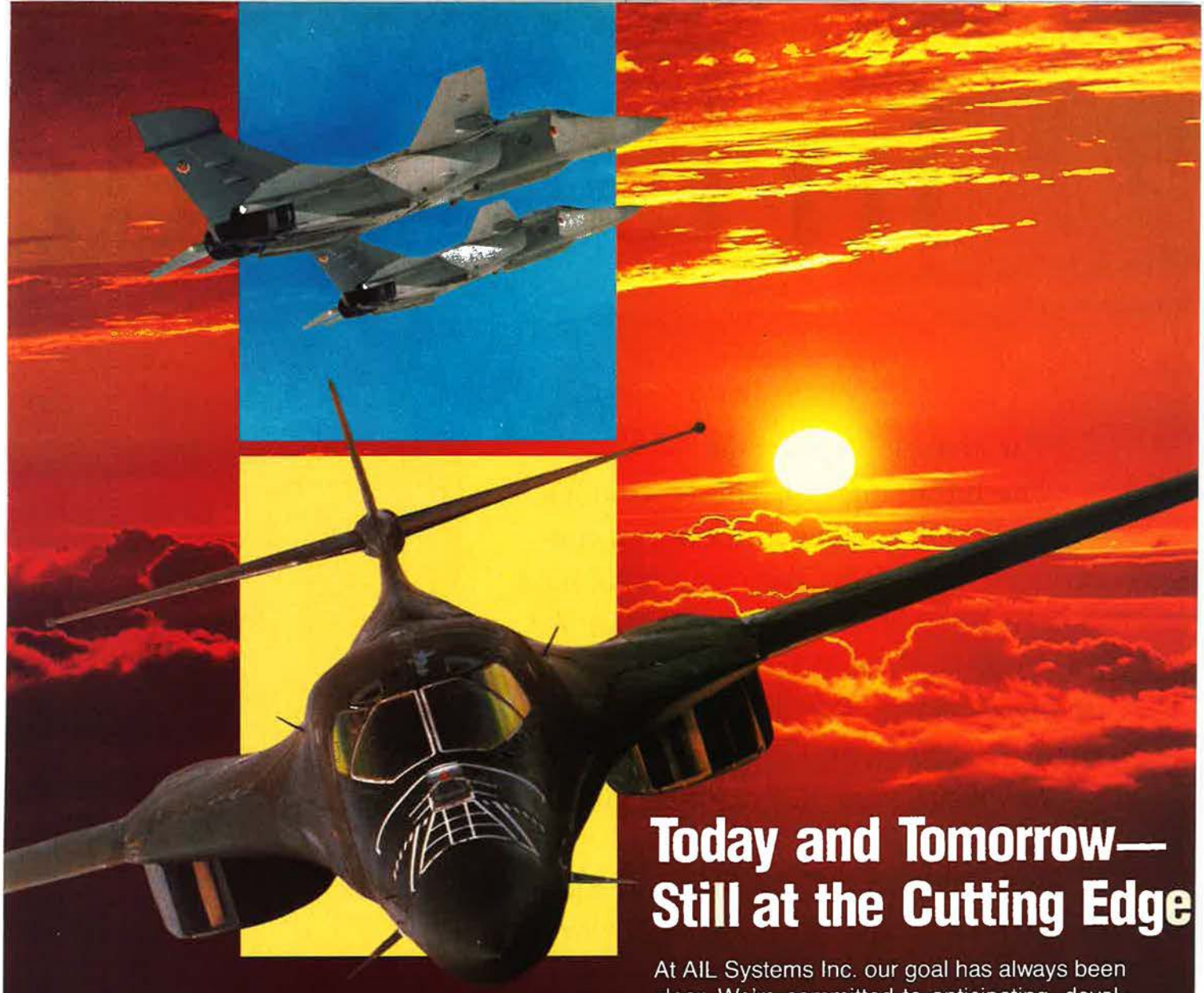


To aid in the design of hypersonic flight vehicles, Arnold Engineering Development Center, Arnold AFB, Tenn., gathers boundary layer stability data from hypersonic wind tunnel tests with conical and hollow cylinder models. At left, Don McCrary, an operations coordinator with Calspan Corp., which performs flight dynamics testing at Arnold, examines a model in the wind tunnel.

Index to Advertisers



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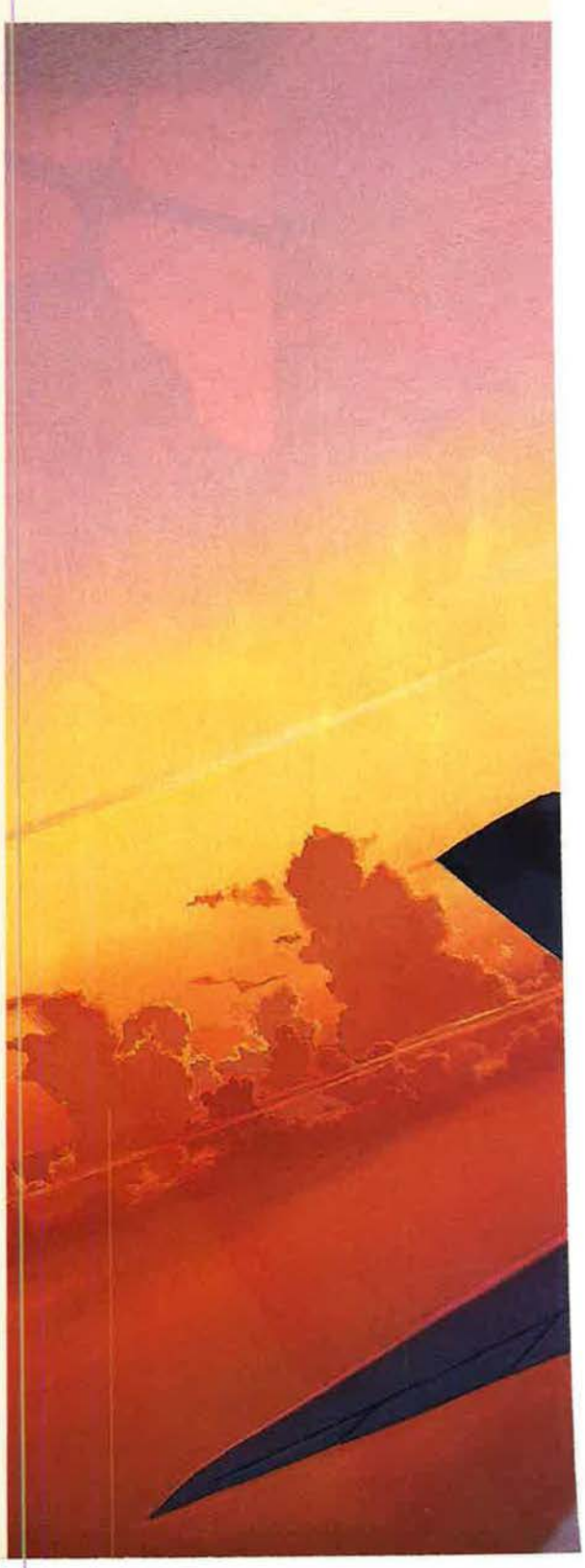

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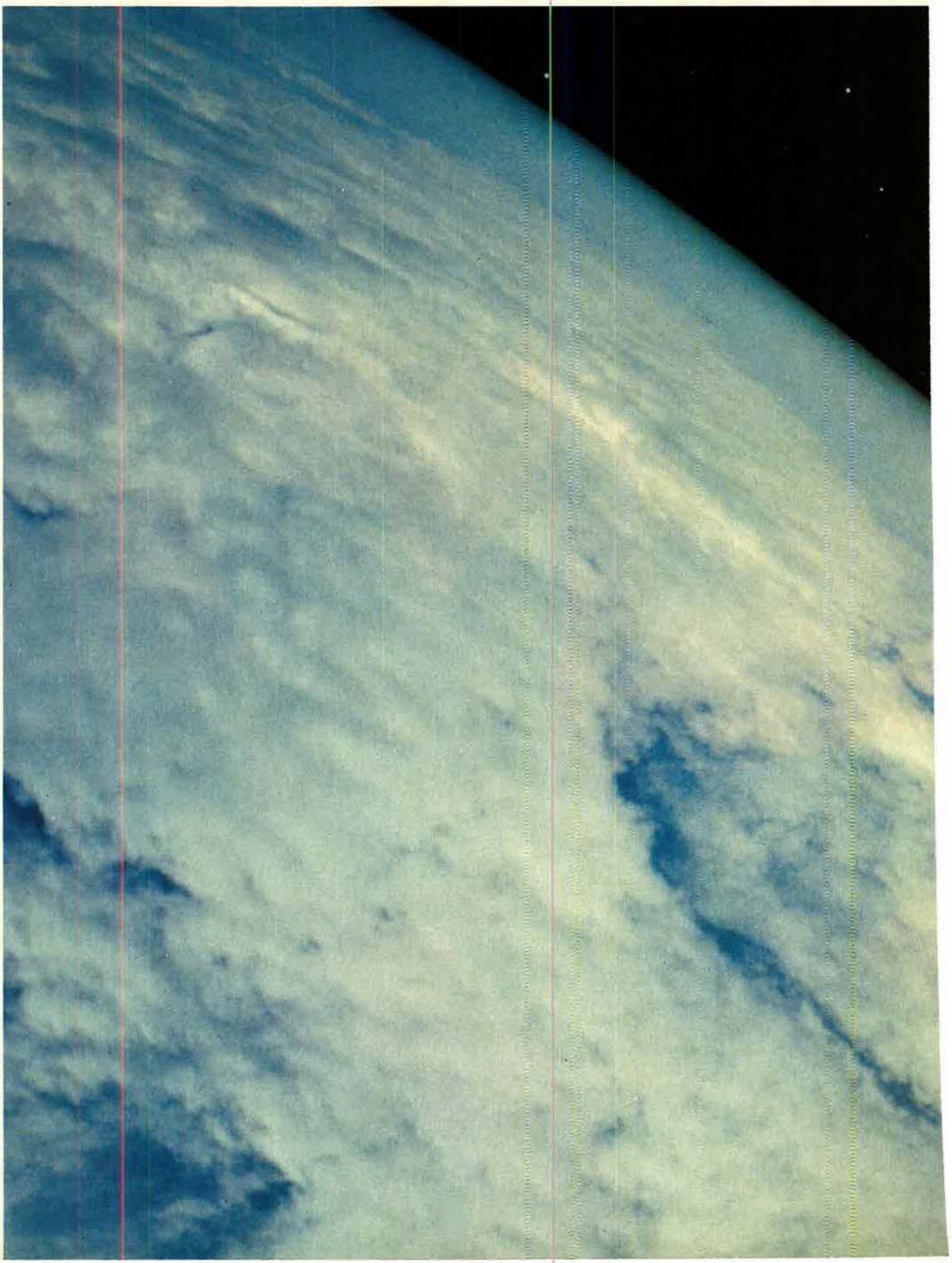

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These achievements haven't gone unrecognized. NASA gave us its first Excellence Award for Quality and Productivity, acknowledging our "outstanding contribution to the nation's aerospace program."

That contribution continues. We're now developing the Data Management System for the Space Station Freedom. And we're extensively upgrading the Air Force's ability to manage the growing number of satellites.

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FEDERAL SECTOR DIVISION

For three years and nine months, the war dominated every aspect of our lives.

The Way It Was

By Bruce D. Callander

Photographs by Paul Kennedy

"WHAT was life like in World War II?" he asked.

How do you explain it to a youngster raised during the divisive Vietnam years? I dragged out my mental snapshots of gas rationing, blackout curtains, and troop trains rattling through the night. I told him about V for Victory, Tokyo Rose, and V-mail letters.

It was no more real to him, I realized, than the Battle of Waterloo.

I realized then how remarkable it was to have the will of the whole nation so concentrated on a single idea. I wonder if we ever will be united in quite that way again.

In the beginning, of course, we were not of a single mind. When Britain and France declared war on Germany in September of 1939, only a few Americans thought we should join them. Most of us wanted no part of another European quarrel. Too many veterans of the last one still limped on artificial legs or wheezed through gas-burned lungs. The United States declared neutrality, and we approved.

We had our own problems. The Great Depression clung like a bad hangover. Jobs were scarce, and worn-out farms blew away in clouds of dust. The New York World's Fair gave us a look into "The World of Tomorrow," but John Steinbeck's *The Grapes of Wrath* depicted reality for millions of Americans.

When Kate Smith dusted off an Irving Berlin tune from before the Great War, it became a hit. It was the introduction to "God Bless America," rarely sung these days, and it summed up our feelings. "As the storm clouds gather far across the sea," it said, "let us all be thankful for a land that's free."

By the summer of 1940, however, the clouds had given way to a full-blown storm in Europe. Hitler had rolled through the Low Countries and taken France. Edward R. Murrow, with his vivid radio descriptions, brought the London blitz to our homes. The newsreels showed us the results. The Royal Air Force, facing the Luftwaffe in the Battle of Britain, was down to a handful of operational aircraft.

America Gears Up

We collected clothing to send "Bundles for Britain." Our government sent surplus arms and aircraft

Ration coupons, V-mail, a vintage radio, the fringed window banner, a war bond poster—and a framed photo of author Bruce Callander as he was then—recall the pervasive mood of life in wartime.


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to the Allies and belatedly began working to build up American defenses. President Roosevelt, already pressing for a two-ocean Navy, also called for production of 50,000 planes a year, including a fleet of new bombers. It seemed like wishful thinking. So far, the Army Air Corps had received only thirty-nine operational B-17s, and the B-24, designed only the year before, still was being service-tested.

In the fall of 1940, Congress authorized the activation of the National Guard and approved the nation's first peacetime draft. In that year's presidential campaign, both Roosevelt and Republican presidential nominee Wendell Willkie supported a stronger national defense and increased aid to Britain, but both still opposed direct participation in a foreign war.

By now, the war in Europe wasn't the only threat to the security of the United States. Japan had invaded China, gained bases in Indochina, and signed a ten-year military and economic alliance with Germany and Italy. These "Axis Powers" were pledged to come to each other's aid in the event of war with any nation not then a belligerent.

By mid-1941, the fiction of US neutrality had faded. Congress approved the Lend-Lease program, which would enable the nation to supply military goods to Britain and, later, to the Soviet Union. The President ordered a state of unlimited national emergency. Restless American youngsters set off for Canada, not to escape the draft, but to join the Allied forces.

Still, we hoped somehow to stay out of it. *Life,* the ten-cent weekly with all the pictures, carried bright ads assuring us the good life was affordable. The new Pontiac promised luxury for $828. General Electric offered an electric iron with a fabric dial ($9.95, ironing board included). Bendix advertised a washing machine so automatic that the housewife could go to the movies while the clothes washed themselves.

Behind the façade of business as usual, however, US forces were gearing up for war. Air Corps strength grew from 23,000 in 1939, to 51,000 in 1940, to 152,000 in 1941. The pilot-training rate jumped from 500 per year to 33,000 per year, with civilian flight schools providing the first phase of instruction.

The first American bombardiers were coming out of school at Lowry Field, Colo. A new Technical Training Command was producing mechanics and technicians. In the summer of 1941, the US Army Air Forces was formed. By fall, small groups of B-17s had reached Hawaii, and nine bombers had gone on as far as the Philippines.

It was no longer a question of whether we would be in the war, but of when. On December 7, we had the answer.

After the Japanese assault on Pearl Harbor, what little antiwar sentiment remained dissipated in a frenzy of patriotism. Recruiting offices were jammed. Able-bodied men of eighteen to thirty-eight were drafted, and those aged forty-five to sixty-four were registered. Deferments were allowed only for men in essential war jobs, agriculture, and the clergy. Men found unfit for service were classified 4-F. Many of these individuals wore the designation like a brand of shame.

Women were mobilized as well. The "Air WACS" alone saw some 40,000 enlistees. Smaller numbers flew with the Women's Airforce Service Pilots. For other American women, Rosie the Riveter and the Red Cross Girl became role models.

The comfort facilities in this photo, found in AIR FORCE Magazine files unaccompanied by explanatory details, show a less restrained expression of anti-Axis sentiments.

The Arsenal of Democracy

Plants that had been making consumer goods switched almost overnight to war production. Factories idle for a decade came to life. Some twenty-five million workers were "frozen" in their war jobs, and the nation went to a forty-eight-hour work week. There would be no new automobiles, refrigerators, or washing machines for the duration.

The ad for a famous candy company assured readers, "If you can't always get your favorite Sampler, it's because millions of pounds of Whitman's Chocolates are going to our fighting forces." One cigarette company, claiming ink once used in its packages was needed for Army camouflage, came out with a plain wrapper and announced, "Lucky Strike green has gone to war."

Mechanics performed minor miracles to keep aging cars in workable condition. Gasoline was rationed; an "A" card allowed four gallons per week. New tires were scarce, and the still-experimental retreads often

The war figured centrally in products for young people, too. Uncle Sam himself was a hero in wartime comic books, copies of which have since become treasured and costly collectibles.

peeled like oranges after a few miles. Sugar, coffee, meat, oils, butter, cheese, and processed foods required ration points. So did shoes.

The few nondefense products still being made contained metal substitutes. In those days before plastics, "victory clocks" had cardboard cases. Price ceilings were set on everything but farm produce. Rents were controlled in areas with defense plants and military bases. Wages were regulated, and strikes were limited by law. When railroad workers threatened to walk out, the President sent the Army to take over the lines. Road construction was halted on all but war-essential highways.

In Washington, the bureaucracy swelled with new agencies: The War Production Board, the War Manpower Commission, the Board of Economic Warfare, the Office of Price Administration, and so on. Temporary buildings sprang up along the Mall from the Capitol to the Washington Monument. Across the Potomac River from Washington, a five-sided office complex rose from a Virginia swamp to provide headquarters for the military.

On the Home Front

The rest of the country became, simply, "The Home Front." Americans dug up their flower beds and planted vegetables in "victory gardens." Youngsters collected old newspapers and scrap metal for recycling into war goods. People gave blood, bought war bonds, and knitted sweaters for the troops. Magazine articles advised families how to treat the men returning from combat, but the signals were confused. Some said, "Encourage them to talk about their experiences." Others said, "Don't remind them of the war."

Early on, cities such as New York and Washington were blacked out at night. Small towns followed suit, their street lights dimmed at night, their citizens hanging black curtains in the windows. They were not targets themselves, they were told, but their lights might guide enemy planes to the nearby cities or bases.

Air-raid wardens patrolled the streets. Civil defense volunteers stocked makeshift air-raid shelters and took note of bread trucks that could be commandeered as ambulances. Boy Scouts taught first-aid classes. Businessmen flew Piper Cubs with the Civil Air Patrol. Small boys studied airplane silhouettes until they could identify a Stuka or a P-51 at a glance.

When enemy bombers failed to materialize, border towns watched for saboteurs. Those on the coasts kept an eye out for landing parties sent from enemy subs and actually captured a few.

Defense workers were warned to watch for "Fifth Column" agents sent to disrupt production. Within months of Pearl Harbor, 110,000 Japanese-Americans were moved from west coast states to relocation camps, where most remained until 1945. The FBI rounded up small groups of Nazi sympathizers in New York.

Much of the concern proved unfounded, and some of the security measures now seem grotesque. But the war was taken with deadly seriousness. It touched every community, every household. Local ration boards weighed requests with the solemnity of the Supreme Court and for their decisions suffered much the same kind of abuse felt by the nine high justices. Draft boards felt

Carefully preserved mementos include a GI's pay record, drink card, and pass to a dance at High Wycombe (above). Below, troops shoot their way to the Japanese stronghold at an amusement gallery.

an awful responsibility when casualty lists were posted.

Two phrases probably summed up the war on the Home Front as well as any. "Don't you know there's a war on?" became the excuse for empty store shelves, poor service, late trains, shoddy goods, and early marriages. When civilians grew weary of shortages and rationing, their consolation was that it was all "for the boys."

The "boys," particularly those stationed overseas, sometimes wondered what had become of all the things civilians had given up for them. GI food was nourishing but hardly the stuff of a gourmet's dreams. Spam was a staple. Milk and eggs came in powdered form with instructions to add water. "SOS," the international distress code, took on new meaning when the letters were used to describe creamed chipped beef on toast. A special strain of butter was developed for use in tropical climates. It retained the consistency of grease, even under intense heat.

K-rations were standard fare for troops in the field and for combat crews on missions. Early versions comprised inedible potted meats, rock-hard biscuits, and tablets that could be eaten as candy or made into a delicious drink if one could find a way to dissolve them. The K-ration also included two cigarettes with brand names such as Fleetwoods and Wings and two sheets of toilet paper. By war's end, the rations had improved somewhat.

Waiting for Zippos

Military bases sprang up all over the country, but none of them ever seemed to get finished. New barracks were forever under construction and were overcrowded as soon as they opened. PXs were always waiting for the next shipment of Zippo lighters. Parade grounds never were idle long enough for the grass to grow. New arrivals were packed into tent cities.

Service life was an endless succession of moves, from recruit training to a series of flight schools to crew training to overseas theaters, with stops at a variety of replacement depots in between. Much of the travel was by troop trains, sometimes with two men in the lower berth and one in the upper, but more often in aged day coaches.

For married couples, "housing" usually meant a shabby hotel, a run-down tourist cabin, or an undersized room in somebody's home. One pair was about to accept a converted chicken coop when the landlady discovered they had a dog and turned them away.

Service pay was ridiculously low by today's standards, but, for many, it was better than the poverty of the prewar period. The first draftees made $21 a month. Later this was raised to $50.

Even with all the disruptions and hardships, it was still the most exciting time most of us had ever known. Prewar servicemen had been treat-


FRENCH
OFFICIAL SERVICE JOURNAL
APRIL 1943
EUT. GENERAL EAKER
GHTH AIR FORCE

ed like bums, but Pearl Harbor changed everything. The uniform—required wear on duty and off—was a free ticket to a Broadway show or a home-cooked Sunday dinner. A combat ribbon was good for a drink on the house at many a bar. Almost every town set up some kind of canteen with doughnuts and dancing for visiting servicemen.

The war invaded our language with a mixture of service jargon, government acronyms, and civilian slang: SNAFU . . . dit, da, dit . . . feather merchant . . . ninety-day wonder . . . Sweat it out . . . hot pilot . . . Head up and locked . . . Never volunteer . . . eager beaver . . . You'll be so-rrr-ry! . . . Hurry up and wait . . . GI . . . chowhound . . . Hut, Toop, Threep, Forp . . . flak . . . Gooney Bird . . . short snorter . . . dogface . . . Jeep . . . able, baker, charlie . . . Dear John.

The times gave us a crash course in geography as well. Americans who had only a vague notion of the location of Pearl Harbor before it was hit could soon pinpoint such places as Bataan and Anzio. Bomber crews circled unpronounceable names on their charts and, a few hours later, were over Schweinfurt, Wilhelmshaven, or Ploesti. Dots in the Pacific became familiar landmarks: Wake, Midway, Tarawa, Guam.

Pounds, Pesos, Lire, Francs

GIs learned to haggle in the markets of Tunisia and the Philippines and to make change in pounds, pesos, lire, and francs. Youngsters who, a few years earlier, had read the funnies in American living rooms, now pored over *Yank* magazine in Quonset huts from England to New Guinea. The world news was flown overseas in stripped-down versions of *Time*, minus the ads and printed on flimsy paper to save weight. Overseas, we were allowed to "frank" our letters (*i.e.*, mail them without postage).

The Olympics were canceled for the duration. The Rose Bowl and World Series were played, but, with many of the best athletes in military uniform, they were not the best of games. The Miss America contests continued with no noticeable lack of talent.

Songwriters set the war to music, much of it mercifully short-lived. It described military life ("This is the Army, Mr. Jones. No private rooms or telephones") and dealt with the problem of lengthy separations ("Don't sit under the apple tree with anyone else but me"). Sentimental ballads captured the longings of the troops ("I'll be home for Christmas, if only in my dreams") and their hopes for better times ("When the lights come on again all over the world").

Show business followed the forces. Bob Hope and Bing Crosby, who had romped through a succession of exotic countries in films, took off on the road to the war zones. Martha Raye, Joe E. Brown, and the Andrews Sisters logged as much flight time as some combat crews. Where the stars didn't go, there were troupes of eager, if not always talented, youngsters ready to entertain.

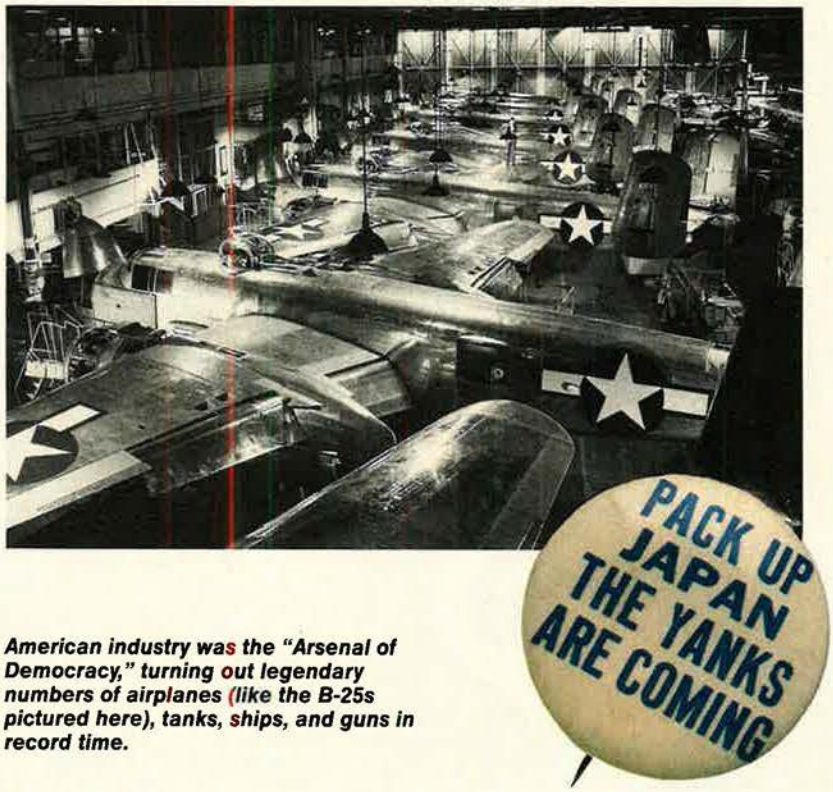
Back home, Hollywood carried on, never quite sure whether the country wanted to see the war on the screen or get away from it for an hour or two. The war films were pretty bad. Extras were scarce, and major battles had to be simulated with models and stock newsreel footage. The results were naval duels that looked as though they were fought in somebody's swimming pool and air strikes in which the hero took off in one type of plane and landed in another. Audiences in GI theaters treated many of these efforts as high comedy.

Escape films, including the nonsensical musicals, were received more warmly. There were enough pretty starlets left to decorate them, and the Hays Office, though still the guardian of movie morals, seemed to be less strict about censoring their skimpy costumes. Nobody seemed to care that the male chorus line was made up of teenaged boys and creaking senior citizens.

Excruciating Detail

The Hollywood film industry also provided movies specifically for the armed services. The "Why We Fight" series dispensed unblushing propaganda. Training films, many of them narrated by familiar stars, augmented classroom lectures. Actors dressed as doctors warned, in excruciating detail, about the perils of VD.

Television had yet to invade American life. Still, the war was "covered" as no previous event had



American industry was the "Arsenal of Democracy," turning out legendary numbers of airplanes (like the B-25s pictured here), tanks, ships, and guns in record time.

been. Radio provided the sound, and *Life* dramatized the action with stark photos. The newsreels and the "March of Time" showed the big picture, and correspondents such as Ernie Pyle filed reports on troops in the field. Many of these reporters, including Pyle, were among the casualties.

Everybody who was anybody was "in it." Jimmy Stewart flew B-24s. Clark Gable was a gunner, and a budding guitar-picker named Ernie Ford was a bombardier. Band leader Maj. Glenn Miller formed the forerunner of today's Air Force Band.

American ingenuity: Somewhere in the China-Burma-India theater, the troops modified and reroofed the remains of an aircraft to serve as the Base Operations shack.

Posters urged Americans to buy bonds, save scrap, apply for work in armament factories, plant victory gardens, and keep their lips buttoned about defense matters.

Even the comic-strip characters got in it. "Smilin' Jack" and the gang from "Gasoline Alley" joined up. When the USAAF began giving some flight school graduates a new warrant officer grade instead of commissions, artist Milton Caniff helped to sell the program by sending the hero of "Terry and the Pirates" through pilot training and making him a flight officer. The less glamorous side of service life was recorded in "The Sad Sack" and Sgt. Bill Mauldin's "Up Front" with the irreverent Willie and Joe.

Pinup pictures decorated a thousand line shops and a million footlockers. In those days before *Playboy* Magazine, the photos demanded more of the viewer's imagination. Lana Turner in a sweater, Betty Grable in a bathing suit, and Rita Hayworth in a lace nightgown were enough. Mae West lent her name to the inflatable life jacket. Varga and Petty girls, copied from the airbrushed art in *Esquire*, graced the noses of countless bombers with names such as *Battlin' Betty, Paper Doll,* and *Miss Behavin'*.

Veronica Lake, famous for the long blond hair that always obscured one eye, sacrificed her glamor to the war effort and tucked her tresses into a net as an example to women working around machinery. Bosomy Carole Landis did her bit for the troops in all war zones one Christmas by answering a serviceman's request that she sigh, just sigh, into the shortwave microphone.

Preserving Morale

It was, in other ways, a more innocent time. The press covered the war but rarely critiqued its conduct and never failed to support the men fighting it. Classified information seldom was leaked, and, when it was, reporters often did not use it. It wasn't censorship alone that guided the media. They exercised a self-restraint rarely seen now. The day Pearl Harbor was struck, for example, broadcaster Murrow was a supper guest at the White House. Late that night, President Roosevelt told him in painful detail about the losses—nineteen warships, 120 planes, 2,403 lives. The President put no restraints on the information, but Murrow, realizing the damage it would do to American morale, sat on the story.

After the war, there would be time for revelations about Eisenhower's love life and infighting among the Allied leaders. For now, such men were the undoubted heroes, as familiar to Americans as movie stars were. Eisenhower was Ike, Arnold was Hap, and Doolittle was Jimmy. We knew "Blood and Guts" Patton, "Vinegar Joe" Stillwell, and "Bull" Halsey.

Less than six months after Pearl Harbor, Doolittle's Raiders lifted their B-25s from the pitching deck of an aircraft carrier and bombed Tokyo. The following year, B-24s from North Africa made a low-level strike on the oil fields at Ploesti, Romania. Both raids were costly,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and neither did lasting damage, but they gave a needed boost to American spirits and showed the enemy that their most vital targets were within our reach.

Victory did not come easily. Planes could leapfrog the battlefield to cripple enemy production, cut transportation lines, knock out airfields, and furnish cover for the Allied advance, but on the ground progress was measured in miles and sometimes in feet. Gradually, Allied forces moved from North Africa to Sicily and into Italy, from northern and then southern France across the Low Countries and into Germany itself. In the Pacific, the war moved west, island by island, to put B-29 bombers within striking range of Tokyo.

In May 1945, Germany surrendered. Three months later—August 6—the *Enola Gay* struck Hiroshima with a new kind of bomb. On August 9, an even more powerful atomic blast leveled Nagasaki. On September 2, 1945—six years almost to the day since the war began—Gen. Douglas MacArthur accepted Japan's surrender on the USS *Missouri* in Tokyo Bay, concluding with the words, "These proceedings are closed."

At last it was over, not only for the armed forces (above, Eighth Air Force troops in England assembled for V-E Day ceremonies), but also for the nation and even for Lucky Strike green (opposite page), which had gone to war, too.

Three years and nine months after Pearl Harbor, it was over. Auto plants shut down their airplane lines and began to make cars again. The electronic "marvels" and the "miracle drugs" of the war were adapted for civilian use. The building techniques that had produced barracks by the thousands were applied to creating crackerbox homes by the millions.

The War in Small Pieces

While the war was on, most of us had seen only small pieces of it—bases laid out in wheat fields and rice paddies, small bomb groups, rows of tents. For us, the enemy had been an Me-109 coming in at twelve o'clock or a marshaling yard five miles below. Casualties were the crew in the bomber hit just off our wing, spinning down with no chutes showing. The global war was the aggregate of millions of such personal experiences.

Now the figures were added up, and they were staggering. More than sixteen million American men and women had been in uniform, roughly one out of eight Americans alive at the time. At its peak, the Army Air Forces alone had almost 2.8 million members, far more than the active-duty strength of all of today's services combined. Battle had claimed 292,131 American lives, and 115,185 other service members had died of other causes. A list of all 407,316 war dead would require a wall almost seven times as long as the Vietnam Memorial. Another 670,846 service members, one out of every twenty-four who served, received "wounds not mortal."

Roughly ten million veterans are still around to remember the bombers sweeping in a great armada over Europe, the landing craft spread miles wide at Normandy, and the agony of taking one more small Pacific island. It was like nothing the world had ever seen before, and God forbid we should ever see its like again. ■

Bruce D. Callander is a regular contributor to Air Force *Magazine. A veteran of World War II and the Korean War, he joined* Air Force Times *in 1952, becoming Editor in 1972. His most recent article for* Air Force, *written with J. H. MacWilliam, was "The Third Lieutenants," which appeared in the March 1990 issue.*

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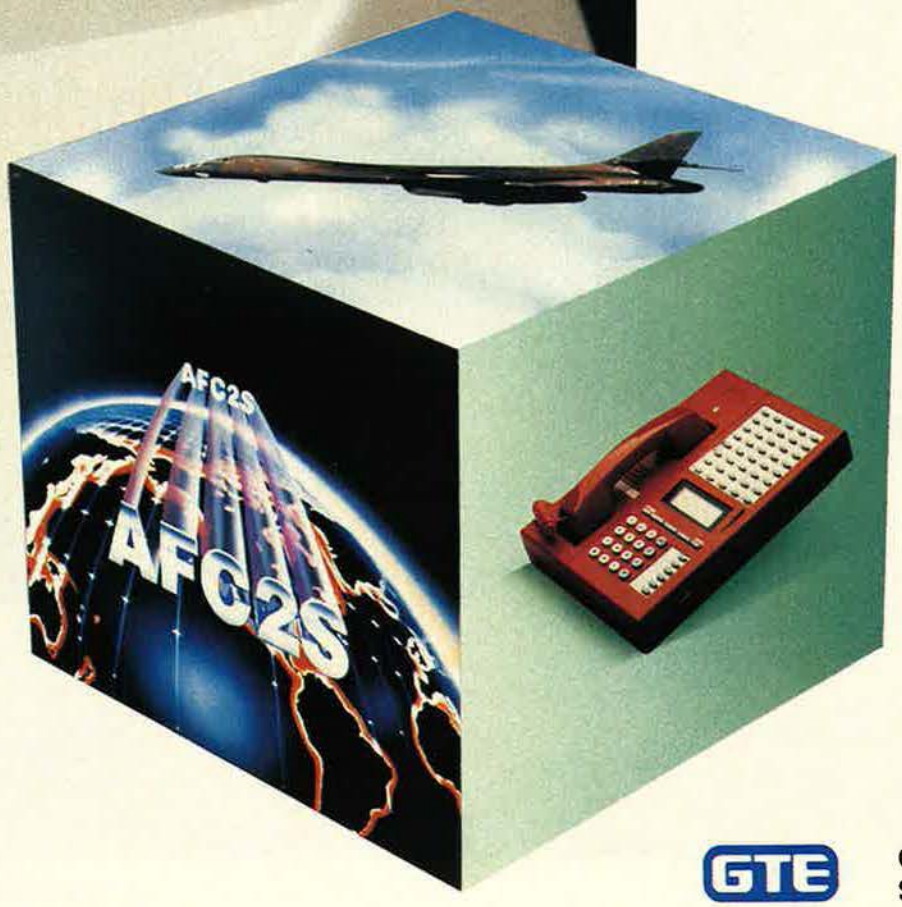

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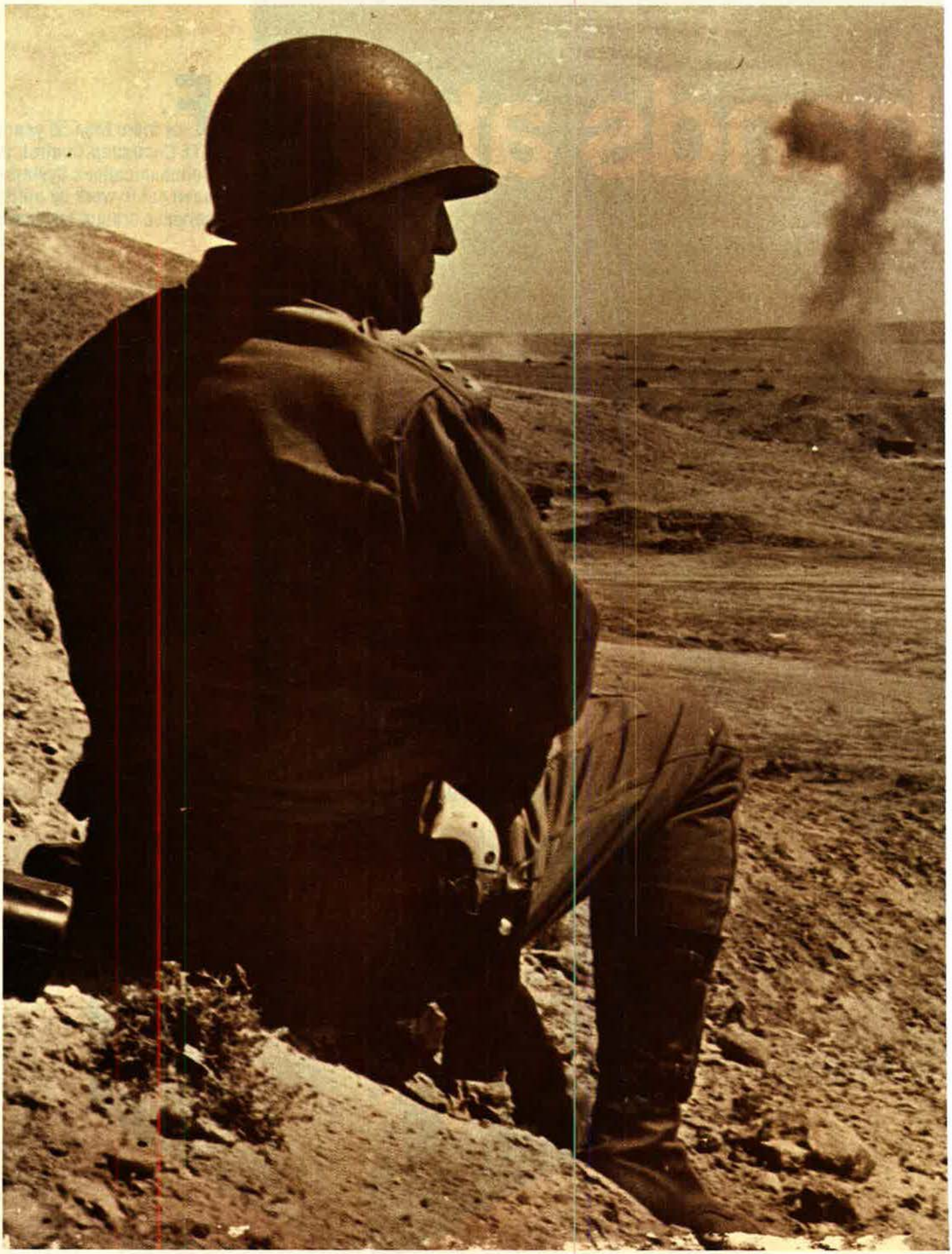

—UPI/Bettmann Newsphotos

Patton in Tunisia

In 1943, tactical airpower finally broke loose from local ground control. Even Patton agreed—eventually.

The Lessons of North Africa

By John L. Frisbee

In popular accounts of World War II, and even of Air Force history, Operation Torch usually gets low billing. This combined US-British invasion of German-held North Africa was a difficult but brief campaign, extending from November 8, 1942, to May 12, 1943. Torch was not a minor operation; it involved more than twenty Allied and Axis divisions supported by strategic and tactical air forces, and it was of great strategic significance to the European war.

Perhaps equally important in the longer term, the early misuse of airpower in Torch led to reforms that set a pattern for joint air-ground operations throughout the remainder of the war and in the years to follow. Today, tactical airpower faces a murky future. There are even mutterings about giving USAF's close support mission to the Army. Though disputes about the proper use of airpower in joint operations have been largely resolved, it is well to remember the high cost of misusing it on the battlefield.

Torch began with the landing of British and US forces from the United Kingdom at Oran and Algiers on the Mediterranean coast of Africa and of an all-US force under Maj. Gen. George Patton, Jr. The latter was deployed directly from the US to the Atlantic Coast of French Morocco. The entire operation was commanded by Lt. Gen. Dwight Eisenhower, whose senior airman was Maj. Gen. Carl "Tooey" Spaatz.

The prime objective of Torch was to defeat the German and Italian armies in North Africa by having the new Allied troops link up with Gen. Bernard Montgomery's British Eighth Army, which had broken through Field Marshal Erwin Rommel's lines at El Alamein, Egypt, in late October 1942 and was driving the German *Afrika Korps* westward across Libya.

In strategic terms, defeat of the Axis in North Africa promised great benefits. It would give the Allies a base for the invasion of southern Europe, enhance the safety of Allied shipping in the Mediterranean, secure the Suez Canal, close off one potential route for German seizure of Middle East oil, and put pressure on Italy to leave the war—which it did in September 1943.

Not incidentally, the North Africa operation would do much to placate Soviet dictator Joseph Stalin, who was pushing hard for the early opening of a second front against Nazi Germany.

Serious Tactical Problems

Those were the strategic aims. Tactically, serious problems soon arose, centering on the use of airpower.

The Allied landings were opposed by troops loyal to French Marshal Philippe Pétain's German-dominated Vichy regime. The opposition was light, and within days all Vichy units had laid down their arms. Many openly supported the invasion forces, and ultimately the poorly equipped French divisions in North Africa joined the Allies as the XIX French Corps.

However, the Allied drive east to Tunisia ground to a halt because of inadequate transportation, logistics snarls, and the winter rains in northwest Africa, which turned roads and airfields into quagmires. Meanwhile, Germany frantically reinforced its ground and air strength in Tunisia.

Physical conditions aside, US air and ground forces did not perform well as a team during the early months of Torch. On that score, there was enough blame to go around. Both sides lacked combat experience. This was the first large-scale ground-air operation of the war for US forces.

Allied landings in North Africa were weakly opposed by Vichy French troops. The French divisions, poorly equipped and often sympathetic to the invading forces, joined the Allies as the XIX French Corps, retraining (above) with US equipment.

—UPI/Bettmann Newsphotos

Air Vice Marshal Sir Arthur Coningham, commander of the RAF's Western Desert Air Force and then of the Allied Northwest African Tactical Air Force, was a strong proponent of airpower under the command of an independent air arm.

There was another principal reason for the poor US showing: the lack of understanding or agreement between ground and air commanders about how to run the war. The ground commanders operated under a liberal interpretation of "Aviation in Support of Ground Forces," War Department Field Manual 31-35, dated April 9, 1942. That manual subordinated the action of the air force to the needs of the ground force. The air commander operated under the Army commander, who could allocate aircraft to lower-level ground units. FM 31-35 stated unambiguously that "the most important target at a particular time will usually be the target which constitutes the most serious threat to the supported ground forces. The final decision as to priority of targets rests with the commander of the supported unit."

This provision of FM 31-35 opened the door for senior US ground commanders to parcel out air assets as they saw fit, with the most likely use being as an air umbrella over ground troops or for close support of units in battle. This was in keeping with the traditional ground-force view of aviation as a primarily defensive weapon. Such operations robbed airpower of its greatest strengths—mobility and flexibility—and made it impossible for the air units to achieve air superiority.

Within the air force itself, most fighter pilots lacked training in the tactics of strafing or dive-bombing. Their planes lacked bomb racks, and "attack" aircraft such as the Douglas A-20 proved too vulnerable to ground fire to survive very long.

The roots of the problems and misunderstandings went back many years. When it entered World War II in December 1941, the US had seven months of real experience in use of military aviation, all of it gained more than

twenty years earlier in World War I. That conflict had created a set of assumptions in the Army. Most Army officers had come to view the airplane as a defensive weapon. They were enthusiastic supporters of military aviation, but only as a tool for observation of opposing ground forces and for keeping the enemy's airpower off their backs. In the view of these officers, US aircraft should be assigned to, and be controlled by, ground commanders down to division level or lower. Further, the aircraft should operate along and over a specific front.

The Offensive Above All

Of course, many US Army airmen, led by Brig. Gen. Billy Mitchell, drew conclusions that were quite different from those of their ground Army counterparts. On the basis of their short but intense experience in France in the Great War in 1918, General Mitchell and his followers came to regard the airplane as an offensive weapon that should be centrally controlled and commanded by an aviator. The primary mission of battlefield aviation, they believed, was to gain air superiority, which made possible effective and efficient support of ground forces. The "offensive" idea of employment was tested successfully in the St.-Mihiel and Meuse-Argonne actions.

Deep differences between air and ground officers continued unmitigated until the service established General Headquarters (GHQ) Air Force in 1935. Up to that time, combat planes had been assigned directly to the Army's nine Corps Area commanders, each of whom trained his air units as he saw fit. With the creation of the GHQ Air Force, Brig. Gen. Frank Andrews took command of all US-based Air Corps combat units, except for observation craft controlled by ground commanders. He reported to the Chief of Staff in peacetime and to the theater commander in wartime.

The GHQ Air Force was greeted by airmen as a long stride toward an independent Air Force and seemed at least to reduce the problem of command and control of aircraft used in support of the Army. Actually, it didn't, for several reasons.

First, senior, ground-oriented Army officers continued to dominate the War Department General Staff and, thus, the doctrines and policies regarding US military forces. This situation did not begin to change until 1939, when Maj. Gen. George C. Marshall became Army Chief of Staff. General Marshall, a strong supporter of US airpower, began bringing airmen into key posts on the General Staff, the first of these being General Andrews.

Second, the offense-minded US Air Corps had conceptually tied its future to operations by long-range, strategic bombers, a type of aircraft that was only then beginning to emerge. Until the technology for making such aircraft was in hand, bombers were justified as short-range weapons useful for coastal defense and defense of the Western Hemisphere. That was not, in the minds of Air Corps theorists, the ultimate purpose of bombers. Believing that war with Germany and Japan was likely in the not-too-distant future, they planned for using bombers in long-range strikes.

In the austere 1920s and the even more austere years of the Great Depression, there was little money in any event for further development of support aircraft. Also, in light of improvements in antiaircraft guns, it seemed to many airmen unlikely that aircraft of the day, or any that seemed feasible, could survive in battle. The close support mission was seen as a wasteful diversion.

When Operation Torch began, there was no coordinated campaign to gain air superiority. Aircraft attempting to provide close support suffered heavy losses. Above, an RAF No. 250 Squadron Kittyhawk's "routine" battle damage.

Finally, Army combat arms schools included little—in some cases, no—airpower thinking in their curricula. Some ground officers attributed to aircraft capabilities that didn't exist, and overlooked others that did. Misunderstandings were rife, aggravated by a lack of planes, pilots, bases, and funds for joint training.

In sum, the United States began Torch, its first large-scale joint campaign of the war, with the "supporters" and "supported" holding almost diametrically opposed ideas on the question of how to command, control, and employ US tactical aviation. Since the Army Air Forces still were part of the US Army, senior ground commanders held most of the face cards.

High-Level Unhappiness

By December 1942, dissatisfaction with the organization and operations of Torch extended to everyone from General Eisenhower and the US and British Chiefs of Staff to Prime Minister Winston Churchill and President Franklin D. Roosevelt.

In North Africa, the US II Corps under Maj. Gen. Lloyd Fredendall was supported by XII Air Support Command (ASC). The II Corps leaders clung tenaciously to the provisions of FM 31-35, which, as we have seen, allowed ground force commanders to use airpower as they pleased. The British First Army was supported by RAF 242 Group; the RAF units found themselves essentially in the same position as the American XII ASC.

As a result of the misuse of airpower, there was no sustained effort by tactical air units to gain air superiority over the battlefield and no coordinated campaign by

fighters, tactical bombers, and strategic bombers for that purpose. The US XII ASC, instructed to support US II Corps and the French XIX Corps, saw use of its aircraft determined by the II Corps senior commanders alone. Small formations of fighters assigned to fly daylight patrols over US troops were easy prey to Axis air forces, which held largely undisputed superiority in Tunisian airspace. Aircraft attempting to provide close support in the face of enemy air superiority met similar fates. Losses of aircraft and crews grew prohibitively high. By February 1, 1943, the 33d Fighter Group, the most experienced USAAF unit, had to be withdrawn to Morocco for regrouping.

Under such a fragmented theater organization, no broad "theater view" existed. On one occasion, the II Corps commander refused a French XIX Corps request for air support, claiming that it was not his responsibility. There was little coordinated planning between II Corps/XII ASC and British First Army/RAF 242 Group. These US and British air forces not only failed to gain air superiority, but also failed to provide adequate close support.

On the other hand, General Montgomery's British Eighth Army was teamed with the RAF's Western Desert Air Force, which was commanded by a talented New Zealander, Air Vice Marshal Arthur Coningham. This pair of ground and air forces was teamed in an entirely different manner. The difference stemmed in part from the fact that the RAF was independent and co-equal to the British Army and the Royal Navy. US Army Air Forces, of course, still were part of the Army.

On January 14, 1943, Roosevelt, Churchill, and their military and political advisors met at Casablanca to discuss current problems and future strategy. The ten-day conference is best remembered for agreement to continue US daylight strategic bombing of Germany. Another decision of lasting importance was to let General Eisenhower reorganize Allied forces in North Africa into component air, ground, and naval commands reporting to him. His air component, the Mediterranean Air Command, was headed by Air Chief Marshal Sir Arthur Tedder and included as its principal element Northwest Africa Air Forces, commanded by General Spaatz. Under Spaatz were separate strategic, tactical, and coastal air forces, service and training commands, and a reconnaissance wing.

General Spaatz's Northwest African Tactical Air Force (NATAF) was headed by Air Vice Marshal Coningham, with USAAF's Brig. Gen. Laurence Kuter serving as deputy. NATAF included fighters and tactical bombers of the US XII Air Support Command, RAF 212 Group, and the Western Desert Air Force. The air force was to be governed by doctrine developed by Air Vice Marshal Coningham and General Montgomery in the campaign against the *Afrika Korps*. That doctrine was laid out in a pamphlet which, though signed by Montgomery, is thought to have been written by Coningham. It stated, in part:

"The greatest asset of airpower is its flexibility. . . . So long as this is realized, then the whole weight of the available airpower can be used in selected areas in turn. This concentrated use of the air striking force is a battle-winning factor of the first importance. It follows that control of the available airpower must be centralized and command must be exercised through Air Force channels.

"Nothing could be more fatal to successful results than to dissipate the air resources into small packets placed under command of army formation commanders, with each packet working on its own plan. The soldier must not expect, or wish, to exercise direct command over air striking forces."

One Battle vs. Two

In a presentation to Eisenhower and other Allied senior officers on February 16, 1943, the day before he took command of the tactical air operation, Air Vice Marshal Coningham added:

"The Army has one battle to fight, the land battle. The Air [Force] has two. It has first of all to beat the enemy air, so that it may go into the land battle against the enemy land forces with the maximum possible hitting power."

In one of his first acts as commander, Air Vice Marshal Coningham forbade creation of any defensive "air umbrella" over a ground unit unless specifically authorized by his headquarters. He further declared that officers should assign maximum offensive roles to aircraft on every mission and that aircraft should be reserved for strikes against only those targets that could not be attacked by organic, ground force weapons such as artillery.

All of this was music to the ears of USAAF airmen, who long had been fighting for acceptance of a doctrine almost identical to that laid out by Air Vice Marshal Coningham and General Montgomery. When confronted with the new doctrine, however, ground commanders were unenthusiastic. Some reacted as though they had been told they could no longer have staff cars but must depend on the motor pool for transportation.

Of these skeptics, General Patton was the most truculent. On April 11, 1943, his headquarters sent out a situation report (SITREP), complaining that a "total lack of air cover for our units" in North Africa "has allowed German Air Force to operate almost at will."

Air Vice Marshal Coningham sent a tough reply, copied to all senior commanders in the theater. It said, in part:

"It is to be assumed that intention was not to stampede local American air command into purely defensive action. It is also assumed that there was no intention to adopt discredited practice of using air force as an alibi for lack of success on the ground. If SITREP is in earnest and balanced against . . . facts it can only be assumed that II Corps personnel concerned are not battle-worthy in terms of present operations."

Squaring Off

The exchange provoked a tense, face-to-face confrontation, ordered by General Eisenhower, between the Air Vice Marshal and the American general, two of the war's strongest-willed commanders. The incident is reported in Ladislas Farago's book *Patton,* in the movie of the same name, and in Gen. Omar Bradley's *A Soldier's Story.* In all three cases, however, a key paragraph of Air Vice Marshal Coningham's message was omitted.

In it, the air commander noted that, on April 1, 1943, a typical day in the campaign, fewer than thirty enemy air-

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NATAF's new airpower doctrine emphasizing air superiority enabled Maj. Gen. Carl "Tooey" Spaatz to send strategic bombers under Maj. Gen. Jimmy Doolittle (above, in a reverse Lend-Lease Spitfire) against airfields in Italy.

craft managed to overfly General Patton's II Corps area. In contrast, Coningham's aircraft flew 362 fighter missions that day against the Germans—with 260 of these missions coming over Patton's area. The air commander further noted that only four II Corps troops had been killed as a result of enemy aircraft attacks.

The two willful leaders avoided a permanent rupture in relations. In the February 1973 issue of AIR FORCE Magazine, General Kuter reported that the two, after much desk-pounding, "shook hands and lunched together with much laughter and good fellowship." It must be said, to General Patton's credit, that he soon became a strong supporter of the new tactical air operating doctrine.

In the new setup, achievement of air superiority was top priority. General Eisenhower observed that the new structure "solved one of the most basic problems of modern warfare—how to apply airpower most effectively to the support of land operations." Air planning became an integral part of theater planning, with air and ground headquarters collocated.

As the emphasis shifted from daylight patrols and close support to air superiority, General Spaatz, who controlled all air elements in northwest Africa, could send Maj. Gen. Jimmy Doolittle's strategic bombers against airfields in Italy and direct Coningham's tactical bombers to attack Axis airfields in Africa, while his tactical fighters pursued air superiority.

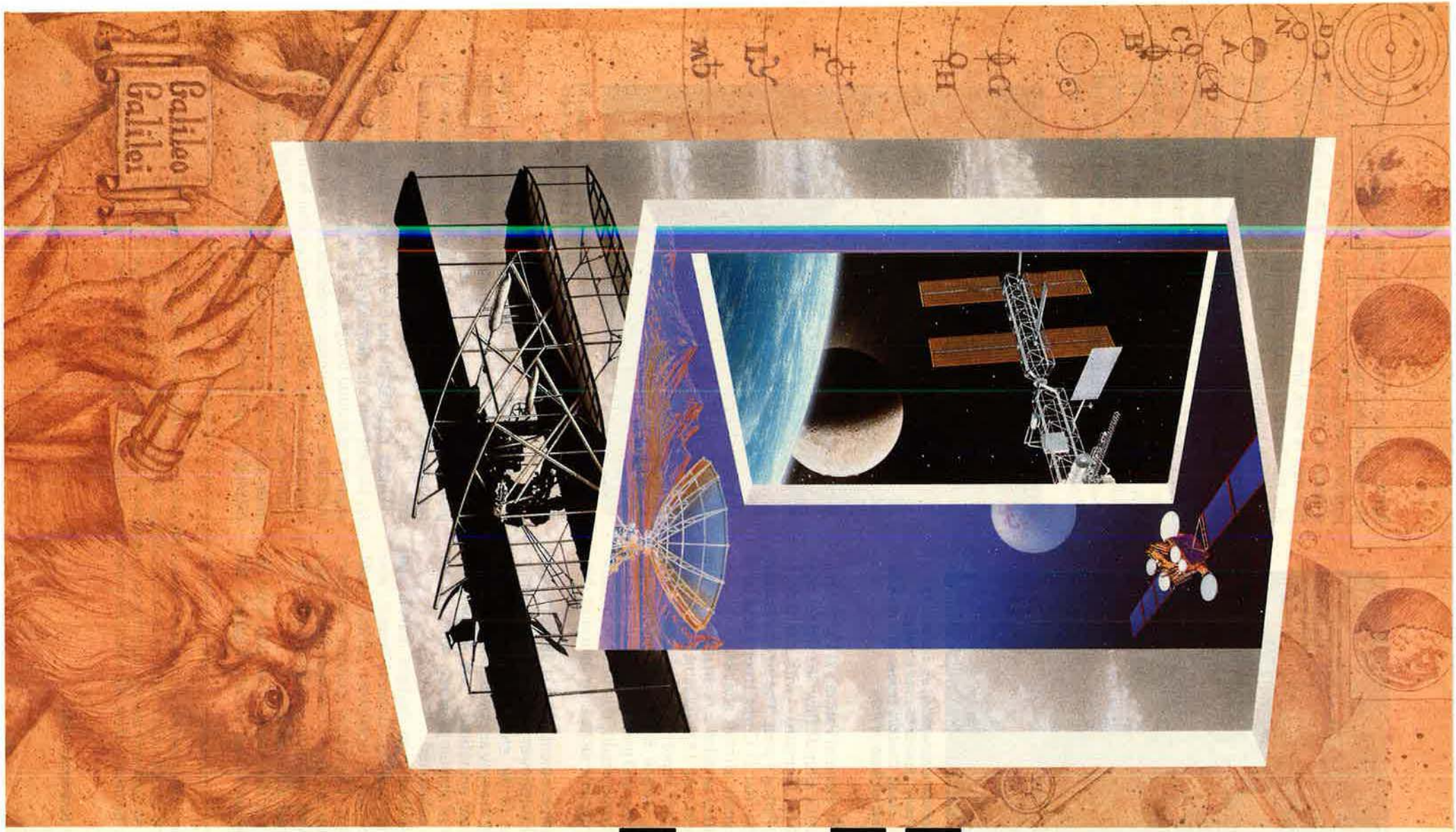
By mid-April, most of the Axis aircraft had been either destroyed or evacuated from Tunisia. Fighters and fighter-bombers now could provide the support that Army commanders had been demanding. On May 6, Coningham's aircraft flew more than 2,000 sorties in direct support of Allied ground forces, which reached Tunis that day. A week later, 275,000 Axis troops surrendered, and the North African campaign ended.

Back in Washington, General Marshall acknowledged that the North African experience mandated a revision of the nation's air-ground doctrine. General Kuter was called home for duty in the War Department General Staff. It is believed that he was principal author of the new Field Manual 100-20, "Command and Employment of Air Power." General Marshall approved FM 100-20, published on July 21, 1943, without consulting Army Ground Forces planners. It stated that "land power and air power are co-equal and interdependent forces: neither is an auxiliary of the other." Thus a theater commander would exercise command of air forces through an air force commander and of ground forces through a ground force commander, and "control of available air power must be exercised through an air force commander."

By mid-April 1943, most Axis aircraft (above, an Italian Macchi MC. 200 Saetta) had either been destroyed or evacuated from Tunisia. A month later, 275,000 Axis troops surrendered.

Under FM 100-20, the first priority was air superiority, second was air interdiction, and third was close air support of ground troops. The new manual dictated cooperation via planning conferences of air and ground commanders and staffs. It directed that both should be "well-versed in air and ground tactics . . . [and that] aviation units must not be parceled out, as the advantage of massed air action and flexibility will be lost." ■

Contributing Editor John L. Frisbee was Editor of AIR FORCE Magazine from 1969 until 1980. A graduate of the Armed Forces Staff College and the Canadian National Defence College, he served the US Air Force as a fighter and bomber pilot, a planner on the Air Staff and at major commands, a teacher at West Point and the Air Force Academy, and a special assistant to the Secretary of the Air Force; he retired as a colonel. His "Valor" articles are a regular monthly feature of this magazine.



evolution

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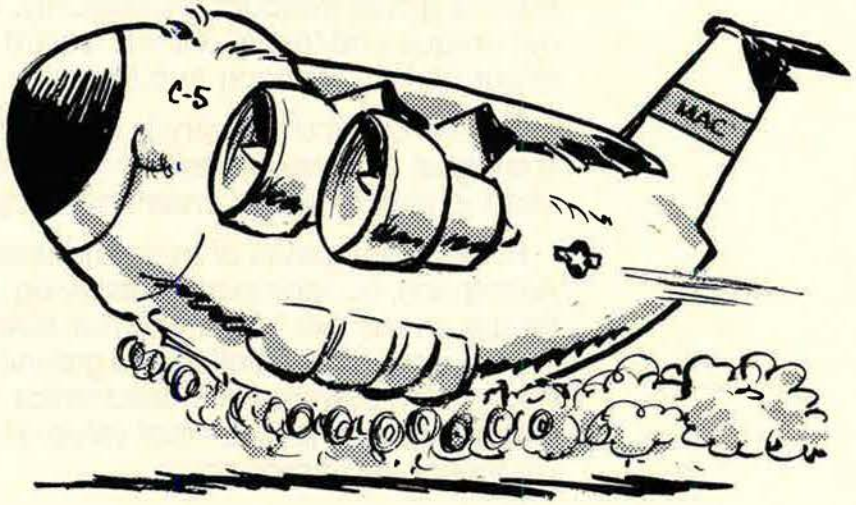
Most airplanes have at least two names —the official one and the one given by the troops.

What They *Really* Called Them

By Jeffrey P. Rhodes, Aeronautics Editor Illustrations by Bob Stevens



After at least four rounds of suggestions and reviews over eight years, the Rockwell B-1 bomber was officially nicknamed "Lancer" this spring. That may catch on as an everyday flight-line reference, or it may not. The airmen who fly and fix airplanes have a long history of deciding for themselves what they will call their machines.

In the list that follows, by no means complete (either in terms of aircraft that have had unofficial nicknames or as a complete list for a given aircraft), some aircraft will be seen to have several "real" (flight-line) nicknames, some affectionate, others derogatory. In some cases, the disrespectful appellations are the work of rivals who fly some other airplane. In other instances, the tough-sounding name was awarded with fondness and used with considerable pride. Still others were given because the airplane was regarded as a "dog."

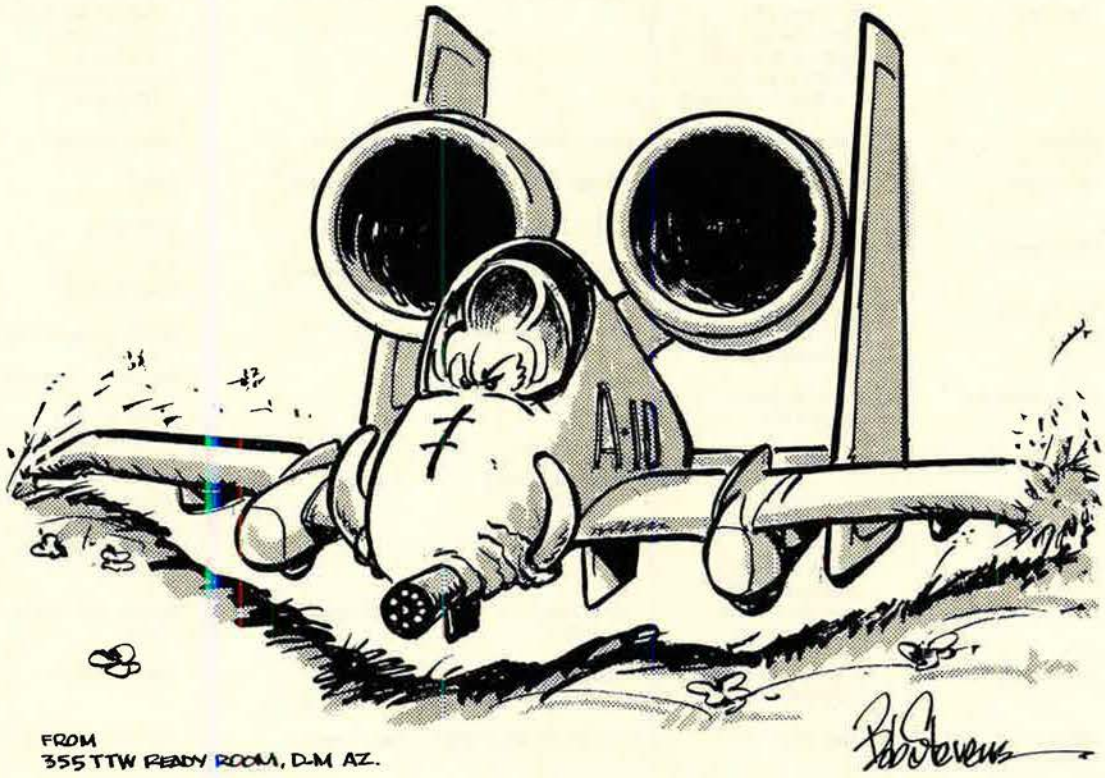
Aircraft are listed by the date of first flight of the prototype (or specific model), except for such planes as the C-47, which moved over from the commercial world. The dates for those reflect when they joined the military. (Another exception: The SR-71 date is first takeoff of the SR-71—not the A-12—from the Lockheed Skunk Works.)

Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
US Air Force/Army		
Curtiss JN-4 (1914)	None	Jenny Canuck (Canadian-built version)
Boeing P-26 (1932)	None	Peashooter
Douglas C-47 (1935)	Skytrain	Gooney Bird Placid Plodder Dowager Duchess Old Methuselah Grand Old Lady (names also applied to DC-3, C-53, and C-117)
North American AT-6 (T-6) (1938)	Texan	Awful Terrible Six Mosquito (Korean War)

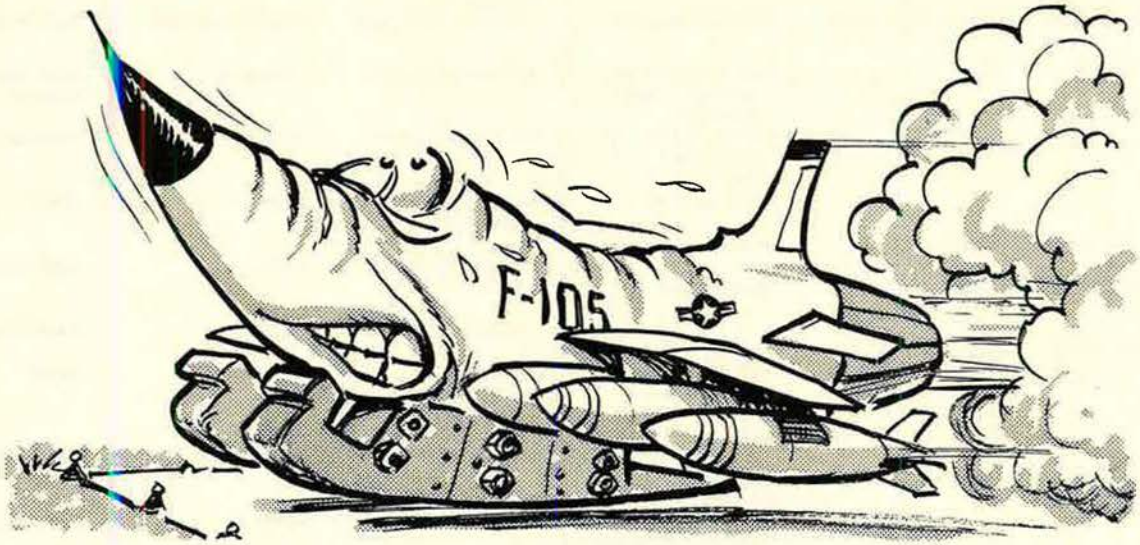
Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
North American B-25 (1939)	Mitchell	Billy's Bomber
Beech C-45 (1940)	Expeditor	Bug Smasher
Martin B-26 (1940)	Marauder	Widow-Maker Flying Prostitute (it had no visible means of support) Baltimore Whore
Vultee BT-13 (1940)	Valiant	Vibrator Bee Tee
North American P-51 (1941)	Mustang	'Stang Peter-Dash-Flash Spam Can
Republic P-47 (1941)	Thunderbolt	Jug T-Bolt
Ryan PT-22 (1941)	Recruit	Maytag Messerschmitt (Also a generic reference to L-series [Liaison] aircraft)
Cessna UC-78 (1942)	Bobcat	Bamboo Bomber Rhapsody in Glue San Joaquin Beaufighter Useless 78 Double-Breasted Cub
Douglas A-26 (1942)	Invader	Li'l Racer Li'l Hummer
Sikorsky R-4 (1942)	Hoverfly	Flying Eggbeater Frustrated Palm Tree
Consolidated C-109 (1943)	Liberator	Cee-One-Oh-Boom (several of these cargo B-24s exploded while ferrying fuel over the Hump to China)
Curtiss XP-55 (1943)	Ascender	Ass-Ender (its canards and rear-mounted engine made it appear to be flying backward)
Fairchild C-87 (1944)	Packet	Crowd Killer
Douglas A-1 (1945)	Skyraider	Spad Sandy (A-1H only)
Convair B-36 (1946)	Peacemaker	Aluminum Overcast Magnesium Overcast
Republic F-84 (1946)	Thunderjet	Hog Lead Sled Lieutenant-Eater
Fairchild C-119 (1947)	Flying Boxcar	Dollar Nineteen Crowd Killer
Lockheed T-33 (1948)	Shooting Star	T-Bird
Northrop F-89 (1948)	Scorpion	FOD Vacuum (because of its low intakes) Stanley Steamer (because of its oversized main landing gear)
Douglas C-124 (1949)	Globemaster II	Aluminum Overcast Old Shaky
North American F-86D (1949)	Sabre	Sabre Dog

Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
Lockheed C-121 (1950)	Constellation	Connie Flying Speed Brake
Republic F-84F (1950)	Thunderstreak	Super Hog Lead Sled Ground-Loving Whore
Boeing B-52 (1952)	Stratofortress	BUFF (Big Ugly Fat Feller—polite form) Monkeyknocker (Vietnam) Coconutknocker (Vietnam)
Vertol CH-21 (1952)	Workhorse	Flying Banana
Convair F-102 (1953)	Delta Dagger	Deuce
Martin B-57 (1953)	Canberra	Cranberry
North American F-100 (1953)	Super Sabre	Hun Silver Dollar
Cessna T-37 (1954)	Tweet	World's Largest Dog Whistle Converter (converts fuel into noise) Hummer Tweety Bird
Lockheed C-130 (1954)	Hercules	Herky Bird Herk Hog (ski-equipped LC-130s are Ski-Hogs)
Lockheed F-104 (1954)	Starfighter	Missile with a Man in It
McDonnell F-101 (1954)	Voodoo	One-Oh-Wonder
Convair TF-102 (1955)	Delta Dagger	Tub (from bulged cockpit)

Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
Lockheed U-2 (1955)	None	Dragon Lady Deuce Black Bird Angel
Republic F-105 (1955)	Thunderchief	Thud Lead Sled Thunderthud Squash Bomber (if all else fails, turn off the engine and squash the target) Triple Threat (it had three ways it could kill the pilot) Ultra Hog Iron Butterfly
Bell UH-1 (1956)	Iroquois	Huey (some versions were called "Slick" or "Hog")
Boeing KC-135 (1956)	Stratotanker	Stratobladder Flying Gas Station Tank GLOB (Ground-Loving Old Bastard)
Convair B-58 (1956)	Hustler	Delta Queen
Convair F-106 (1956)	Delta Dart	Six Sixshooter (with gun pod attached)
Cessna U-3 (1957)	None	Blue Canoe
Kaman HH-43 (1958)	Huskie	Flying S--thouse
McDonnell Douglas F-4 (1958)	Phantom II	Double Ugly Rhino Old Smokey
Northrop T-38 (1959)	Talon	White Rocket
Boeing CH-47 (1961)	Chinook	S--thook Hook
Hughes OH-6 (1963)	Cayuse	Loach (from original LOH [Light Observation Helicopter] designation) Egg
Lockheed C-141 (1963)	StarLifter	StarLizard (from its camouflage paint scheme) T-Tailed Mountain Magnet
Cessna T-41 (1964) (military 172 Skyhawk)	Mescalero	Chickenhawk F-172
Douglas AC-47 (1964)	Skytrain	Puff the Magic Dragon Spooky Dragon (and Dragonship)
General Dynamics F-111 (1964)	None	Aardvark Flying Edsel Widow-Maker Switchblade Swinger
Lockheed SR-71 (1964)	None	Blackbird Habu (an Okinawan species of snake) Lead Sled
Sikorsky CH-54 (1964)	Tarhe	Skycrane Crane
Bell AH-1 (1965)	Huey Cobra	Snake
LTV A-7 (1965)	Corsair II	SLUF (Short Little Ugly Feller—polite form) Man-Eater
Northrop M2-F2/M2-F3 (1966/1970)	None	Flying Bathtub Cadillac (from its 1950s-style tail fins)



Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
Cessna O-2 (1967)	None	Duck (from the way its landing gear retracted) Blow-Suck (from its powerplant arrangement) Pushme-Pullyu
Lockheed C-5 (1968)	Galaxy	Fat Albert
Martin Marietta X-24A (1970)	None	Flying Potato
Fairchild A-10 (1972)	Thunderbolt II	Warthog SLAT (Slow, Low, Aerial Target) Porker Hog
McDonnell Douglas F-15 (1972)	Eagle	Great Bird Rodan Big Bird Tennis Court (a match could be played on its fuselage and wings) Aluminum Overcast
Boeing T-43 (1973)	None	Gator (from navigator) Strike Pig
Martin Marietta X-24B (1973)	None	Flying Flatiron
General Dynamics F-16 (1974)	Fighting Falcon	Electric Jet Viper Lawn Dart Little Hummer
Rockwell B-1 (1974)	Lancer	Bone (from B-one) Lawn Dart The Jet
Sikorsky UH-60 (1974)	Black Hawk	Catfish
Grumman EF-111 (1977)	Raven	Sparkvark Electronic Fox
Lockheed F-117 (1981)	None	The Black Jet Nighthawk Frisbee F-19 (Note: "Wobbly Goblin" is purely a media creation)
Grumman X-29 (1984)	None	Polecat
Generic References		
All rescue aircraft (SB-17, SB-29, SA-16, etc.)	Various	Dumbo
All cargo aircraft	Various	Trashhauler Trashcarrier
US Navy/Marine Corps		
Grumman FF-1 (1931)	None	FiFi
Stearman N2S (PT-17) (1934)	Kaydet	Yellow Peril
Consolidated PBY (1935)	Catalina	Pigboat P-Boat Black Cat (those aircraft involved in a specific, continuing, night mission only)
Naval Aircraft Factory N3N (1935)	None	Yellow Peril
Vought SB2U (1936)	Vindicator	Wind Indicator Vibrator
Douglas SBD (A-24) (1938)	Dauntless	Slow But Deadly
North American SNJ (AT-6) (1938)	Texan	J-Bird
Beech SNB (AT-11) (1940)	Kansan	Slow Navy Bomber
Vought F4U (1940)	Corsair	Bent-Wing Bird
Grumman TBF/ General Motors TBM (1941)	Avenger	Turkey
McDonnell F2H (1947)	Banshee	Banjo Drut
Beech T-34 (1948)	Mentor	Radial Interceptor
Douglas F3D (F-10) (1948)	Skyknight	Whale
North American AJ-1 (1948)	Savage	Salvage
Vought F7U (1948)	Cutlass	Gutless Cutlass
Douglas F4D (F-6) 1951)	Skyray	Ford (from pronunciation of F-4-D)
Douglas A3D (A-3) (1952)	Skywarrior	All Three Dead (no ejection seats)
Grumman S2F (S-2) (1952)	Tracker	Stoof (from pronunciation of S-2-F)
Lockheed WV-2 (EC-121) (1953)	Warning Star	Willie Victor
Douglas A-4 (1954)	Skyhawk	Scooter Heinemann's Hot Rod Tinker Toy Bantam Bomber Mighty Mite Skyhog
Vought F-8 (1955)	Crusader	MiG Master
Grumman WF-1 (E-1) (1956)	Tracer	Willie Fudd Stoof With a Roof (because of the large radome)
Douglas EA-3 (1958)	Skywarrior	Electric Whale
North American T-2 (1958)	Buckeye	Attack Guppy
Douglas ERA-3 (1960)	Skywarrior	Warbird
Grumman E-2 (1960)	Hawkeye	Hummer
Grumman EA-6 (1963)	Intruder/Prowler	Sterile Arrow
McDonnell Douglas/ British Aerospace AV-8 (1966)	Harrier	Jump Jet Whistling S--tcan Scarier
Grumman F-14 (1970)	Tomcat	Turkey
Lockheed S-3 (1971)	Viking	Hoover (from sound of its turbofan engines)
Sikorsky CH-53E (1974)	Super Stallion	Super S--tter (from its tendency to leak hydraulic fluid)



Aircraft (Year of First Flight)	Official Nickname	Real Nickname(s)
Foreign		
Bristol Fighter (1916)	None	Brisfit Biff
Royal Aircraft Factory R.E.8 (1916)	None	Harry Tate
de Havilland DH-4 (1917)	None	Flaming Coffin (from alleged tendency to burn)
Junkers Ju-52 (1930)	None	*Tante Ju* (Auntie Junkers) Iron Annie
Dornier Do-11 (1932)	None	*Fliegender Sarg* (Flying Coffin)
Heinkel He-51 (1933)	None	*Caza de Cadena* (Chain Fighter, from the Nationalists' follow-the-leader strafing tactics in the Spanish Civil War)
Supermarine Walrus (1933)	None	Shagbat
Fairey Swordfish (1934)	None	Stringbag
Avro Anson (1935)	None	Faithful Annie
Dornier Do-17 (1935)	None	*Fliegender Bleistift* (Flying Pencil)
Hawker Hurricane IIB (1935)	None	Hurribomber Hurricat (these were catapulted from merchant ships)
Messerschmitt Bf-109 (1935)	None	Usually called by series name (*e.g.* Bf-109E was Emil), but Bf-109G (Gustav) also called *Beule* (Boil) for additional equipment crammed in and faired over
Fairey Battle (1936)	None	Fairly Rattle
Hadley Page Hampden (1936)	None	Flying Frying Pan
Vickers Wellington (1936)	None	Wimpy
Westland Lysander (1936)	None	Lizzie
Blohm & Voss BV-138 (1937)	None	*Fliegender Holzschuh* (Flying Wooden Shoe)
Focke-Wulf FW-189 (1938)	*Uhu* (Owl)	*Fliegendes Auge* (Flying Eye)
Fairey Albacore (1939)	None	Applecore
Heinkel He-177 (1939)	*Greif* (Griffon)	*Luftwaffenfeuerzeug* (Luftwaffe's Lighter)
Mitsubishi G4M (1939)	None (Allied code name "Betty")	*Hamaki* (Cigar)
de Havilland Mosquito (1940)	None	Wooden Wonder Mossie
Hawker Typhoon (1940)	None	Tiffie
Fiesler Fi-103 (V-1) (1942)	None	*Kirschkern* (Cherry Stone)
Messerschmitt Me-262 (1942)	*Schwalbe* (Swallow) *Sturmvogel* (Storm Bird)	Turbo
Messerschmitt Me-323 (1942)	*Gigant* (Giant)	*Leukoplastbomber* (Adhesive Tape Bomber—it was mostly canvas)
Dornier Do-335 (1943)	*Pfeil* (Arrow)	*Ameisenbär* (Anteater—it had a long nose)
Gloster Meteor (1943)	None	Meatbox
Focke-Wulf FW-190D (1944)	None	Dora *Ameisenbär* (Anteater)
Avro Shackleton (1949)	None	100,000 Rivets Flying in Loose Formation

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AFA and the Air Force recognize these crews as best of the year.

The Top Crews

By Amy D. Griswold

This year's outstanding strategic aircrew is crew E-21 of the 28th Bombardment Wing, Ellsworth AFB, S. D. The winners of the Gen. Curtis E. LeMay award are (from left) Capt. Billy R. Shrader, Maj. Patrick J. Larkin, Maj. Paul J. Curtis, and Capt. Richard E. Werling.

EACH September at its National Convention, AFA presents five awards—named for five general officers who made special marks in USAF history—to the top crews in the US Air Force. The Curtis E. LeMay Award goes to the top strategic crew, the Claire Lee Chennault Award to the outstanding aerial warfare tactician, the Jerome F. O'Malley Award to the best reconnaissance crew, the William H. Tunner Award to the best aircrew in Military Airlift Command, and the Thomas S. Power Award to the best strategic combat missile crew.

The LeMay Award

The outstanding strategic aircrew award goes to crew E-21 of the 28th Bombardment Wing, Ellsworth AFB, S. D. This B-1B crew, consisting of Maj. Paul Curtis, aircraft commander; Maj. Patrick J. Larkin, instructor pilot; Capt. Richard E. Werling, offensive systems officer; and Capt. Billy R. Shrader, defensive systems officer, was selected on the basis of "sustained superior performance" in 1989, especially in three major events that make up the crew's "triple crown."

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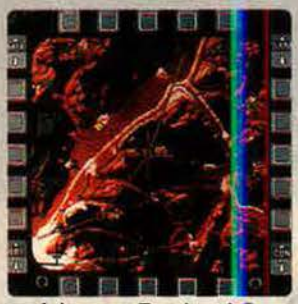

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In the first of these, the Operational Readiness Inspection (ORI), they aced the command and control, nuclear surety, and emergency war order examinations, "setting the pace for the rest of the wing," according to the nomination. In the ORI flying phase, crew E-21 was the lead cell in the wing's record-setting strike and had the best damage-expectancy rating of all crews in the wing. CINCSAC called the wing's ORI scores "the best in Strategic Air Command."

In the 3909th Strategic Aircraft Evaluation Squadron's evaluation of the 28th Bombardment Wing, all the members of crew E-21 scored 100 percent, contributing to the wing's "Outstanding" rating.

In Proud Shield '89, the 1989 SAC Bombing and Navigation competition, Major Larkin was a wing project officer responsible for the planning, and crew E-21 was selected as the lead crew of four crews chosen to represent the 28th Bombardment Wing. They conducted debriefings for the younger crews representing the wing, emphasizing a "team first" approach. It paid off: The 28th Bombardment Wing won the Ira C. Eaker Memorial Trophy for the best B-1B unit, the William J. Crumm Linebacker Memorial Trophy for the best bomber unit, and the Fairchild Trophy for the best bomber-tanker team in SAC. The Fairchild victory, in only the second year of B-1 competition, marked the fastest rise to the top for a new bomber. Crew E-21 had the top Short-Range Attack Missile scores of all competing aircrews.

The Chennault Award winner, Capt. (Major selectee) Mark Joseph Svestka, an F-4G and F-16C instructor pilot known for his Wild Weasel expertise, was named the outstanding aerial warfare tactician for his contributions to NATO war planning.

The Chennault Award

This year's outstanding aerial warfare tactician is Capt. (Major selectee) Mark Joseph Svestka, who is chief of the Weapons and Tactics Branch, Weapons and Tactics Division, 52d Tactical Fighter Wing, USAFE, Spangdahlem AB, West Germany.

Captain Svestka is the 52d TFW's top F-4G instructor pilot and is recognized throughout USAFE and NATO as "the expert in the tactical application of Wild Weasels." The 52d TFW is the only unit that employs both the F-4G and the F-16C in the same fighting element—Wild Weasel defense suppression. While serving as the wing's air combat tactics monitor, Captain Svestka created "the only mixed element training program of its kind" and trained F-4G pilots, electronic warfare officers, and F-16C pilots in air combat and Wild Weasel tactics.

His greatest accomplishment, however, was the development of two innovative concepts that reoriented NATO war planning. The first of these, Wild Weasel suppression of enemy air defenses (SEAD), demonstrates the benefits of concentrating the Wild Weasel defense suppression teams. In his analysis, Captain Svestka considered the orders of battle, the campaign objectives, and the upgraded capabilities of both the aircraft and ordnance, then recommended changes to NATO war plans, including an updated target priority list and airspace changes that could double the F-4G's target-area firepower. He presented this analysis in a briefing to USAFE. The changes were incorporated in as little as six months from his initial presentation.

His second concept expanded his SEAD initiatives to include the Army and other fighter assets along with the electronic combat triad and attack aircraft in a plan to disable an enemy air defense system during an initial attack. This concept was strongly supported by the 65th AD Commander and in NATO, and the new targeting strategy was adopted by a conference called by the Allied Forces Central Europe Deputy Commander for Operations.

The O'Malley Award

Crew S-02/R-18 from the 24th Strategic Reconnaissance Squadron, 6th Strategic Reconnaissance Wing, Eielson AFB, Alaska, was chosen for its demonstrated outstanding performance and judgment in the RC-135S Cobra Ball aircraft to man the RC-135X Cobra Eye, a joint Army-USAF venture to collect and record data on strategic weapon systems and targets of interest to US Army Strategic Defense Command and Strategic Defense Initiative Organization. Their performance on Cobra Eye missions earned them the title of best reconnaissance crew of the year.

On August 15, 1989, the crew, made up of flight crew S-02 (Capt. William J. Zehner, aircraft commander; Capt. Robert S. Hopkins III, pilot; Capt. Paul R. Yakes, Jr., first navigator; Capt. Brian G. Saucier, instructor navigator; and Capt. Carol A. Colemen, second navigator) and reconnaissance crew R-18 (Capt. Jeffrey M. Murray, tactical coordinator (TC); 1st Lt. Thomas A. Jacobs, sensor operator (SO); Sgt. Steven E. Lung, sensor technician (ST); Capt. Dale R. Ekmark, instructor TC; Maj. Robert T. Marlin, evaluator TC; Capt. William B. Mitchell, evaluator SO; and SSgt. Jonathan A. Sanders, evaluator ST)


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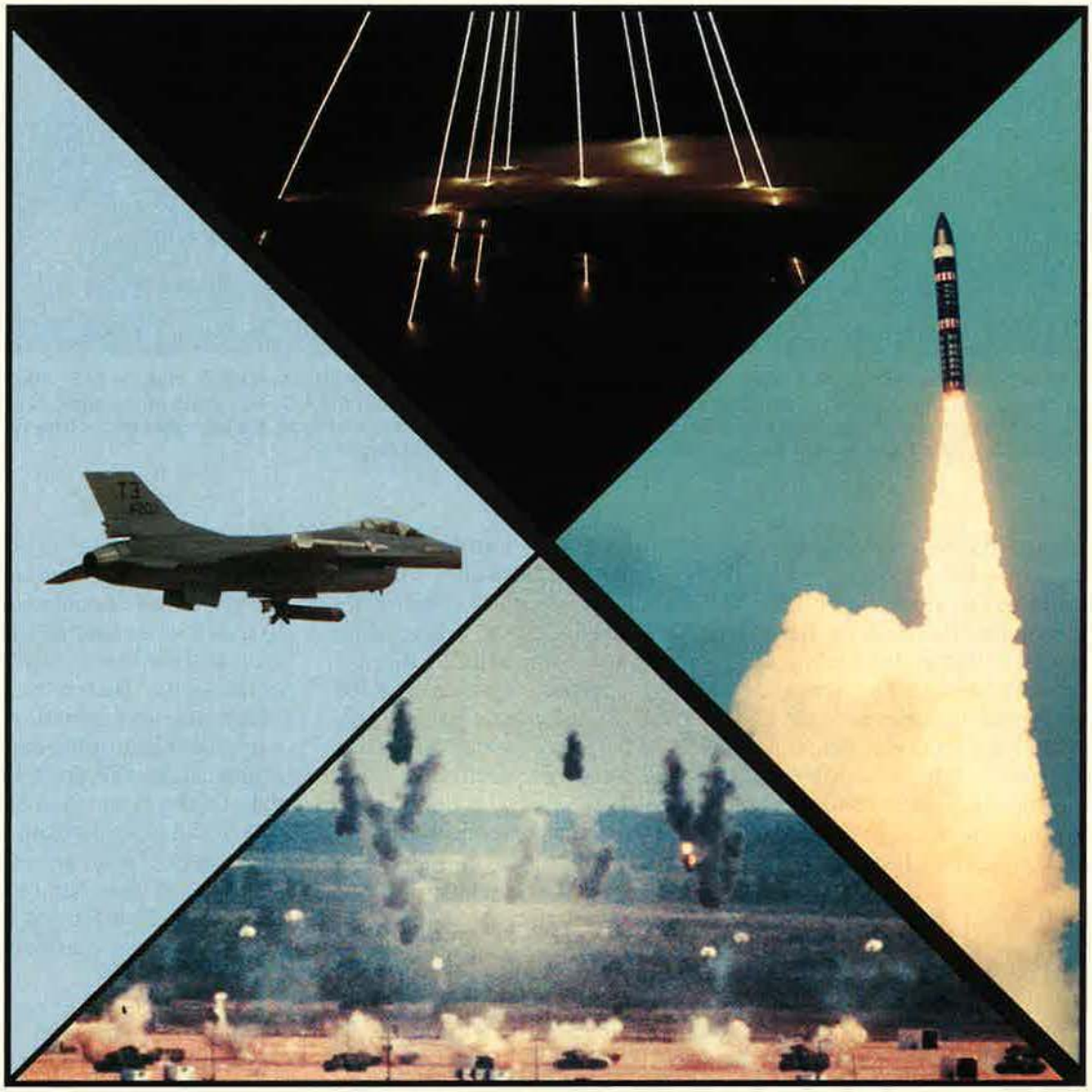

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From Top, clockwise: Ten unarmed TDS-developed reentry vehicles during successful Peacekeeper flight tests; Peacekeeper missile lifting off; TDS Skeet projectiles defeat a column of target vehicles; F-16 dropping the Sensor Fuzed Weapon CBU-97/B.

Crew S-02/R-18 of the 24th Strategic Reconnaissance Squadron, 6th Strategic Reconnaissance Wing, Eielson AFB, Alaska, had to overcome problems with uncooperative weather and malfunctioning computers, but the RC-135X crew persevered to gather high-quality data in two missions with the Cobra Eye aircraft (shown here). The Cobra Eye Sensor is a joint platform of the Air Force and the Army designed to collect and record data on strategic weapon systems and targets.

became the first to fly an operational Cobra Eye mission.

The mission began smoothly, but once in the designated orbit area the computers controlling the Cobra Eye sensor shut down. The crew immediately began troubleshooting procedures and corrections. Finally, minutes before the scheduled event, the computers were brought on line. Because the sensors would not operate at the orbit altitude, the pilots immediately climbed to the highest possible altitude, "taking the aircraft to the very edge of its performance envelope." According to the award nomination, "the aircraft was perfectly positioned for the event" and successfully collected its first data associated with a strategic weapon system.

Three days later, the crew again battled marginal weather and computer problems during a mission to collect data on a US weapon system. They had to adjust the data-collection track continually in order to avoid large thunderstorms in the area and find clear sky for the data collection. "Because of their perseverance and initiative, a clearing was found, computers were restored, and the first high-quality data on the target [were] collected," reads the nomination. These two data-collection missions demonstrated not only the capabilities of the Cobra Eye Sensor but also the versatility and resourcefulness of crew S-02/R-18.

This year's outstanding Military Airlift Command crew poses with a ZPU-4 captured at Rio Hato AB, Panama, during the early hours of Operation Just Cause. The crew was airborne for nearly sixteen hours straight during that operation, with eight of those hours spent providing close air support.

The Tunner Award

Capt. Mark Transue and crew from the 16th Special Operations Squadron, Hurlburt Field, Fla., were selected as the outstanding Military Airlift Command crew for their extraordinary achievement while providing close air support from their AC-130H gunship during Operation Just Cause in Panama on December 20, 1989.

In addition to Captain Transue, aircraft commander, the crew included Capt. Edward R. Appler, navigator; Capt. Philip G. Bradley, fire control officer; Capt. Scott E. Taylor, pilot; Capt. John T. Virgione, pilot; 1st Lt. Dennis T. Beatty, navigator; 1st Lt. Stephen D. O'Connor, electronic warfare officer; MSgt. Steven W. Hicks, air-

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vit·re·ous \'vi-trē-es\ *adj* [L *vitreus*, fr. *vitrum* glass] 1: of, derived from, relating to, or consisting of glass 2 a : similar to glass (as in characteristics of composition, brittleness, or luster): GLASSY <~rocks> b: char-acterized by low porosity and usually translucence due to the presence of a glassy phase <~ china> 3 : of, relating to, or constituting the vitreous humor – vit·re·ous·ly

vitreous silica *n* : a chemically stable and heat resisti… glass made from silica

vit·ri·fy \'vi-tre-,fī\ *vb* -fied: f… MF, fr. L *vitrum* gl… a glass…

Vi·tro /vi-trō/ *n* 1: the company that pioneered systems engineering (as in systems design, integration, and support) 2: an industry leader in software engineering 3: a company in the forefront of applied technology syn see SYSTEMS ENGINEERING

vit·tae \'vit-ē, 'vi-,tē, 'vi-,ti\ … L, fillet, akin to L *viēre* to plait] 1: one of the oil-tubes in the fruits of plants of the carrot family 2: stripe, streak

vit·tate \'vi-,tāt\ *adj* 1: bearing or containing vittae 2: longitudinally striped

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borne gunner; MSgt. Frederick T. Kramer, sensor operator; TSgt. Guy M. Davis II, flight engineer; TSgt. William B. Walter, airborne gunner; TSgt. Wayne S. White, airborne gunner; SSgt. Frank T. Demchenko, illuminator operator; SSgt. Bernard R. Gilbert, airborne gunner; SSgt. William T. Jackson, sensor operator; SSgt. William L. Jennings, flight engineer; SSgt. Michael K. McCarthy, illuminator operator; and Sgt. Barry M. Clark, airborne gunner.

They had ample chance to demonstrate their "courage, professional performance, and dedication to mission accomplishment" in the opening minutes of Just Cause. After eight hours of nonstop, instrument-flight-rules, night formation flying from Hurlburt Field and two "tactical minimum communication aerial refuelings," the crew arrived over its holding point near Rio Hato AB ten minutes before H-hour. At H-hour they rolled into their firing orbit over Rio Hato, a Panamanian military airfield housing the 6th and 7th Rifle Infantry Battalions of the Panamanian Defense Forces. "Immediately they began receiving heavy antiaircraft artillery (AAA) from every section of the air base," noted the nomination. They engaged the gun positions, knowing that they had "only two minutes to pacify the airfield" before the arrival of fifteen C-130s with 500 airborne rangers.

The infrared sensor operator located the AC-130H's first target, a ZPU-4 AAA weapon, and the crew destroyed it with their 105-mm howitzer. In short order they also destroyed a stationary armored personnel carrier and a moving V-300 personnel carrier and eventually suppressed all AAA fire on the airfield.

Once the rangers had landed safely, the gunship crew worked with them on calls for fire, destroying several targets, including a two-ton truck carrying enemy personnel that was later found to have been carrying tear gas packets to incapacitate US forces. They fought in "near-perfect coordination" with the friendly ground parties for five hours. Because of the support from the gunship, the rangers, who had expected heavy casualties, received only minimal casualties.

This year's Power Award winners, Capt. Michael J. Morgan (standing) and 1st Lt. Scott E. Russell, were chosen for superior performance during their tenure as the 91st Strategic Missile Wing's Senior Standardization Evaluation Crew. The training program they devised was described as the best in the command.

Once the job was done at Rio Hato, the crew members refueled a third time before proceeding to Paitilla airfield, where they provided overhead security and area surveillance for ground forces. By the time the crew landed, it had been airborne for nearly sixteen hours, eight of them in close air support.

The Power Award

Capt. Michael J. Morgan and 1st Lt. Scott E. Russell "demonstrated superior technical competence and sustained superior performance in their duties" with S-200 of the 4091st Operations Group/Standardization Evaluation Division, 91st Strategic Missile Wing, Fifteenth Air Force, Minot AFB, N. D., and are this year's outstanding strategic missile crew.

During their tenure as the 91st SMW's Senior Standardization Evaluation Crew, Captain Morgan and Lieutenant Russell devised a new evaluator training course, including a 200-page workbook covering all aspects of evaluator duty, in order to improve evaluator proficiency. The Strategic Air Command Inspector General described their training program as "the best observed in the command."

Their leadership and motivation of evaluation crews paid off in the SAC Operational Readiness Inspection (ORI) in August 1989. In fourteen launch-control center inspections, there were no significant crew errors, and the SAC Inspector General said the 91st SMW was "the most standardized observed with the lowest error rate" in that inspection cycle. Crew S-200 led the way in the ORI, with perfect scores on Emergency War Order (EWO), Codes, and Communications Security Exams. Five of their evaluation programs were identified by the SAC Inspector General as "good ideas."

Excellent teamwork is made possible by excellent individuals. Captain Morgan received a total of fourteen Highly Qualified ratings before completing his crew tour in August 1989. He was a 3901st Strategic Missile Evaluation Squadron Outstanding Performer four times, the Fifteenth Air Force's DO/Staff Person of the Quarter for the third quarter of 1989, and 91st SMW Company Grade Officer of the Year for 1989. He was selected by 91st SMW/CC to be the chief of the EWO Training Branch in the Plans and Intelligence Division. Lieutenant Russell became missile combat crew commander in October 1989 after receiving three Highly Qualified ratings and one Outstanding Performer award in four Minuteman crew evaluations. He is only the third crew member to receive the Outstanding Performer award on his upgrade evaluation to crew commander. ■

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The Outstanding Airmen of the Year

By Susan Katz Keating

FOR the Air Force enlisted corps, no group is more distinguished and exclusive than the twelve Outstanding Airmen of the Year. These dozen airmen, presented each September at AFA's National Convention, represent the best of the force:

MSgt. David B. Bayliss, NCOIC of Nursing Services, Air Force Systems Command Hospital, Edwards AFB, Calif. Students in Sergeant Bayliss's advanced nursing care courses study under one of the best. He was selected to serve on both the base Presidential Support Team and the NASA Shuttle Recovery Team.

Sergeant Bayliss is in charge of enlisted staffing at the hospital, where he emphasizes total patient care. He keeps in constant touch with patient services. He develops and teaches courses in such diverse areas as orthopedics, intravenous therapy, and emergency medical technician work. His management of the logistics portion of Continuous Medical Training exercises was described by AFSC as "second to none."

Sergeant Bayliss, cited by the State Department for his support of operations in the aftermath of the mass suicide-execution of followers of the Rev. Jim Jones in Guyana, designed a special hospital disaster trailer being considered for worldwide use. He seeks a master's degree in Nursing Administration and has been selected for the NCO Academy. He has earned the Air Force Commendation Medal with one oak leaf cluster. He was named AFSC Hospital Senior NCO of the Year. He has earned recognition as one of America's Outstanding Young Men for 1989.

Sgt. Brant C. Bushnell, Munitions Maintenance Technician, Munitions Division, 2892d Distribution Squad-

MSgt. David B. Bayliss

Sgt. Brant C. Bushnell

MSgt. Paula T. Campa

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ron, Hill AFB, Utah. Sergeant Bushnell's ability to foresee problems has made him a key part of the team responsible for USAF's only conventional depot storage facility. In its warehouses, the depot has some 4,000 line items valued at more than $460 million. Thanks to the efforts of Sergeant Bushnell, a remarkable fifteen percent increase in storage space was made available at this facility. This was accomplished by rewarehousing 140,000 tons of explosives into 10,000 storage spaces. In addition, he single-handedly supervised the proper disposal of more than 11,700 unserviceable assets.

Sergeant Bushnell maintains twelve munitions storage facilities and has received 100 percent pass rates on all Quality Assurance evaluations. He is credited with helping to keep the F-15 fleet fully mission capable by expeditiously filling 300 mission-capable asset requests that were received simultaneously. The average is five to ten requests per day.

Sergeant Bushnell has earned a number of USAF honors, including Outstanding Airman of the Year for both Air Force Logistics Command and the Ogden Air Logistics Center. He was also named Hill AFB Airman of the Quarter.

MSgt. Paula T. Campa, NCOIC, Wing Command Section Administration, 66th Electronic Combat Wing, Sembach AB, West Germany. A key wing information manager, Sergeant Campa is known for willingness to take on responsibility. She serves as Resource Advisor for four cost centers, Equipment Custodian, Adjunct Instructor for NCO Preparatory Course, and Unit Career Advisor for wing staff.

MSgt. Diana D. Ceciliani

SSgt. Lynne M. Donovan

TSgt. Kevin A. Ford

Thanks to Sergeant Campa, the Wing Recognition program is itself worthy of recognition. After she rewrote a regulation governing program management and made other changes, attendance doubled and sponsorship jumped dramatically.

As Resource Advisor to the 66th ECW staff, Sergeant Campa manages the entire budget process for four groups. She helped the 66th ECW Clinic Commander obtain additional funding for furniture and equipment in a new renovation project.

Sergeant Campa completed the Senior NCO Academy and received the Air Force Commendation Medal with two oak leaf clusters. She was named Senior NCO of the Year by US Air Forces Europe (USAFE), the 66th Mission Support Squadron, the 66th ECW, and the 17th Air Force. She was named Senior Enlisted Administrator of the Quarter by the 66th ECW and Senior NCO of the Quarter by the 66th MSSQ.

MSgt. Diana D. Ceciliani, Security Police Technician, Headquarters Air Training Command, Randolph AFB, Tex. Budget management and control for ATC's Security Police have noticeably improved, thanks to Sergeant Ceciliani's revision of budget oversight procedures. She created a management system for the Model Installation Program, reducing processing time by half. She helped write a computer program that automates the annual Law Enforcement Report, resulting in greater accuracy and fewer man-hours of work.

Sergeant Ceciliani took part in a Functional Review Workshop, during which she helped create an entirely new approach to determining security police manpower needs. This will have a direct impact on USAF security policy operations worldwide.

Sergeant Ceciliani was chosen as one of only two enlisted members to serve on the elite Hq. ATC Command Briefing Team. She was named NCO of the Quarter by Hq. ATC and Randolph AFB and is a recipient of the Air Force Commendation Medal.

SSgt. Lynne M. Donovan, Wideband Communications Equipment Specialist, 2146th Communications Group, Osan AB, Republic of Korea. Sergeant Donovan's contributions are viewed as critically important in the training of newly assigned communications personnel, and her methods are innovative. For example, to compensate for a lack of readily available technical information, she used commercial publications to develop and implement training modules for fiber optics equipment. Her new training modules have reduced training time from six months to two weeks.

Sergeant Donovan redesigned and reconfigured protection circuits for high-current conditions, reducing by fifty percent the number of unscheduled maintenance actions on sixty key command and control links. To ensure that working backups were available for vital C^2 circuits, she disassembled and cleaned all components in eight digital multiplexers. She virtually eliminated the danger of injury to maintenance personnel and significantly reduced maintenance time by initiating tech order improvements for five communications items.

Sergeant Donovan seeks an associate degree in Electronics Systems Technology. She has been chosen Outstanding Airman of the Year by both the Pacific Communications Division and the 2146th Communications Group.

TSgt. Kevin A. Ford, Deputy Director of Supply Operations, Headquarters 13th Air Force, Clark AB, the Philippines. In 1989, Sergeant Ford not only earned his grade under the Stripes for Exceptional Performers program but also was named Top Staff Supply NCO of the Air Force and Pacific Air Forces' Outstanding Staff Supply NCO. In the deactivation of a USAF unit, he arranged the transfer of $350,000 in excess equipment. As part of a Pacific Defense Reutilization and Marketing Offices survey that he set up and led, he obtained more than $1 million in vehicles and equipment to enhance security force operations at Clark, USAF's largest overseas installation. He helped improve procedures for providing some $1 million in foreign military sales equipment and supplies to the Philippine government.

Sergeant Ford played a key role in the success of the $50 million "Buy Philippine Products Program," personally calling on local vendors and business groups to convince them of the program's merits. His effort resulted in a fifty percent increase in purchases, faster deliveries, and a $6 million saving in transport costs. His work in monthly base supply coordination meetings helped reduce by forty percent the discrepancies between supply and contracting records.

Sergeant Ford, a recipient of the Air Force Commendation Medal with one oak leaf cluster, is working toward a Bachelor of Science degree. He was named 1989 NCO of the Year for the 13th Air Force and for the Pacific Air Forces.

SSgt. Gilbert T. Garcia, NCOIC and Law Enforcement Specialist, 24th Security Police Squadron, Howard AFB, Republic of Panama. During trying days for US forces in Panama in 1989, before the fall of Gen. Manuel Noriega, Sergeant Garcia played a major security role. He assumed the critical "overwatch" role when more than 100 US service members were forced by the Panama Defense Forces (PDF) to move out of off-base leased quarters, ensuring that the moves were conducted smoothly with no interference from the PDF. Later it was learned that three US servicemen in Sergeant Garcia's party possessed highly classified information, which, if seized by the PDF, could have had serious consequences. While under PDF escort, Sergeant Garcia managed to transfer the attaché case containing the information to safety.

Sergeant Garcia spent some thirty hours arranging the release of an Air Force officer wrongfully detained by the PDF. He played a key role in pinpointing hostile checkpoints, ensuring the safety of US personnel who otherwise might have been harassed or placed in physical danger. As Sergeant Garcia performed his duties, Panamanian authorities arrested him six times, detained him in jail for a total of forty hours, and held him at gunpoint five times.

He seeks a degree in criminal justice and has completed the Command NCO Academy Correspondence Course. He has been honored as Outstanding NCO of the Twelfth Air Force and NCO of the Quarter.

MSgt. Edward B. Huneycutt, Chief, Special Analysis Branch, 690th Electronic Security Wing, Tempelhof Central Airport, Berlin, West Germany. Sergeant Huneycutt plays a pivotal part in USAFE's European Surface-to-Air Tactics Analysis Team (ESTAT). As a key leader in one of Electronic Security Command's most critical programs, he provides tailored analytical support to ESTAT. He has been with ESTAT from its start, having been handpicked to serve on the initial cadre of analysts. The detailed monthly feedback bulletins he produces are credited with enhancing USAFE's fighting power.

SSgt. Gilbert T. Garcia

MSgt. Edward B. Huneycutt

SMSgt. William O. Morris, Jr.

Sergeant Huneycutt is responsible for planning USAFE's ESTAT conferences. He hosted a highly praised Allied Forces Technical Conference that included representatives from the US Air Force and Army, the British Royal Army and Air Force, and the Canadian Air Force.

Sergeant Huneycutt recently earned a master's degree in International Relations, with a near-perfect 3.97 grade point average. He graduated from the USAFE Kisling NCO Academy first in his class and earned the John Levitow and Communication Skills Awards. He was named the 690th ESW Senior NCO of the Year and the Quarter and was European Electronic Security Division Senior NCO of the Year.

SMSgt. William O. Morris, Jr., Assistant NCOIC, Tanker Branch, 96th Organizational Maintenance Squadron, Dyess AFB, Tex. Technical and management skills underpin Sergeant Morris's exceptional record of keeping KC-135A tankers ready to support the 96th Bombardment Wing's aircraft. On his watch as Production Superintendent last year, the number of sorties flown exceeded the planned number by sixteen percent, the overall noncommission rate fell from twelve percent to 2.3 percent, and the maintenance cancellation rate dropped from 6.8 percent to under 2.2 percent.

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SMSgt. David M. Orange, Sr.

MSgt. Timothy M. Payton

Sgt. Daniel N. Ries

In Operation Nimrod Dancer in May 1989, Sergeant Morris handled the short-notice generation of eight aircraft needed to deploy US troops to Panama. Last year, an airborne B-1B with jammed nose gear got an assist through his quick-thinking professionalism. In just twenty minutes, Sergeant Morris located two tankers whose fuel enabled the crippled aircraft to fly to Edwards AFB, Calif., where it landed safely. When the 1989 Proud Shield competition rolled around, he was selected to head the Tanker Branch team; all eight contest sorties were launched on time.

Sergeant Morris has been selected to attend the Senior NCO Academy, has received the Air Force Commendation Medal with two oak leaf clusters, and is acting pastor of his church.

SMSgt. David M. Orange, Sr., Combat Control Supervisor, combat control team, 123d Tactical Airlift Wing, Kentucky Air National Guard, Louisville. The ANG is a second military career for Sergeant Orange, who first served in the Marine Corps. In the Corps, he was an E-6 by age twenty-two. In the Guard, Sergeant Orange has become a role model for those in the Combat Control field. This career path is new to the Reserve Forces, and Sergeant Orange has organized a complex schedule of tasks necessary to maintain the Combat Control Team's readiness. He coordinates his team's activities with the Joint Airborne Air Transportability monthly conferences, the National Guard Bureau, and Military Airlift Command.

Sergeant Orange completed the Combat Control training pipeline, which has a washout rate of eighty percent. In addition, he attended Jump Master School even before completing required minimum time on jump status and passed the course.

Sergeant Orange further distinguished himself at Combat Control School by earning two top honors: the Jerome Bennett Award for demonstrating the highest qualities of leadership and professionalism and the Honor Graduate Award for earning the highest academic and performance grades.

MSgt. Timothy M. Payton, Avionics Communication/Navigation System Technician, 934th Consolidated Aircraft Maintenance Squadron, Air Force Reserve, Minneapolis–St. Paul International Airport, Minn. Complex airborne avionics systems require exceptional technicians, and Sergeant Payton is one of them. His extensive knowledge of circuit analogy and technical manuals have made him an invaluable asset.

Sergeant Payton converted what had been just an average radio shop into an outstanding Communication Maintenance Center. His efforts resulted in an eighteen percent reduction in his section's maintenance man-hours per flying hour. He also reduced the number of recurring discrepancies to a level well within acceptable AFRES standards and increased production with exceptionally high quality.

For the unit's C-130s preparing to undergo major avionics upgrades, Sergeant Payton served as principal inspector and technical advisor. He solved many complex wiring problems, saving 120 man-hours. Promoted to Master Sergeant under the Promotion Enhancement Program, Sergeant Payton is enrolled in the Senior NCO Academy. He seeks a degree in Electronic Engineering Technology. He is a recipient of the Air Force Commendation Medal.

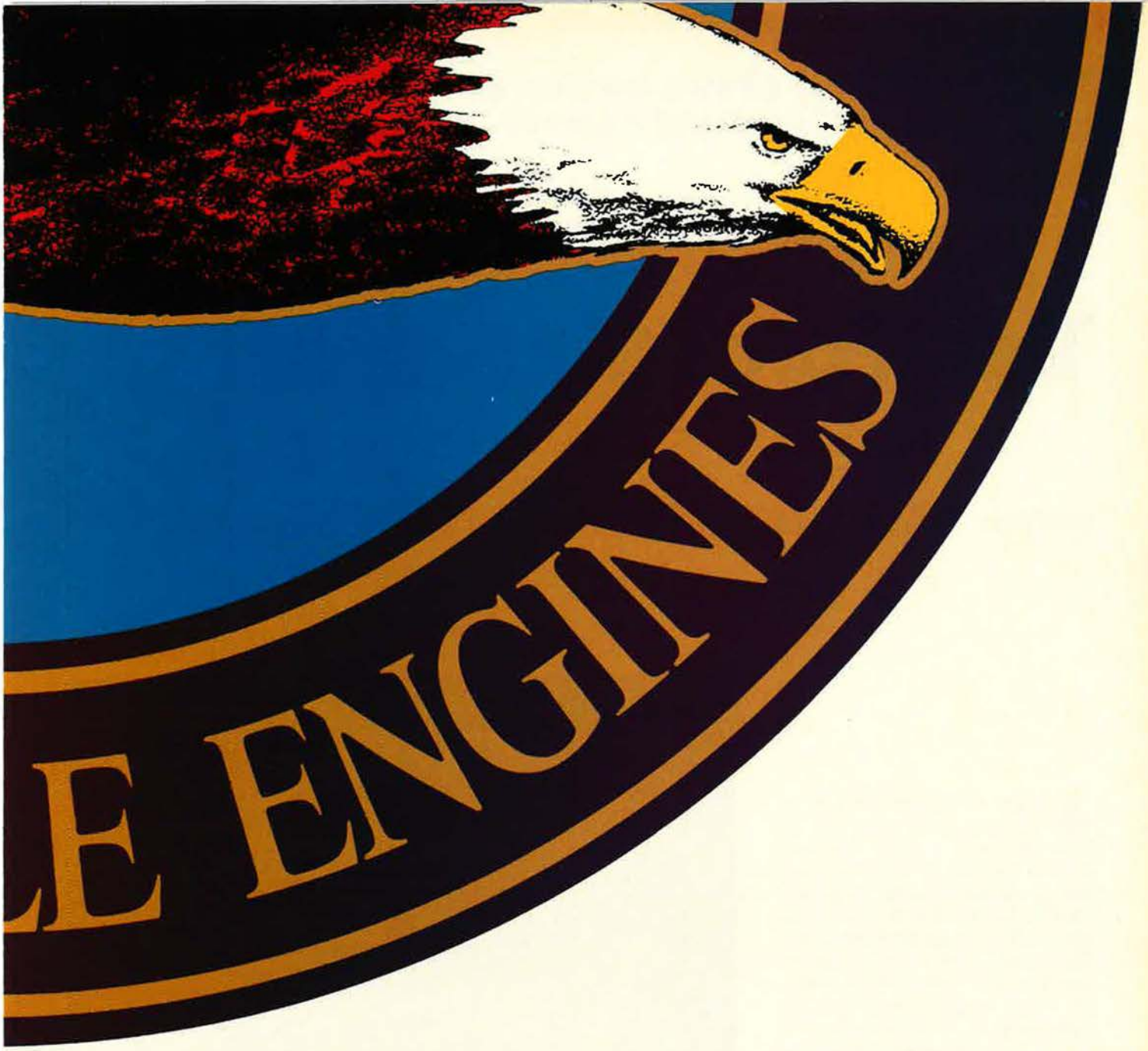
Sgt. Daniel N. Ries, Guidance and Control System Specialist, 463d Avionics Maintenance Squadron, Dyess AFB, Tex. Sergeant Ries is continually looked to by his superiors for practical advice. Promoted below the zone, he is respected by colleagues for his technical expertise. During a 1989 ORI, he was selected over more experienced personnel to man the squadron launch truck at a forward operating location. He took on five jobs without a hitch, resulting in 100 percent on-time launches for all missions and an "Outstanding" rating for maintenance.

Lack of notice doesn't seem to bother him or interfere with his ability to maintain high standards. He voluntarily deployed to Europe on one day's notice and helped produce a 99.7 percent reliability rate for 210 missions. Four times during the year, he came under the watchful eye of Quality Assurance personnel, who ranked him at 100 percent three times and at ninety-four percent once.

When an aircraft was released from depot maintenance with a malfunctioning altitude indicator, Sergeant Ries quickly and correctly assessed that the problem was caused by a phase reversal. In only an hour, he located and fixed the reversed wiring. Sergeant Ries has been named 463d AMS and 463d TAW Airman of the Month and 463d AMS/463d TAW Airman of the Year. ■

Susan Katz Keating, a writer for Insight *Magazine since 1985, specializes in military topics. Her most recent article for* Air Force *Magazine, "The Man Who Fixes Things," appeared in the February 1990 issue.*

WHAT KIND SHOULD GO



OF ENGINES IN THE ATF?

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These are the top airmen and the top units in the Air Guard and Reserve.

Total Force Showcase

By Daniel M. Sheehan, Assistant Managing Editor

(Left to right) TSgt. Larry D. Johnson, TSgt. Billy R. Harcus, SSgt. Jeffrey M. Choplin, and TSgt. Steven Gardinier, four of the gunners on the AC-130 crew that won this year's President's Award, load the Spectre's 40-mm gun, which proved to be an effective weapon, judiciously applied during Operation Just Cause.

ANYONE seeking evidence of the integral role played by the Air National Guard and the Air Force Reserve in today's Air Force need look no further than the winners of the four awards AFA presents annually to Guard and Reserve crews. This year's winners of the President's Award (top AFRES crew), the Ricks Award (outstanding airmanship in the Air National Guard), the Air Force Reserve Outstanding Unit Award, and the ANG Outstanding Unit Award demonstrate the strength of the Total Force concept.

The President's Award

If Hemingway is right in defining "guts" as "grace under pressure," then the 919th Special Operations Group's AC-130A crew commanded by Maj. Clay McCutchan measured up fully to that standard during Operation Just Cause in Panama last December.

Sent to Panama to train and provide security assistance in relief of active-duty forces, the crew, which consisted of Major McCutchan, copilot Maj. Michael L. Milton, navigator Capt. Bruce A. Fernald, fire control officer Maj. James N. Strength, electronic warfare officer Capt. Adrian Wells, flight engineer MSgt. Tom Grimes, television sensor operator MSgt. Walter L. Watley, Sr., illuminator operator TSgt. Jerry G. Allen, infrared sensor operator TSgt. James D. Dombrosky, and gunners TSgts. Richard E. Kelley, Steven E. Gardinier, Billy R. Harcus, and Larry D. Johnson, and SSgt. Jeffrey M. Choplin, had no plans to get in-

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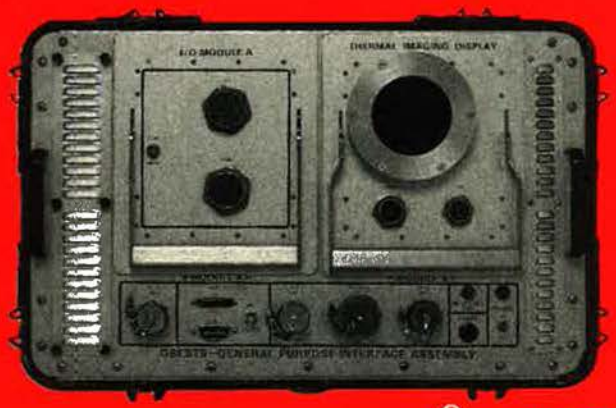

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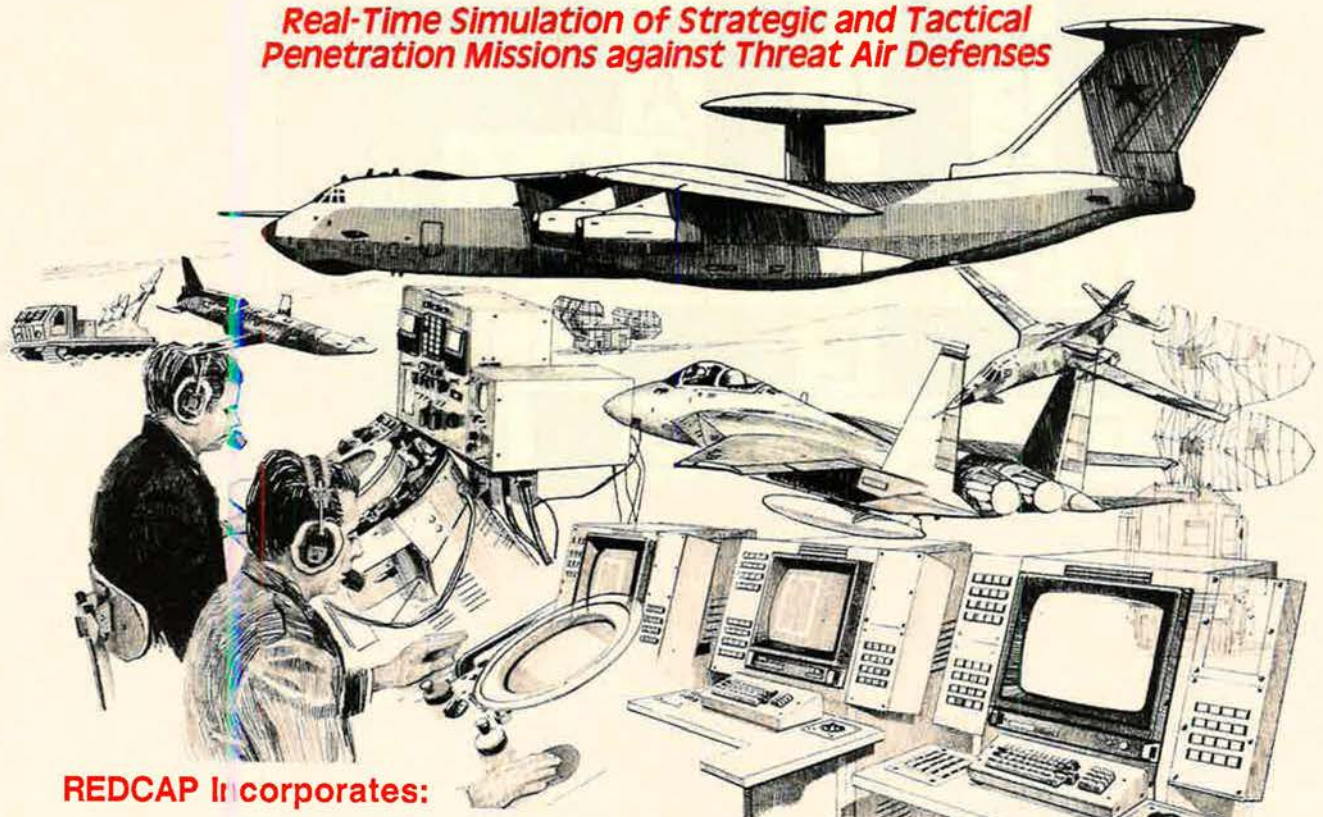

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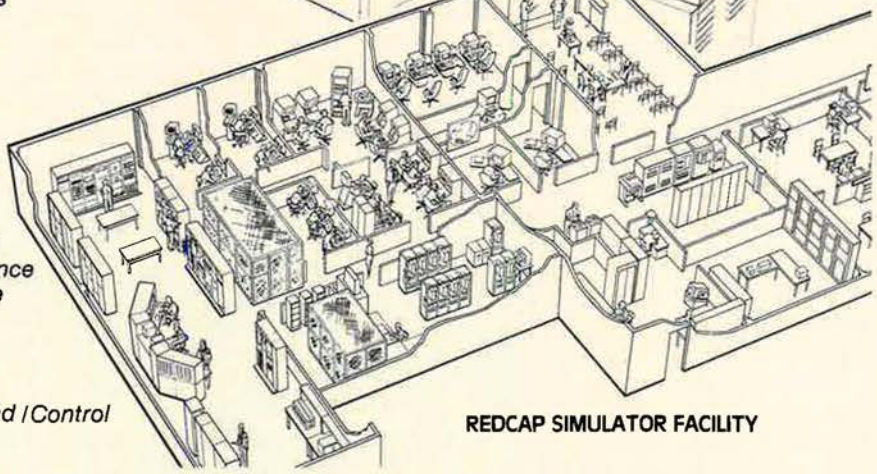

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volved in a shooting war. As it turned out, they were the first combat aircrew airborne during Operation Just Cause, sent aloft to provide air base defense for Howard AFB during the early phases of the operation.

After returning briefly to Howard, the crew soon had its AC-130 airborne again, this time to disperse intruders at the main gate. After doing so, then performing an abortive search for a reportedly downed helicopter, the AC-130 was directed by the 24th Composite Wing Air Operations Center (AOC) to support a ground party under fire at Albrook AFS, where hostile activity ceased after the aircraft fired on four structures. As Major McCutchan and crew were returning to Howard, the AOC directed them to destroy three armored personnel carriers heading toward a US installation, declaring the vehicles hostile and giving the AC-130 clearance to fire.

Despite eagerness to destroy what had already been declared a hostile force, the crew members, even after being given a repeated clearance to fire, under the guidance of Major Strength showed admirable restraint and exceptional discipline in holding their fire until the disposition of any friendly forces had been determined. Television sensor operator Watley detected what appeared to be friendly forces among the vehicles and informed Major Strength, who advised Major McCutchan not to fire. It was later confirmed that the vehicles had been captured and friendlies were in the area. Thus the professionalism of Major McCutchan's crew averted a possible catastrophe and saved the lives of more than thirty US troops.

The crew flew two more sorties during the operation and was instrumental in the safe recovery of twenty-nine Americans held hostage in the Marriott Hotel. In all, the crew flew four sorties and logged 15.1 hours of combat time and continued to provide support for the next three weeks of the operation.

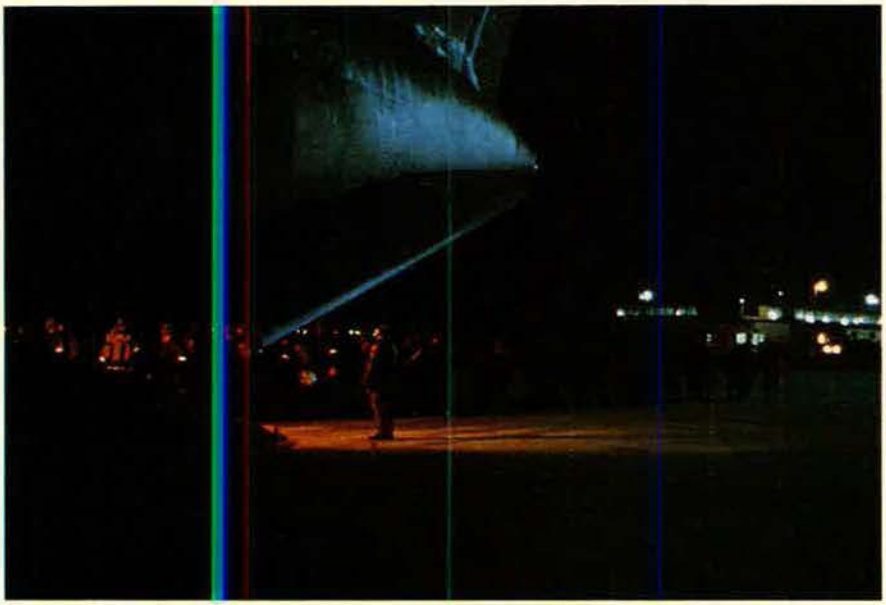
The Ricks Award

The Air Rescue mission often contains enough unexpected emergencies to make a hardened civilian paramedic blanch. Such was the case when the crew of the 129th Air Rescue Group's Air Force Rescue 284 (AFR-284) got the call on October 20, 1989, that there had been an explosion aboard M/V *Explorer,* a Greek vessel about 600 miles south of San Diego off the Baja California coast. Their speedy action and proficiency in coping with the unexpected won this HH-3E crew, augmented by two pararescue jumpers from the 41st Rescue and Weather Reconnaissance Wing and aided substantially by the US Coast Guard and the crew of AFR-224 (an HC-130P that provided the necessary refueling), the Earl T. Ricks Award for Outstanding Airmanship in the Air National Guard.

The award-winning crew members, assigned to the 919th Special Operations Group, take time out to pose in front of their aircraft after seeing extensive action during the operation. Standing (from left), MSgt. Tom Grimes; TSgt. James Dombrosky; Capt. Adrian Wells; Sergeants Gardinier, Johnson, Harcus, and Choplin; Maj. Michael Milton; TSgt. Richard Kelley; and Capt. Bruce Fernald; kneeling, from left, MSgt. Walter Watley, Maj. James Strength, TSgt. Jerry Allen, and Maj. Clay McCutchan.

The California ANG crew, pilot Maj. Gregory A. Bose, copilots Capt. Douglas A. Bawden and Capt. Glen H. Stoddard III, and flight engineers SMSgt. David J. Rhoads and SrA. Keith M. Shukait, along with flight surgeon Maj. Victoria V. B. King, took off in foul weather from NAS Moffett Field, Calif., followed within minutes by

This Air Rescue crew, from left, TSgt. Don Allie, SMSgt. David Rhoads, Capt. Glen Stoddard III, Capt. Douglas Bawden, Maj. Victoria King, and Maj. Gregory Bose—plus SrA. Keith Shukait and A1C Frederick R. Foote—braved foul weather to save two badly burned sailors, thereby winning this year's Ricks Award.



This year's Outstanding Reserve Unit, the 439th Military Airlift Wing, used its enormous C-5 Galaxies to good advantage during Operation Just Cause, launching seven assigned missions without a glitch despite record-breaking cold and unfinished maintenance facilities at its home base, Westover AFB, Mass.

the tanker. The first air refueling proved extremely difficult because of the weather, and the mission was almost aborted.

Meanwhile, the two pararescue jumpers, TSgt. Don M. Allie and A1C Frederick R. Foote, had jumped to the stricken Greek cargo ship from a US Coast Guard HC-130 that had flown from CGAS Sacramento. Aboard the ship, they found that two of the four injured sailors, though badly burned, were still alive. The two were quickly transported to USS *Jouett* (CG-29), a nearby US Navy guided missile cruiser, for pickup by AFR-284.

Once radio contact with the *Jouett* was established, the crew determined that the ship's helipad was not certified for an H-3, so a hover would be required. Hoisting the first victim aboard took so much time that another air refueling was required before the remaining injured sailor could be rescued.

Once the survivors and the pararescue jumpers were aboard, the helicopter headed to the University of California–San Diego Medical Center. En route, the patients were attended by flight surgeon King, aided by the pararescue jumpers. On landing, the patients were transferred to a waiting ambulance and arrived at the hospital in good condition. The 19th ARS was credited with two saves.

One difficulty that the 439th MAW had to contend with during Just Cause was the need to operate at night to reduce the ever-present risk of sniper fire around Howard AFB. Despite this and the insufficient air traffic control and overcrowded runway ramp, the 439th MAW's contribution was termed "spectacularly successful."

Outstanding Reserve Unit

A lengthy array of accomplishments earned the 439th Military Airlift Wing of Westover AFB, Mass., and its associated units, the 911th Tactical Airlift Group at Greater Pittsburgh International Airport, Pa., and the 914th Tactical Airlift Group at Niagara Falls IAP, N. Y., the Outstanding Reserve Unit Award.

Not least among these accomplishments was the exemplary contribution made by 439th MAW C-5s during Operation Just Cause. "We had seven airplanes to launch for Panama, and we launched every one of them without a glitch," reports Col. Tom Hargis, 439th Air Base Group commander. In all, the wing's C-5s sent 647 tons of cargo and hundreds of troops and vehicles to the Republic of Panama, contributing immeasurably to the resounding success and early termination of the operation.

The 337th Military Airlift Squadron, commanded by Lt. Col. Jim Gallin, rose to the occasion despite the short-notice nature of the mission. They successfully contended with insufficient air traffic control and an overcrowded runway ramp at Howard AFB. They also operated successfully without lights to reduce the ever-present risk of sniper fire. Back at Westover, maintenance squadrons had to "turn" the aircraft in record-breaking cold weather, despite the fact that indoor facilities to work on the C-5 had not been completed.

Earlier in the year, the wing had participated in relief missions to the Virgin Islands, Puerto Rico, and South Carolina after Hurricane Hugo. The wing's 337th MAS received an "Outstanding" rating during an Aircrew Standardization/Evaluation Team visit, and the 439th MAW received an "Excellent" rating during its Unit Effectiveness Inspection.

The Biased Media's Worst Nightmare.

Polls show that most people are fed up with the arrogant, exploitive tactics of the media giants. *Time*, CBS, and the rest of the entrenched media establishment.

They brand the public as ignorant and hopelessly out of step if they do not unconditionally accept gun control, gay rights, and massive defense cuts as the norm. The media "deck" seems stacked against middle America.

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In the powerful August cover story, "Top Gun, No Ammo," ***ND*** exposes what some are calling "Doormat Diplomacy." And how Gorbachev has taken control of U.S.-Soviet negotiations and wrested unheard-of concessions from Bush, to the detriment of American and NATO security.

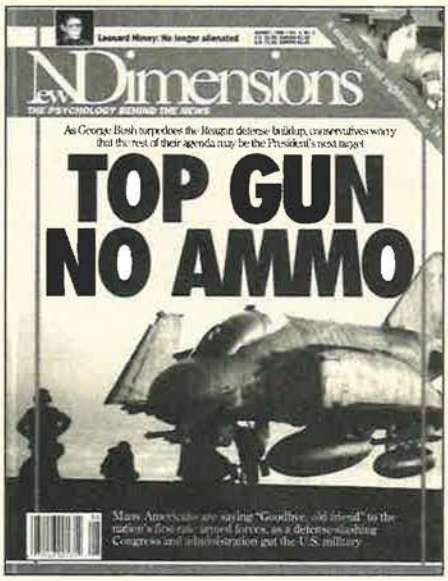
As the media swoon, singing the praises of Gorbachev, *glasnost*, and *perestroika*, the Soviet Union is in the midst of the single greatest defense build-up in the history of mankind. All while Congress mysteriously yields to calls for drastic reductions in defense spending, from *Time*, CBS, and the entrenched media establishment. ***New Dimensions*** dares to break the media mold and tell it like it really is.

*"**New Dimensions** is one of the magazines we here at High Frontier turn to first for good, honest, solid information about defense and other important American issues. **New Dimensions** is top drawer."*

—Lt. Gen. Daniel O. Graham, USA (Ret.), Director, High Frontier

"Hats off to ***New Dimensions.*** As America enters the 1990s, it is encouraging to know that there is a straight-shooting, no-nonsense news source for grass roots America. Watch out *Time* and *Newsweek*."

—U.S. Congressman Robert Dornan



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—Photo by Don Linn

The F-16s of the South Carolina ANG (shown here being refueled by a Tennessee ANG KC-135) helped win the 169th Tactical Fighter Group this year's Outstanding Guard Unit Award by performing magnificently (scoring 9,313.5 points out of 10,000) at 1989's Gunsmoke Competition, besting fifteen of TAC's premier units.

Prior to Just Cause, the 337th MAS delivered thirty-eight Marines and 140,000 pounds of cargo to Howard AFB during Operation Nimrod Dancer, and the 430th MAW garnered the Best C-130 Maintenance Team and Best C-130 Postflight Inspection at 1989's Airlift Rodeo at Pope AFB, N. C. The wing also participated in Reforger, Red Flag, Patriot Tiger, and numerous other exercises.

The wing's aggressive accident-prevention program, under the direction of Lt. Col. Archer Battista, wing safety officer, and Lt. Col. Gale Franch, chief of wing safety, is paying off. The wing has now accumulated more than 180,000 hours of accident-free flying.

Outstanding Guard Unit

To win Gunsmoke, Tactical Air Command's biennial competition, is a noteworthy accomplishment for any unit. For a unit to win it flying the oldest model F-16s in the competition is especially impressive. The 169th Tactical Fighter Group from McEntire AFB, S. C., did just that in 1989, besting fifteen of TAC's premier units from around the world. This victory was instrumental in earning the 169th TFG the Outstanding Guard Unit Award.

The group scored 9,313.5 points out of a possible 10,000 to earn the title of best overall team, team members placed near the top in all flying profiles, and the wing's Maj. Waymond Nutt won two individual flying awards (in the low-angle high drag bomb and level-bomb competitions). The wing triumphed despite the added psychological pressure caused by the damage to its home state in the aftermath of Hurricane Hugo.

The unit's members brought home many individual honors during the year, including Col. Allen C. Pate, ANG Judge Advocate General of the Year, and MSgt. Donald G. Wilson, ANG Logistics Planner of the Year.

The Group's 157th Tactical Fighter Squadron received an "Excellent" rating during a Unit Effectiveness Inspection, with the Social Actions Program and the Civil Engineering's Fire Department singled out as "best seen to date." The Group's Security Police Flight's safety program was cited by inspectors as a model for other sections. The Group completed 1989 without an accident, earning it its second TAC Flight Safety Award in a row. ■

SMSgt. Henry Russell Wins Chief Red Award

SMSgt. Henry M. Russell III, a Communication/Navigation Aids Section supervisor, is the winner of AFA's Chief Red Award for 1990. Established in 1984 and named for legendary maintenance man CMSgt. Dick Red of the Arkansas Air National Guard, this award goes annually to an enlisted Guardsman for outstanding contributions to aerospace maintenance.

Sergeant Russell joined the Alabama Air National Guard in 1971 after four years of active duty, most of it working on communication/navigation equipment on F-4s in Europe. Among his first duties was helping his unit make the transition from RF-84Fs to RF-4Cs. He was soon named NCO in Charge of the Communication/Navigational Aids Section and continues in that post today.

Sergeant Russell has been involved in numerous unit deployments, including Jack Frost to Alaska in 1975 and 1979, Red Flag to Nellis AFB, Nev., in 1979, and Sentry Sunset to Florida in 1984, 1988, and 1989. His expertise is continually sought by and given to other Guard units around the country.

He has tirelessly sought self-improvement, taking courses at the Senior NCO Academy, Jefferson State Junior College, and the University of Alabama at Birmingham. His last six technician performance appraisals have been rated "Excellent," with a Sustained Superior Performance Award being given in 1987 and 1989.

An active member of the Roebuck Drive Methodist Church, Sergeant Russell is also a leader of the local Boy Scout troop and an enthusiastic volunteer in all manner of community activities.

AFA recognizes the Services career field.

The Team of the Year

By Colleen A. Nash, Associate Editor

THE five members of AFA's 1990 "Team of the Year" represent the 5,800 enlisted people in the Services career field. Often taken for granted and usually underappreciated, they are directly responsible for maintaining the quality of life in the Air Force.

Among other specialties, the field includes food service, dormitory management, billeting, squadron administration, and consumer affairs personnel for commissaries and exchanges.

SSgt. Timothy M. Brunori of the 325th Services Squadron, Tyndall AFB, Fla., is the Customer Service Representative at the base billeting office. The Tactical Air Command Innkeeper Evaluation Team selected him as the 1989 Professional Performer.

Sergeant Brunori has been described as a natural leader, and his accomplishments bear that out. During a recent Readiness Challenge, USAF's annual worldwide engineering and services contingency skills competition, he served as the NCOIC for the Tyndall team. After winning the TAC championship, his team won the William T.

SSgt. Timothy M. Brunori (left) of the 325th Services Squadron, Tyndall AFB, Fla., has been described as a natural leader. As NCOIC of Tyndall's team at Readiness Challenge, USAF's annual worldwide engineering and contingency skills competition, he led his team to win the TAC championship and the William T. Meredith Award.

SrA. JoAnne M. English, a services specialist with the 379th Services Squadron at Wurtsmith AFB, Mich., went straight from basic training into her first assignment. Having a natural talent for baking, she now prepares some 800 servings daily of assorted desserts for the wing and bakes for special events.

Meredith Award as best in the Air Force.

He was chosen to represent Tyndall on the Panama City Chamber of Commerce Military Affairs Committee and was a speaker at the 1989 USAF Worldwide Engineering and Services Conference. Sergeant Brunori is working toward a degree in hotel and restaurant management.

SrA. JoAnne M. English of the 379th Services Squadron, Wurtsmith AFB, Mich., is a services specialist. She went straight from basic training into her first assignment as an apprentice cook and completed her career development courses in minimum time.

Her supervisor found that Airman English possessed a natural talent for baking. She now prepares some 800 servings of assorted desserts for the wing each day. She often does the baking for special events.

She was selected for below-the-zone promotion to senior airman and is taking college courses in preparation for her next step ahead.

SrA. Ian Pritchard of the 375th Services Squadron, Scott AFB, Ill., is the squadron's chief accountant and primary administrator for the Services Information Management Systems (SIMS). His SIMS expertise is much in demand. He frequently goes to other MAC bases to help implement the system.

Airman Pritchard is also good with computers. Work he has already done will enable transfer of the flight kitchen computer to a new facility without interruption in service—no small task since the flight kitchen is a twenty-four-hour operation and serves an average of 5,000 flight meals and 1,800 ground meals each month. He also developed a system of cross-checks that greatly reduced errors in accounting.

Airman Pritchard was promoted to Senior Airman below the zone and is pursuing a private pilot's license.

TSgt. Ross M. Ryan of Hq. SAC, Directorate of Housing and Services, Offutt AFB, Neb., is the Command Food Service Accountant. He ensures the accuracy of reports from all twenty-four SAC bases, accounting for $20 million in subsistence funds each year.

At Scott AFB, Ill., SrA. Ian Pritchard is the 375th Services Squadron's chief accountant and primary administrator for the Services Information Management System (SIMS). He frequently travels to other MAC bases to help implement the system. He also developed a cross-check system that has greatly reduced accounting errors.

As Command Food Service Accountant with SAC's Directorate of Housing and Services at Offutt AFB, Neb., TSgt. Ross M. Ryan ensures the accuracy of reports from all twenty-four SAC bases, accounting for $20 million in subsistence funds each year. His proposal to streamline food service accounting is being tested at four bases.

He is a member of the team that promotes "Healthy Heart" menu choices throughout the command.

Sergeant Ryan wrote a Command Model Installation Program proposal to modify the basic daily food allowance and streamline food service accounting. It is now being tested at four SAC bases and will be considered for USAF-wide implementation. In 1988, Sergeant Ryan was SAC Services Technician of the Year and honor graduate of the first Services Specialist Course.

SSgt. Shirley M. Sanders of the 384th Services Squadron, McConnell AFB, Kan., is a food services specialist. In her previous assignment at Clark AB in the Philippines, she was named Quality Assurance Evaluator of the Quarter for Thirteenth Air Force. Her uncompromising standards resulted in sixteen outstanding sanitation inspections in a row.

Sergeant Sanders is a self-taught SIMS-implementation specialist—and a fine one. She was chosen for the Pacific Air Forces SIMS-implementation team.

She initiated a "Master Chef of the Quarter" program to recognize outstanding food service workers. In addition, she was the squadron representative for prevention of fraud, waste, and abuse.

Sergeant Sanders has accumulated forty-two credit hours—while maintaining a 3.45 grade point average—toward an associate's degree in hotel and restaurant management. ■

SSgt. Shirley M. Sanders was named the Quality Assurance Evaluator of the Quarter for Thirteenth Air Force in her previous assignment at Clark AB in the Philippines. A self-taught SIMS-implementation specialist, she is now a food services specialist with the 384th Services Squadron at McConnell AFB, Kan.

SCIENCE/SCOPE®

An innovative radar antenna that can look forward, back, or to the side virtually instantaneously may soon be performing reconnaissance for the U.S. Air Force. The electronically scanning antenna (ESA), built by Hughes Aircraft Company, can position its broader beam faster than conventional antennas because it is a phased-array radar antenna that scans the radar beam electronically instead of mechanically. As a result of four years of successful testing in Europe, during which time an ESA was mounted in a United States Air Force TR-1 reconnaissance plane, the Air Force plans to install ESAs in the U-2R and TR-1 aircraft of its advanced Synthetic Aperture Radar Systems - 2 fleet.

An improved flow of information between air defense command and control centers and surface-to-air missile systems will be one result of a new state-of-the-art communications link being designed by Hughes. The link, called the Intelligent Interface Processor, will provide the signal interface between AN/TSQ-73 surface-to-air missile control systems and fixed NATO Air Defense Ground Environment sites in West Germany, Italy, Belgium, and the Netherlands. With the new system, NATO commanders will be able to allocate targets to be engaged by missile batteries and still retain autonomy. Commanders will also be able to exchange target and status information currently available only through voice communications.

An improved sight stabilization system will significantly increase first-round hit probability for tank gunners. The two-axis stabilized head mirror for the U.S. Army's M1A2 Abrams tank is currently under development at Hughes. Current M1 tanks are equipped with a single-axis stabilized head mirror, which limits the gunner's ability to accurately sight and fire on moving targets when the tank is also moving. The new system is part of the Army's planned improvements for the M1A2. Hughes also produces the laser rangefinder and thermal imaging system for the current M1 tank.

A state-of-the-art, on-line computer graphics projector helps a computing company manage a network of 300 host computers. Seven Hughes-built Superprojectors operating around the clock in General Motor's Electronic Data System's (EDS) Information Management Center give more than 100 operators up-to-date network status reports (operation bulletins, maps) and other network management information. Additionally, it provides a visually dramatic presentation of EDS services to its customers. The Superprojectors, connected via a standard RS232 bus to display-generating computers, project images with resolutions in excess of 1,000 TV lines onto 14- by 16-foot screens. The projectors use liquid crystal light valve technology developed by Hughes for displaying information in military command and control centers.

A new hydrogen maser "atomic clock" combines a compact size suitable for space applications with the highest long-term stability ever reported for this type of device. Developed and built by Hughes for the U.S. Navy, the fully automated frequency standard is about 10 times more stable than currently-used cesium beam devices. Atomic clocks use the resonance frequency of an atom to provide a precise measurement of time, but use of hydrogen maser clocks in space has been limited due to their bulkiness. Other Hughes-built atomic clocks are being developed for use in the Defense Department's NAVSTAR Global Positioning System.

For more information write to P.O. Box 45068, Los Angeles, CA 90045-0068

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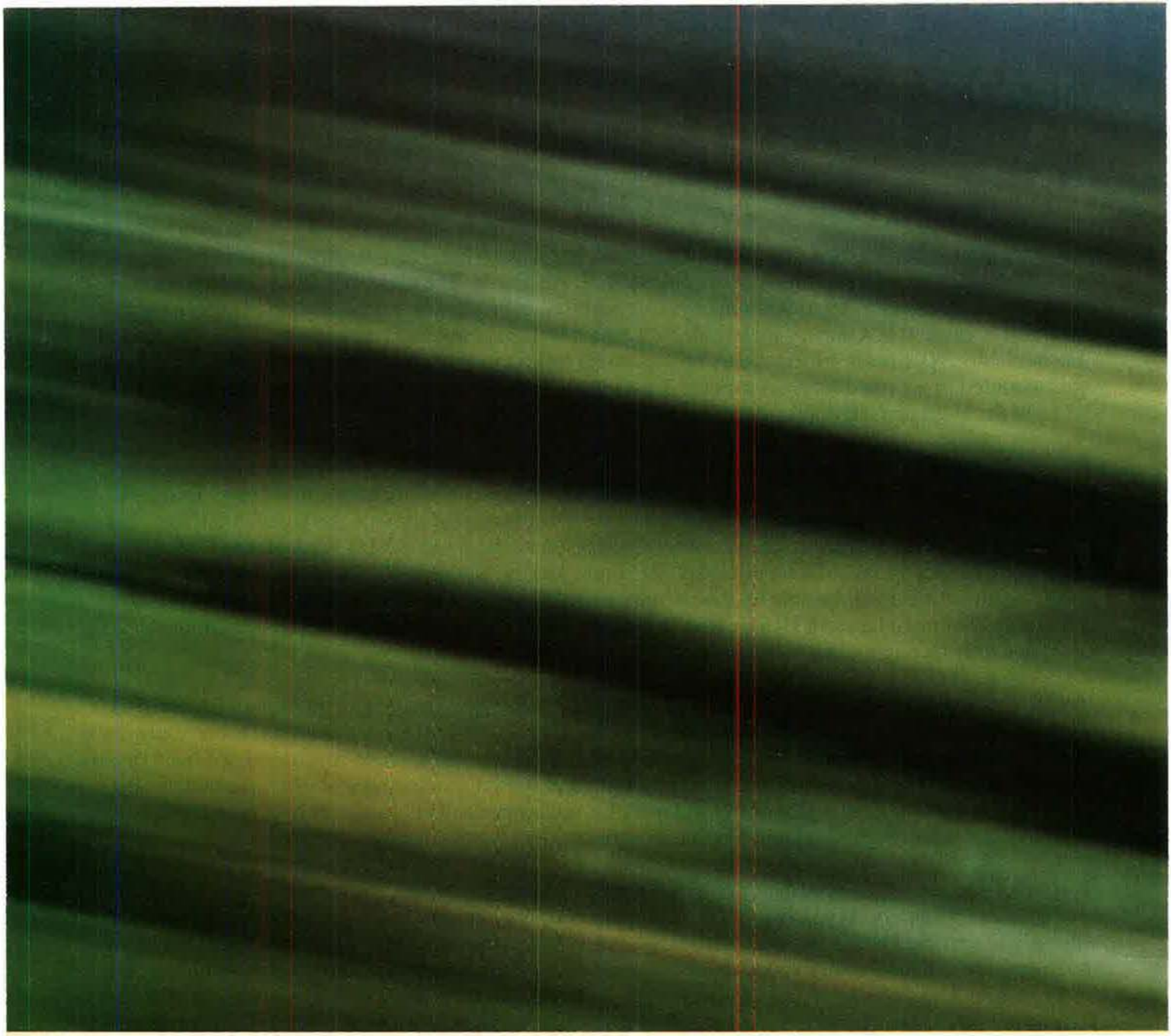

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Fully maintainable by Air Force personnel, the ALQ-184 and its support needs are now in production. It's another example of how Raytheon's

the ALQ-184.

long experience with system fundamentals can improve an older system's capabilities.

For more information, write Raytheon Company, Government Marketing, 141 Spring Street, Lexington, MA 02173.

The ALQ-184 jamming pod is being deployed on U.S. Air Force F-4s and F-16s.

Raytheon

Where quality starts with fundamentals

In the Battle of Britain, the fate of the nation hung on victory in the air.

Their Finest Hour

By C. V. Glines

Though they faced long odds in the Battle of Britain, the RAF had the morale and the tenacity to achieve the many "miracles" that resulted in victory.

"NEVER in the field of human conflict was so much owed by so many to so few." With these words, Winston Churchill paid timeless tribute to the brave fighter pilots of Britain's Royal Air Force who saved their nation from invasion in the summer and fall of 1940, fifty years ago. Small in number, they met the swaggering German Luftwaffe and, fighting in Spitfires and Hurricanes, remained unconquerable and supreme in what has been known ever since as the Battle of Britain.

Nazi invasions of the Low Countries and France began on May 10, 1940. By May 21, Hitler's war machine reached the English Channel. Victorious Nazi forces had overwhelmed all resistance. Only a few areas in western and northwestern France held out.

Two weeks after the epic evacuation of Allied forces at Dunkirk, the Battle of France was over. There was every reason to believe Britain would be invaded. The world's largest air force was now only an hour's flight from England. As Churchill told his people: "Hitler knows that he will have to break us . . . or lose the war. If we can stand up to him, all Europe may be free, and the life of the world may move forward into broad, sunlit uplands. But if we fail, then the whole world . . . will sink into the abyss of a new Dark Age. . . . Let us therefore brace ourselves to our duties, and so bear ourselves that, if the British Empire and its Commonwealth last for a thousand years, men will still say, 'This was their finest hour.'"

For the RAF, Dunkirk had a high cost. The British had lost some 100 aircraft and eighty pilots in ten days of fighting. As the evacuation continued, more planes and pilots were sought by Air Vice Marshal Keith Park, head of No. 11 Group covering the pullback. Air Chief Marshal Sir Hugh C. T. Dowding, head of Fighter Command, refused, reckoning that to do so would weaken English defenses against the Nazi invasion. Dowding's decision would pay off in the months ahead.

The Great Battle Begins

The Battle of Britain is deemed to have begun on July 10. On that day, 100 Luftwaffe bombers executed a large-scale night bombing raid against targets in Yorkshire and Kent. The next night, 100 more bombers attacked targets throughout England.

German operations divided into four phases. The first, spanning August 8–18, saw concentrated attack on Channel convoys, England's southeast coast and harbors, and nearby airfields. In the second phase, August 19 through September 5, attacks fell on RAF fighter fields farther inland. The third phase, September 6 through October 5, brought indiscriminate attacks on London. The fourth phase, October 6–31, consisted of night attacks on key civil and military targets.

The Germans had three objectives: to blockade British ports and shipping, achieve air superiority, and crush Britain's spirit.

On July 16, 1940, Hitler signed Directive Number 16, authorizing Operation Sea Lion, the code name for the invasion of Britain. On August 1, 1940, Hitler issued Directive Number 17 "for the final conquest of England," with August 15 as D-day. He ordered destruction of the RAF with attacks on "flying forma-

tions, their ground organizations, and their supply organizations; secondly, against the aircraft production industry. . . ."

The air operation, named *Adlerangriff* (Eagle Attack), was to begin on *Adlertag* (Eagle Day), first set for August 10, then postponed to August 13. Three massive Nazi *Luftflotten* of bombers, fighters, and other aircraft—3,500 planes in all—faced England.

Across the Channel, Dowding's Fighter Command had 704 operational fighters and 289 in reserve. He had 1,253 pilots for four fighter groups totaling sixty squadrons on thirty-nine bases.

The Air Ministry had established other defensive units, including a network of stations operating radio-direction-finding (RDF) equipment. The latter became known as "radar" stations (for radio detection and ranging) and proved decisive in the air war. RDF sites could track Luftwaffe planes joining up over France and follow their routes and altitudes. British defenders were rarely surprised, and RAF fighters could scramble at the last minute.

Göring predicted the air war would be over in four days. As the Luftwaffe prepared for massive Eagle Day assaults, harassment raids increased. To prevent losses, RAF fighters were ordered to go after bombers and avoid scrapping with German fighter escorts.

The Luftwaffe had 2,700 planes ready to fly Eagle Day sorties. The war's largest air battles up to that time took place in five actions along a 500-mile front on August 13. The Luftwaffe flew 2,000 sorties, the RAF 974. "It was indeed a crucial day," said Churchill. "In the south, all our twenty-two squadrons were engaged, many twice, some three times, and German losses, added to those in the north, were seventy-six to our thirty-four." This, observed Churchill, was "a recognizable disaster to the German Air Force."

Göring did not think so. He attributed the strong RAF resistance in the south to participation of fighters from the Midlands and Scotland. In reality, Dowding wisely kept them in reserve. On August 15, German seaplanes, approaching across the North Sea, tried to lure RAF fighters away as Heinkel He-111 bombers and Messerschmitt Bf-110 escorts, following closely, turned toward airfields in northeast England. British radar was not deceived. RAF fighters from No. 13 Group stopped most of the bombers.

Göring sent another mass attack against airfields in Yorkshire. A formation of Junkers Ju-88 twin-engine bombers was intercepted by two squadrons of fighters from No. 12 Group but managed to get through and destroy ten RAF bombers on the ground. German raids continued in the south.

Dowding's insistence on going after the bombers caused Göring to send up larger numbers of fighter escorts. However, attempts to weaken the RAF's fighter resources were ineffective.

Spectacular Heroism

The next day, the Luftwaffe flew 1,715 sorties and bombed eight airfields, but only three contained fighter units. There were fierce dogfights along the south coast. There were spectacular acts of heroism, such as that of Flight Cmdr. James Nicolson. Badly wounded, his Hurricane on fire, Nicolson was about to bail out when a Bf-110 drifted in

front of him. He resumed his seat and fired away as the German pilot tried desperately to escape. Nicolson kept firing at the enemy plane even as flames burned the flesh from his hands. He bailed out only when he saw the Bf-110 go down. His heroism won him the only Victoria Cross given to a British fighter pilot during the war.

Göring continued his attacks against British radar stations and bases for two days. On August 18, the Luftwaffe lost another seventy-one planes, the RAF thirty-nine fighters.

In Germany, it was time for reassessment. Göring's four days of huge assaults—August 13, 15, 16, and 18—cost 236 fighters and bombers, yet the RAF fighter force seemed strong as ever. The Nazi air chief blamed his fighter units for the disaster. The RAF also suffered heavy losses: 213 Spitfires and Hurricanes between August 8 and 18. Factories could not replace them fast enough.

The raids continued. On August 24, 170 German bombers, intending to bomb Thames Haven and Rochester, hit central London instead. The next day, in retaliation, Bomber Command sent eighty-one Hampdens to bomb factories near Berlin. Hitler flew into a rage; Göring had boasted that the capital would never be hit.

Göring's intelligence sources and pilots erroneously reported that the RAF was decimated and had lost 1,115 aircraft in the period from August 8 to August 31. The true figure was 465 Spitfires and Hurricanes lost. Fighter Command was reduced to 419 Hurricanes and 211 Spitfires; 103 pilots had been killed and 128 seriously wounded—a quarter of total strength.

However, the swift loss of nearly 1,000 German aircraft sobered Göring. Luftwaffe pilots also were greatly affected by the disparity between their leaders' assurance of an easy victory and the RAF's fighting performance.

By August 31, RAF Fighter Command pilots were weary from two months of unrelenting action. Losses had been high, replacements few. Pilots were being sent to operational units with only five to ten hours' time in Hurricanes or Spitfires, and no practice at all in air-to-air gunnery. Still, RAF morale remained high.

On September 7 a change occurred in Nazi strategy—one Dowding later called "a miracle"—that took pressure off RAF airfields. The Luftwaffe suddenly focused on London. Five hundred bombers, accompanied by 600 fighters, hit the city in a mass day attack. That night, 250 bombers returned. For twenty-three days, Luftwaffe planes roared up the Thames valley to London, dropping explosives and incendiaries. Hundreds of civilians were killed and wounded.

For eight crucial days after September 7, however, Fighter Command had breathing room to regroup. On September 15, the weather was excellent, and the Luftwaffe launched the heaviest daylight attack to date on London. Its leaders expected little opposition, but the RAF Spitfires and seventeen Hurricanes were waiting.

The Hinge of Fate

Churchill went that day to the Group Operations Room at Uxbridge. There he witnessed the unfolding of what he called "one of the decisive battles of the war."

The Operations Room, Churchill later wrote, was like a small, two-tiered theater. On the floor was a large map table, around which men moved disks denoting German and RAF planes. Covering one wall was a blackboard divided into six columns (for six fighter stations) of light bulbs. The lowest horizontal row of bulbs, when lit, showed which RAF squadrons were "standing by." The next highest showed squadrons "at readiness" of five minutes, the next those that had taken off, the next those that had seen Nazi planes, the next—with red lights—those in action.

"After about a quarter of an hour," recalled Churchill, "the raid plotters began to move about. . . . The bulbs along the bottom of the wall display panel began to glow as various squadrons came to 'stand by.'" In quick succession, the operations room received reports of German aircraft sightings, and to Churchill "it was evident that a serious battle impended."

Blackboard lights began to flash. "Presently the red bulbs showed that a majority of our squadrons was engaged," Churchill said. "A subdued hum arose from the floor, where busy plotters pushed their disks to and fro in accordance with the swiftly changing situation. . . . In a little while all our squadrons were fighting, and some had already begun to return for fuel. All were in the air. The lower line of light bulbs was out. . . .

"I became conscious of the anxiety of the Commander," Churchill recalled. "Hitherto I had watched in silence. I now asked, 'What other reserves have we?' 'There are none,' said Air Vice Marshal Park. The odds were great; our margins small; the stakes high. Another five minutes passed, and most of our squadrons had now descended to refuel. In many cases our resources could not give them overhead protection.

"Then it appeared that the enemy was going home. The shifting of the disks on the table below showed a continuous movement of German bombers and fighters. No new attack appeared. In another ten minutes, the action ended."

On that historic day, Churchill had followed what he later termed "the crux of the Battle of Britain." Scores of Luftwaffe bombers and fighter escorts made it to London, but fifty-six had been brought down, compared to twenty-seven RAF planes and thirteen pilots.

Fighter Command had fought with all it had. The Luftwaffe, hoping to pulverize London and terrorize the English people, had failed. Two days later, Hitler postponed Sea Lion. On February 13, 1942, he called it off altogether.

By October 31, so far as England was concerned, the Battle of Britain was over. The Luftwaffe lost 1,733 aircraft, the RAF 915. The Luftwaffe's best efforts were never good enough. Airpower and the will of the British people had saved England. Never again was the island threatened by Nazi invasion. ■

C. V. Glines is a regular contributor to this magazine. A retired Air Force colonel, he is a free-lance writer, a magazine editor, and the author of numerous books. His most recent article for AIR FORCE *Magazine was "The Inverted Jenny," which appeared in the July 1990 issue.*

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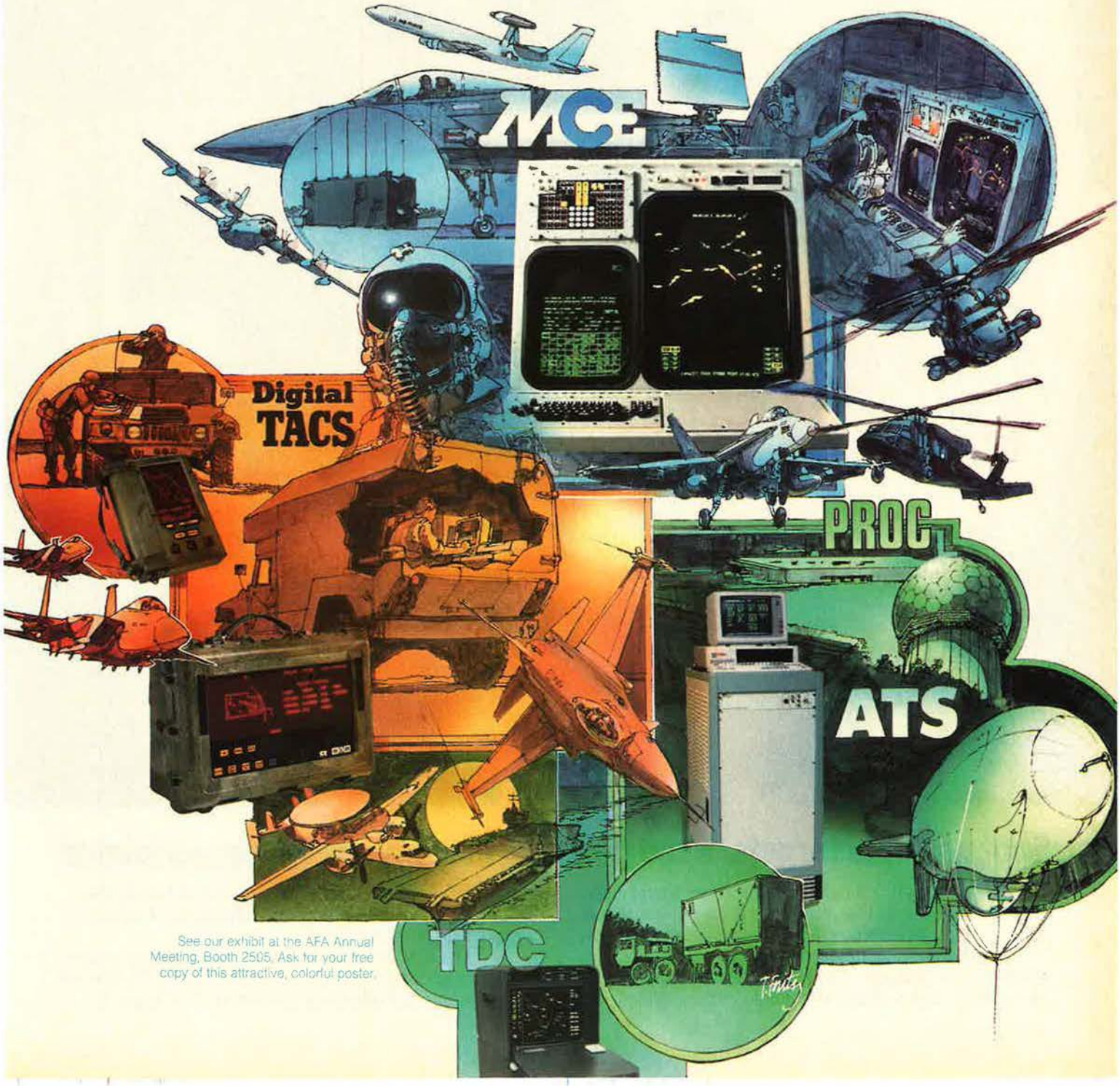

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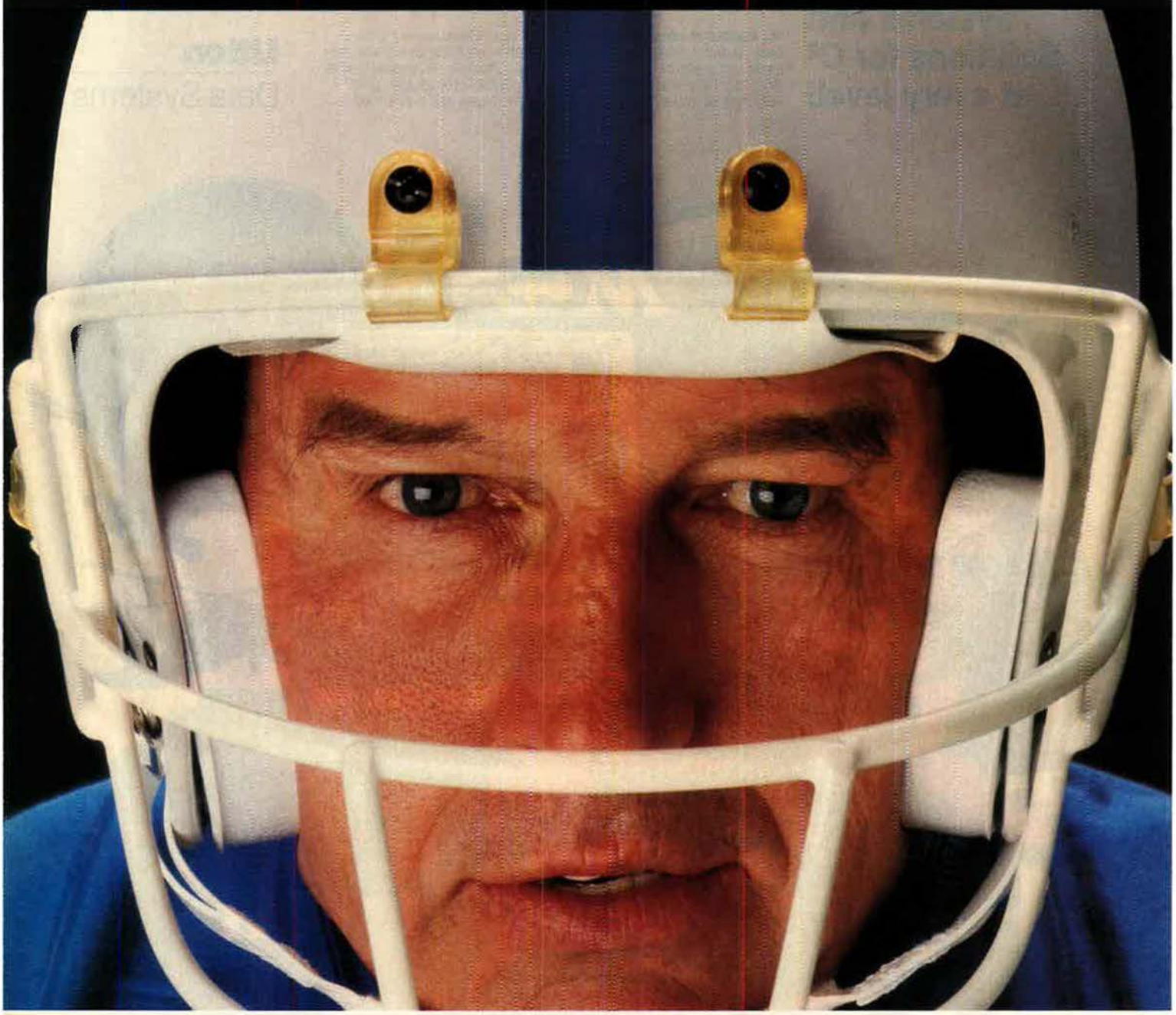

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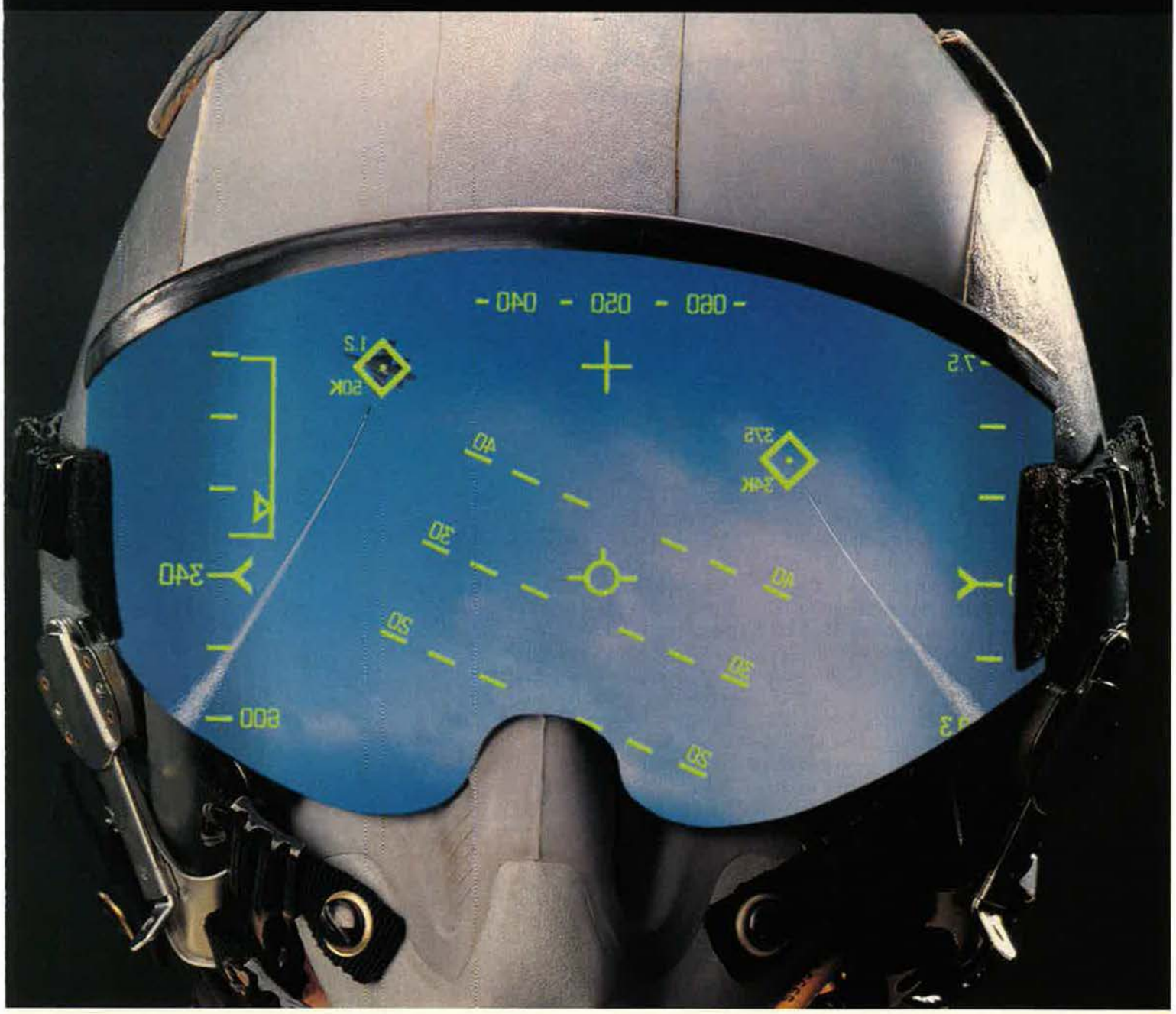

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The public gets a look at the first of the prototypes competing to become the Advanced Tactical Fighter.

The YF-23A Rolls Out

By Jeffrey P. Rhodes, Aeronautics Editor

"EIGHTEEN years ago—almost to the day—we unveiled our current air-superiority fighter, the F-15 Eagle," Gen. Robert D. Russ, commander of Tactical Air Command, reminded the crowd gathered in front of the Advanced Tactical Fighter Combined Test Force hangar at Edwards AFB, Calif., on June 22.

"By the time the ATF enters the operational inventory, most of our F-15s will be well over twenty years of age, so the time is upon us to produce a new air-superiority fighter," he said.

Then the hangar doors opened, and the Northrop/McDonnell Douglas YF-23A—one of the two prototypes competing to become the ATF—rolled out publicly for the first time.

Next spring, the Air Force is scheduled to wind up the fifty-four-month demonstration/validation phase of the ATF program and choose either the YF-23A or the Lockheed/Boeing/General Dynamics YF-22A prototype for full-scale development. One engine contractor (either Pratt & Whitney or General Electric) will also be chosen. At stake is a planned buy of 750 aircraft.

From the start, the ATF program has been an ambitious one. The aircraft was required to incorporate low-observable (stealth) characteristics to the extent possible while preserving high maneuverability. It had to cruise at supersonic speeds without the use of afterburners. It had to carry an adequate payload for greater range than the current generation of fighters. In addition, the design had to be flexible enough for the Navy to adapt most of it for its next-generation fleet air defense fighter.

On top of all that, the Air Force said the ATF should operate with less support equipment and fewer maintenance personnel than current-generation aircraft and be much more reliable than any of its predecessors.

"Each of the contractors has taken a different approach on [its] aircraft, so this is not a flyoff," said Brig. Gen. James A. Fain, the ATF program manager. "We are looking at the total weapon system, so comparing the two aircraft is not really fair. Each contractor will do its own

—Staff photo by Jeffrey P. Rhodes.

The first of two Northrop/McDonnell Douglas YF-23A Advanced Tactical Fighter prototypes (right) rolled out at Edwards AFB, Calif., on June 22. Northrop test pilot Paul Metz (above) will have the honor of flying the aircraft for the first time.

flight-test program to meet our generally stated requirements to build a database and reduce risk when we go into full-scale development."

Out of the Hangar

"We are witness to the emergence of a new aircraft, a new generation of aircraft, that represents a turning point in tactical military airpower," said Northrop President and Chief Executive Officer Kent Kresa as the YF-23 prototype (serial number 87-800) was towed outside.

At first glance, it seemed that the Northrop and McDonnell Douglas designers might have borrowed ideas from other aircraft and combined them in new ways on the YF-23. The nose section, with its chine, is reminiscent of the SR-71. The chine blends into wing leading edge extensions (a prominent feature of the Navy F/A-18, for which Northrop is the principal subcontractor to McDonnell Douglas).

The landing gear also resembles that of an F/A-18. The nose gear retracts forward, while the two single-wheel main gears retract aft. The main gear also has the Hornet's distinctive "knee" joint below the oleo strut piston. The gear doors remain open when the landing gear is down.

The deck aft of the engine nacelles has a serrated edge similar to that on Northrop's other stealth design, the B-2A bomber. Another similarity to the B-2 is that the compound curves in the main fuselage and the nacelles deny radar beams an angular surface off of which to bounce.

This slate-gray YF-23A prototype air vehicle had few visible access panel lines, and panels that did show were covered with a lighter-colored radar-absorbent "tape" to seal off the edges. Officials would not talk about materials, but the aircraft is probably built mostly of composites.

The YF-23 is sixty-seven feet, four inches long and has a wingspan of forty-three feet, six inches. That makes it both longer (by almost three and a half feet) and wider (by almost a foot and a half) than the F-15 it would replace. At a height of thirteen feet, nine inches, however, the YF-23 is about five feet shorter than the F-15. The airplane sits relatively low to the ground, and most of it is slightly above shoulder height, making access convenient.

The YF-23's wings are delta-shaped with squared tips. Viewed from above, they form a diamond, a planform very similar to that of the X-15. The cantilever wings have a thin cross section and are mounted with approximately two degrees of anhedral. The leading edge slats run about a third the length of the wing. The small ailerons are positioned outboard of the flaps, which are located at the wing/fuselage juncture. There are no wingtip missile rails.

The two large ruddervators cant upward at forty-five-degree angles from the horizontal and are fully movable from the fuselage join. The flat, single-piece units are positioned to mask the engine exhausts from the sides.

The Ins and Outs

The fixed-geometry, inverted trapezoidal inlets, which were covered during the rollout, are positioned under the wing. The oversized engine nacelles, on the other hand, are located above the wing, indicating an upward-sweeping duct. This arrangement most likely prevents radar beams that enter the intake from reaching the highly reflective engine turbine blades.

However, designs that distort airflow for reasons of stealth (as on the B-2 and F-117 fighter) also restrict the amount of air that reaches the engine at slow speeds and during takeoff and landing. A pair of panels on the dorsal side of the YF-23 above each of the main inlets are apparently auxiliary intakes, similar to those on the other stealth aircraft.

The intakes straddle the forward fuselage section, and the pronounced dorsal nacelles meet in a V shape. The length of the nacelles and the relative shortness of both the Pratt & Whitney and General Electric ATF engines indicate that the efflux is either fed through baffles or mixed with bleed air for cooling before it flows out the exhaust.

Reporters at the rollout did not get a look at the exhausts, but a three-view drawing of the YF-23 shows two-dimensional exhaust nozzles on the top of the fuselage, much like the B-2 and the F-117. Given that configuration, it appears that Northrop and McDonnell Douglas did not use thrust vectoring. Earlier, the Air Force dropped a requirement for thrust reversers because of the weight penalty they imposed.

The separate main fuselage section houses the cockpit, fuel, and weapons bay. Glazing in the rear-hinged, upward-opening canopy is tinted, indicating protection from electromagnetic interference.

Visibility for the pilot appears to be good. The McDonnell Douglas ACES II ejection seat (which was covered at the rollout) sits fairly high. The windscreen is a separate piece, and there is a substantial canopy arch. At the rollout, a wide-field-of-view head-up display could be seen through the windscreen.

The plane's aerial refueling port is behind the cockpit on the fuselage spine, as is a UHF "sharkfin" antenna. The plane has three air data probes, one on each side underneath the nose and one above the chine on the starboard side. Rollout observers were kept twenty yards from the plane, but weapons bay doors aft of the nose-wheel well were discernable.

"The weapons load for the aircraft was established in an overall balance with the performance of the plane," said General Fain. "The solution we reached was backed up by a tremendous amount of digital simulation. The load is comparable to that of the F-15, but [the mix] is still classified."

Whichever ATF prototype is eventually chosen, it will carry both the short-range, heat-seeking AIM-9M Sidewinder and the radar-guided AIM-120A Advanced Medium-Range Air-to-Air Missile (AMRAAM). The ATF will also have a proven-design internal gun, probably the 20-mm M61A1 used on the F-15 and F-16. While no gun port showed on the YF-23 prototype at rollout, it could have been faired over for initial flight tests.

Because the missiles (and possibly the gun) will be carried in the internal bay (to reduce drag and increase stealth), ordnance will most likely be mounted on a hydraulically operated rack. This will allow the missiles to get out into the slipstream, acquire their targets, and allow for launch even if the aircraft is inverted. The rack, which will have to withstand severe aerodynamic

loads, must extend and retract within a few seconds in order for the aircraft to maintain stealthiness.

Other Development Efforts

The first YF-23 will fly with a pair of Pratt & Whitney YF119-PW-100 turbofan engines. The second YF-23 prototype, which will be finished by the end of the summer, will use the General Electric YF120-GE-100 in its tests. The YF-22 prototypes will fly first with YF120s and then with YF119s. Both engines are in the 35,000-pound-thrust category, and both allow cruise at approximately Mach 1.5 without afterburner. These new engines have fewer parts than current-generation F100s and F110s and will be more reliable.

Pratt & Whitney, whose strengths lie in materials and digital engine controls, appears to have decided to extend the current state of the art with its YF119. General Electric, on the other hand, has taken a radical variable-cycle approach that will allow the YF120 to operate like a turbojet at supersonic speeds and like a fuel-efficient turbofan at subsonic speeds.

A third major ATF development effort (and many would say that this is *the* major development effort) is in avionics. The ATF will use common-module avionics architecture. Instead of individual "black boxes" for the various systems, the common modules will work in a variety of combinations to handle the full range of sensor and mission-processing tasks. Many of the modules will also be usable in the Navy's A-12A attack aircraft and the Army's LH next-generation helicopter.

The Northrop/McDonnell Douglas team modified a BAC-111, a twin-engine jetliner, to serve as its avionics flying laboratory. Tests began last year. The McDonnell plant in St. Louis, Mo., also has an avionics ground prototype.

Last April, the ground prototype was used to run more than 500,000 lines of Ada software in a demonstration of fifteen of the sixteen common modules that will be needed in the ATF demonstration/validation phase.

The electronically scanned array radar of the YF-23 is built by Westinghouse and Texas Instruments. While it is known that the YF-23 will make use of common modules, little other detail about the avionics suite was revealed at the rollout.

The work split on the YF-23 has Northrop performing total systems integration and final assembly. The company is also responsible for the aft fuselage and empennage, defensive avionics, and the flight-control system. McDonnell Douglas is responsible for the forward and center fuselage, landing gear and wings, fuel and armament systems, offensive avionics, and controls and displays. The crew station and the pilot/vehicle interface are a joint responsibility.

The YF-23 industrial team consists of sixty-two subcontractors in twenty-five states. Development work on the YF-23 was done at Northrop's facility in Pico Rivera, Calif., and if this is the prototype selected for full-scale development, the "home of the B-2" will also be the "home of the F-23." Mr. Kresa said that F-23 production would be done in Northrop facilities, which he did not specify, in California and at the McDonnell plant in St. Louis.

"We've got a new airplane, a new engine, and new avionics," General Fain said at the rollout. "We want to be careful before we fly." Ground and taxi tests, as well as a final safety inspection, lay ahead before Northrop pilot Paul Metz would take the airplane up. (Originally expected in July, the first flight came in August.) During testing, which will include weapon launches, company and military pilots will fly the plane.

Under the current schedule, the Air Force will select one airframe team and one engine builder in April 1991, and a contract will be awarded in July. Secretary of Defense Richard Cheney has stretched out the ATF program, and production is not forecast to begin until 1996.

Projected flyaway cost of production ATFs is $43.5 million per aircraft, with a total cost of $53.8 billion in FY 1985 dollars, the standard measure of cost since the financial baseline was laid down in 1985. (In current dollars, unit flyaway cost would be $51.3 million and total program cost $63.5 billion.)

Northrop's Mr. Kresa ended the rollout ceremonies on a somber note. "This is not just a competition to build the Air Force's next fighter," he said. "Given the current budget climate, this could very well be a competition for survival for several aerospace companies." ■

This photo shows the YF-23's fixed, rectangular exhausts, similar to those on the B-2. The exhausts appear to be surrounded by heat-absorbing material similar to that on the space shuttle and are also masked by the ruddervators. Video footage reveals that all of the YF-23's control surfaces (except the leading edge slats) can be operated independently. This will greatly increase maneuverability.

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Employer | Position | Years/Months There | Bus. Phone

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Previous Employer | Position | Years/Months There

Nearest Relative (not living with you) | Address | City/State/Zip

Phone | Relationship

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First Name | Middle Initial | Last Name

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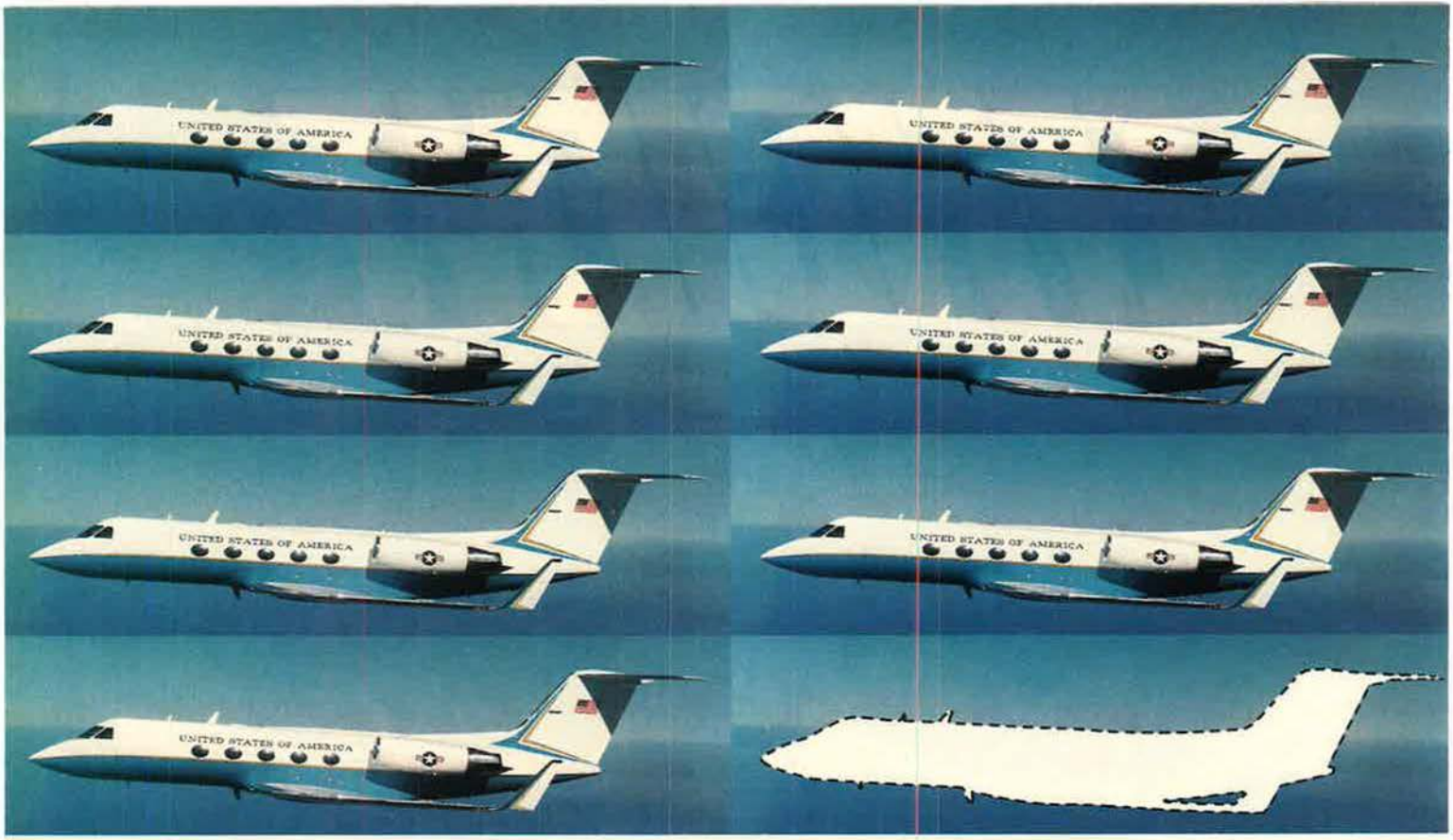

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Program Executive Officer Tactical and Airlift Systems
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Wright-Patterson AFB, Ohio

Program Executive Officer Information Systems
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Gunter AFB, Ala.

Program Executive Officer Space Systems
Brig. Gen. Garry A. Schnelzer
Los Angeles AFB, Calif.

The Major Commands

Air Force Communications Command

Hq. Scott AFB, Ill.

Maj. Gen. Robert H. Ludwig
Commander

Airlift Communications Div.*
Col. Stephen E. Helley
Scott AFB, Ill.

Engineering Installation Div.
Col. Robert L. Hayes
Tinker AFB, Okla.

European Communications Div.*
Col. Kenneth Key
Kapaun Administration Annex,
West Germany

Pacific Communications Div.*
Col. Vincent Majkowski
Hickam AFB, Hawaii

Space Communications Div.*
Col. Michael J. Ondrasek
Colorado Springs, Colo.

Computer Systems Div.
Brig. Gen. Lester J. Weber
Gunter AFB, Ala.

Strategic Communications Div.*
Brig. Gen. Stanley L. Dilda, Jr.
Offutt AFB, Neb.

Tactical Communications Div.*
Col. Bruce J. Bohn
Langley AFB, Va.

Air Training Communications Div.*
Col. Robert M. Chaplin
Randolph AFB, Tex.

Logistics Communications Div.*
Col. Stephen E. Anno
Wright-Patterson AFB, Ohio

Research and Acquisition Communications Div.*
Col. Paul G. Patton
Andrews AFB, Md.

Technology Integration Ctr.**
Brig. Gen. Frederick A. Zehrer III
Scott AFB, Ill.

*To be transferred in AFCC restructuring October 1.
**To be activated October 1.

Air Force Logistics Command

Hq. Wright-Patterson AFB, Ohio

Gen. Charles C. McDonald
Commander

Ogden Air Logistics Ctr.
Maj. Gen. James W. Hopp
Hill AFB, Utah

Oklahoma City Air Logistics Ctr.
Maj. Gen. Joseph K. Spiers
Tinker AFB, Okla.

Sacramento Air Logistics Ctr.
Maj. Gen. Trevor A. Hammond
McClellan AFB, Calif.

San Antonio Air Logistics Ctr.
Maj. Gen. Richard C. Smith
Kelly AFB, Tex.

Warner Robins Air Logistics Ctr.
Maj. Gen. Richard F. Gillis
Robins AFB, Ga.

Logistics Operations Ctr.
Maj. Gen. William F. Hallin
Wright-Patterson AFB, Ohio

Logistics Management Systems Ctr.
Brig. Gen. John F. Phillips
Wright-Patterson AFB, Ohio

International Logistics Ctr.
Brig. Gen. Otto K. Habedank
Wright-Patterson AFB, Ohio

Acquisition Logistics Div.
Brig. Gen. Lewis E. Curtis III
Wright-Patterson AFB, Ohio

Air Force Logistics Management Ctr.
Col. Russell G. Stafford
Gunter AFB, Ala.

Aerospace Guidance and Metrology Ctr.
Col. D. B. Flournoy
Newark AFB, Ohio

Aerospace Maintenance and Regeneration Ctr.
Col. Larry P. Jones
Davis-Monthan AFB, Ariz.

Air Force Contract Maintenance Ctr.
Col. Kenneth R. Wheeler
Wright-Patterson AFB, Ohio

Air Force Museum
Richard L. Uppstrom
Wright-Patterson AFB, Ohio

Cataloging and Standardization Ctr.
Col. J. H. O'Neill
Battle Creek, Mich.

Air Force Contract Law Ctr.
Brig. Gen. Nolan Sklute
Wright-Patterson AFB, Ohio

2750th Air Base Wing
Col. William B. Orellana
Wright-Patterson AFB, Ohio

AFLC Inspection and Safety Ctr.
Col. Lloyd R. Powell
Wright-Patterson AFB, Ohio

Wright-Patterson Contracting Ctr.
Col. Roland Hassebrock
Wright-Patterson AFB, Ohio

USAF Medical Ctr.
Col. John A. Anderson
Wright-Patterson AFB, Ohio

Air Force Distribution Agency
Col. Ronald D. Via
Wright-Patterson AFB, Ohio

The Major Commands (Continued)

Air Force Space Command

Hq. Peterson AFB, Colo.

Lt. Gen. Thomas S. Moorman, Jr.
Commander

1st Space Wing
Col. Richard G. DeKok
Peterson AFB, Colo.

2d Space Wing
Col. (Brig. Gen. selectee)
Jimmey R. Morrell
Falcon AFB, Colo.

3d Space Support Wing
Col. Gerald M. Bergeman
Peterson AFB, Colo.

Air Force Special Operations Command

Hq. Hurlburt Field, Fla.

Maj. Gen. Thomas E. Eggers
Commander

1st Special Operations Wing
Col. George A. Gray III
Hurlburt Field, Fla.

39th Special Operations Wing
Col. Byron R. Hoolen
Rhein-Main AB, West Germany

353d Special Operations Wing
Col. James P. Nance
Clark AB, Philippines

Air Force Systems Command

Hq. Andrews AFB, Md.

Gen. Ronald W. Yates
Commander

Aeronautical Systems Div.
Lt. Gen. Thomas R. Ferguson, Jr.
Wright-Patterson AFB, Ohio

Space Systems Div.
Lt. Gen. Donald L. Cromer
Los Angeles AFB, Calif.

Electronic Systems Div.
Lt. Gen. Gordon E. Fornell
Hanscom AFB, Mass.

Air Force Flight Test Ctr.
Maj. Gen. John P. Schoeppner, Jr.
Edwards AFB, Calif.

Ballistic Missile Organization
Brig. Gen. Ralph G. Tourino
Norton AFB, Calif.

Air Force Development Test Ctr.
Maj. Gen. Kenneth E. Slaten
Eglin AFB, Fla.

Human Systems Div.
Maj. Gen. Fredric F. Doppelt
Brooks AFB, Tex.

Arnold Engineering Development Ctr.
Col. Richard H. Roellig
Arnold AFB, Tenn.

Foreign Technology Div.
Col. Francis C. Gideon, Jr.
Wright-Patterson AFB, Ohio

Air Force Space Technology Ctr.
Col. Joseph R. Johnson
Kirtland AFB, N. M.

National Aerospace Plane Joint Program Office
Dr. Robert R. Barthelemy
Wright-Patterson AFB, Ohio

Air Force Office of Scientific Research
Col. Art Pavel
Bolling AFB, D. C.

Air Force Systems Command Inspection Ctr. (AFSCIC)
Col. Thomas J. Devenny
Eglin AFB, Fla.

Air Training Command

Hq. Randolph AFB, Tex.

Lt. Gen. Joseph W. Ashy
Commander

Air Force Military Training Ctr.
Maj. Gen. David C. Reed
Lackland AFB, Tex.

Chanute Technical Training Ctr.
Maj. Gen. Lawrence E. Day
Chanute AFB, Ill.

Keesler Technical Training Ctr.
Maj. Gen. Paul A. Harvey
Keesler AFB, Miss.

Goodfellow Technical Training Ctr.
Col. James A. Maxwell, Jr.
Goodfellow AFB, Tex.

Lowry Technical Training Ctr.
Maj. Gen. Dale C. Tabor
Lowry AFB, Colo.

Sheppard Technical Training Ctr.
Maj. Gen. Michael A. Nelson
Sheppard AFB, Tex.

USAF Recruiting Service
Brig. Gen. John J. Salvadore
Randolph AFB, Tex.

Air Force Reserve Officer Training Corps
Brig. Gen. Robin C. Tornow
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Hq. Maxwell AFB, Ala.

Lt. Gen. Charles G. Boyd
Commander

Air War College
Maj. Gen. Charles D. Link
Maxwell AFB, Ala.

Air Force Institute of Technology
Brig. Gen. Stuart R. Boyd
Wright-Patterson AFB, Ohio

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Brig. Gen. Phillip J. Ford
Maxwell AFB, Ala.

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Col. John B. Sams, Jr.
Maxwell AFB, Ala.

Hq. Civil Air Patrol—USAF
Col. Joseph M. Nail
Maxwell AFB, Ala.

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Hq. Kelly AFB, Tex.

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San Antonio, Tex.

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Hq. Scott AFB, Ill.

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McGuire AFB, N. J.

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Hq. Offutt AFB, Neb.

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Ramstein AB, West Germany

42d Air Div.
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Vandenberg AFB, Calif.

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40th Air Div.
Brig. Gen. Teddy E. Rineharger
Malmstrom AFB, Mont.

57th Air Div.
Brig. Gen. Robert E. Linhard
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Tactical Air Command

Hq. Langley AFB, Va.

Gen. Robert D. Russ
Commander

1st Air Force
Maj. Gen. Richard A. Pierson
Langley AFB, Va.

9th Air Force
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Shaw AFB, S. C.

12th Air Force
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Bergstrom AFB, Tex.

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Tyndall AFB, Fla.

24th Air Div.
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Griffiss AFB, N. Y.

25th Air Div.
Maj. Gen. James G. Andrus
McChord AFB, Wash.

28th Air Div.
Brig. Gen. William J. Ball
Tinker AFB, Okla.

830th Air Div.
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Howard AFB, Panama

831st Air Div.
Brig. Gen. Richard C. Bethurem
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832d Air Div.
Brig. Gen. Daniel J. Sherlock
Luke AFB, Ariz.

833d Air Div.
Brig. Gen. Travis E. Harrell
Holloman AFB, N. M.

836th Air Div.
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Davis-Monthan AFB, Ariz.

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Gen. Robert C. Oaks
Commander in Chief

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3d Air Force
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RAF Mildenhall, England

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Maj. Gen. James E. Chambers
Sembach AB, West Germany

TUSLOG
Maj. Gen. Ralph R. Rohatsch, Jr.
Ankara AS, Turkey

65th Air Div.
Brig. Gen. Glenn A. Profilt II
Lindsey AB, West Germany

316th Air Div.
Brig. Gen. Richard T. Swope
Ramstein AB, West Germany

Separate Operating Agencies

Air Force Accounting and Finance Center

Hq. Lowry AFB, Colo.

Maj. Gen. Charles D. Metcalf
Commander

Air Force Audit Agency

Hq. Norton AFB, Calif.

Brig. Gen. Gerald E. Hahn
Commander
Deputy Auditor General

Air Force Commissary Service

Hq. Kelly AFB, Tex.

Maj. Gen. Robert F. Swarts
Commander

Air Force Engineering and Services Center

Hq. Tyndall AFB, Fla.

Col. Marshall W. Nay, Jr.
Commander

Air Force Inspection and Safety Center

Hq. Norton AFB, Calif.

Maj. Gen. Alexander K. Davidson
Commander

Air Force Intelligence Agency

Hq. Washington, D. C.

Brig. Gen. Billy J. Bingham
Commander

Air Force Legal Services Center

Hq. Washington, D. C.

Maj. Gen. Keithe E. Nelson
Commander

Air Force Management Engineering Agency

Hq. Randolph AFB, Tex.

Col. Ronald W. Blake
Commander

Air Force Military Personnel Center

Hq. Randolph AFB, Tex.

Maj. Gen. Billy J. Boles
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Hq. Brooks AFB, Tex.

Col. Charles W. Morrison
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Hq. Kirtland AFB, N. M.

Brig. Gen. Frank K. Martin
Commander

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Hq. Bolling AFB, D. C.

Brig. Gen. Francis R. Dillon
Commander

Air Force Operational Test and Evaluation Center

Hq. Kirtland AFB, N. M.

Maj. Gen. Peter D. Rooinsan
Commander

Air Force Reserve

Hq. Robins AFB, Ga.

Maj. Gen. Roger P. Scheer
Commander

Air Reserve Personnel Center

Hq. Denver, Colo.

Col. Joseph C. Ramsey, Jr.
Commander

IS IT OVER? SHOULD IT BE?

You have surely read the stories or heard about them: the advanced technological projects that took too long, cost too much, and did too little. Perhaps you lived through one yourself. But the full impact of the real horror story will hit home only if we stop trying. If we turn away from technology's promise. If we let others make the breakthroughs while we make excuses.

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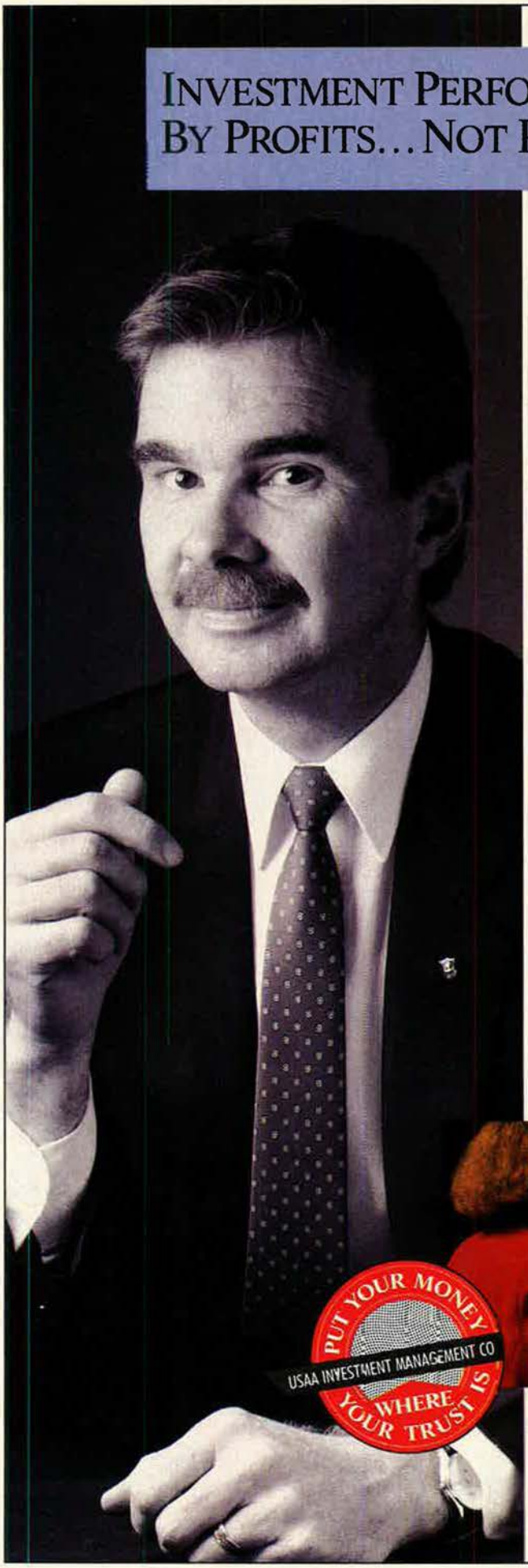

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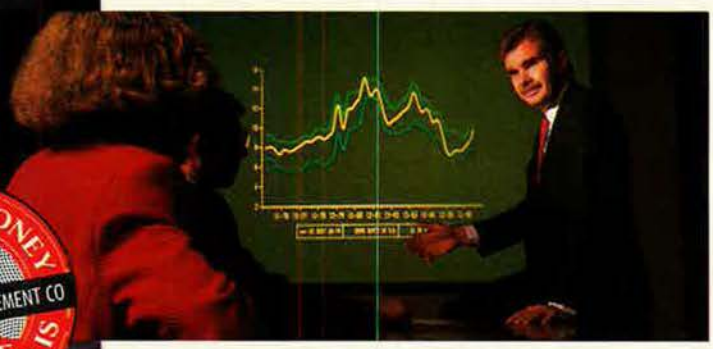

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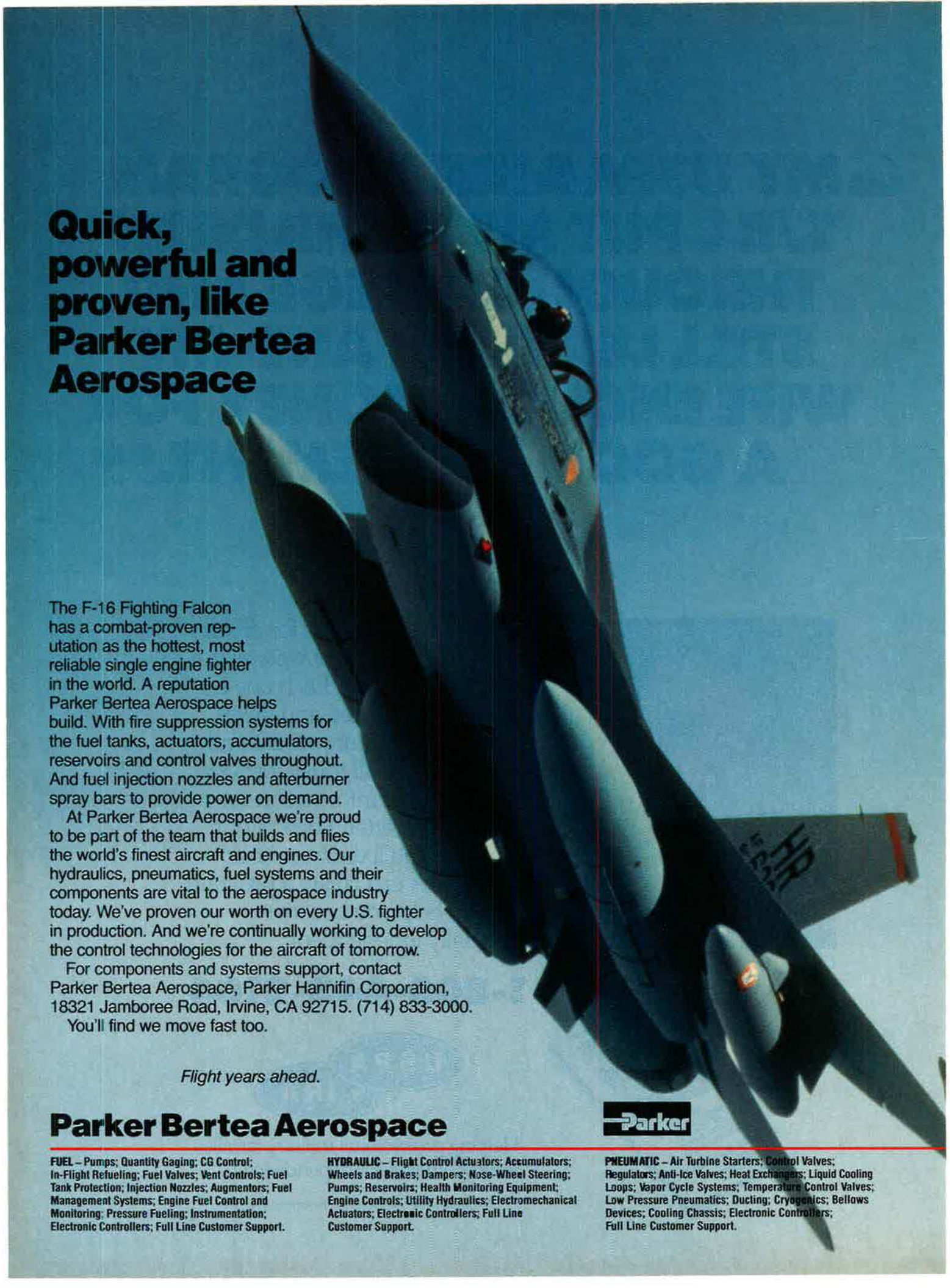

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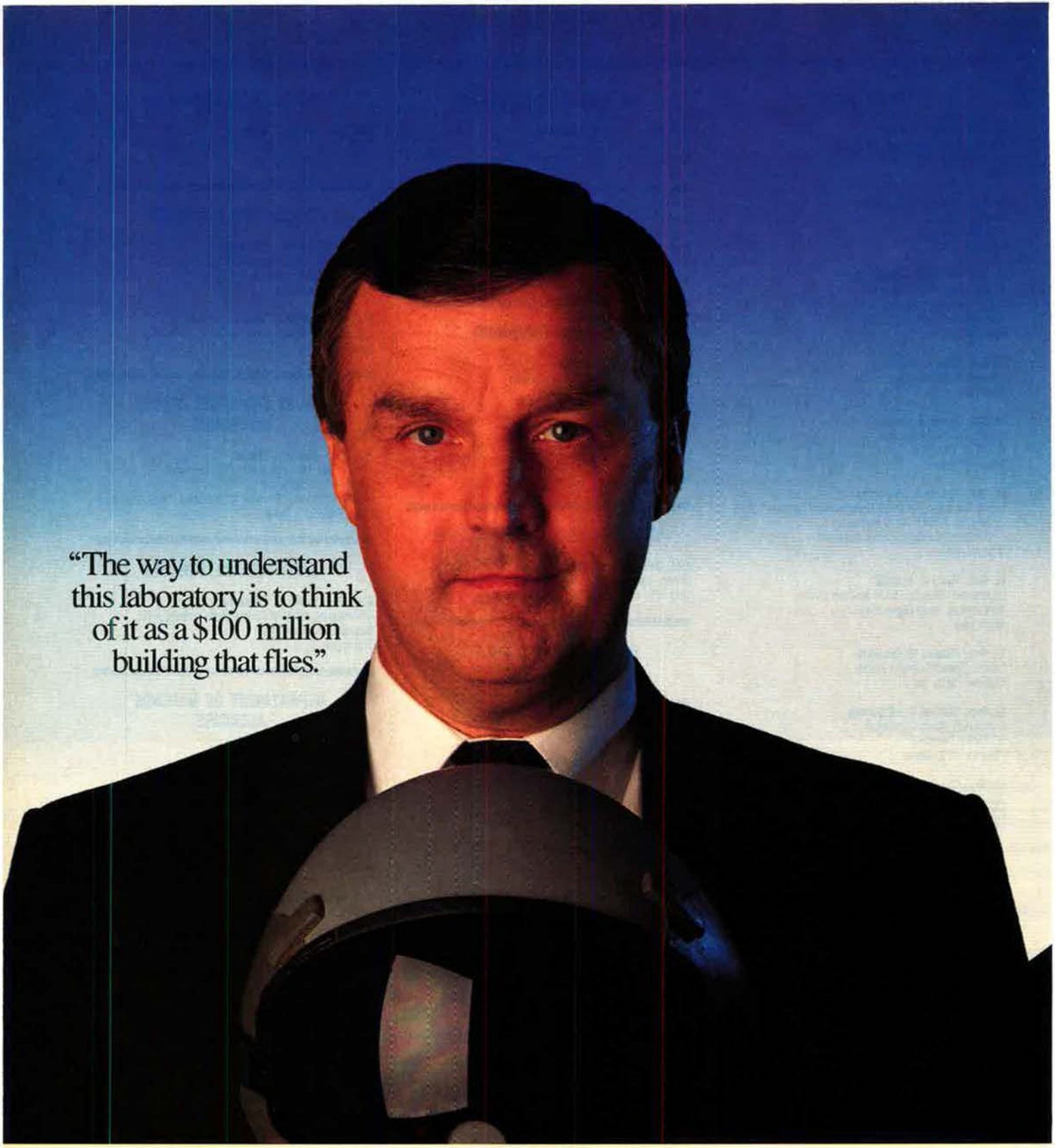

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Okay, so robots can do spot-welding, but can they fix an airplane under combat conditions?

The Robots Are Coming

By John Rhea

—Springer/Beltmann Film Archive

ROBOTS are coming to the Air Force, but they're not going to look anything like R2D2, C3PO, or any of the other engaging little androids whose principal function is to entertain moviegoers.

Researchers at the Armstrong Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio, have begun studies to determine if a new generation of task-oriented robots can be developed to tackle real-world Air Force problems. At the top of their list is servicing tactical aircraft under the demanding conditions of combat.

There are two main differences between these robots and their fictional counterparts, explains Capt. Ronald G. Julian, manager of the human sensory feedback project at the Armstrong Lab: They are optimized for a specific set of jobs rather than being all-purpose machines, and they are not intended to operate autonomously; humans are always "in the loop."

This new generation of robotic servicing devices therefore falls somewhere in between industrial robots, used for many years in such preprogrammed tasks as spot-welding automobiles and assembling complex electronic components, and visions of future autonomous fighting vehicles and roving vehicles to explore the surface of Mars and other planets.

The thrust of USAF research is to create a "robotic telepresence" that will enable human operators to perform vital maintenance tasks in hazardous areas at a safe distance from the hazards. This is accomplished by what Captain Julian calls a "quasi-anthropoid" device that instantaneously mimics all the motions of the human operator's arms, hands, and fingers.

The human wears a sensor-laden exoskeleton that translates each of

his movements into a series of signals that are transmitted to the robot for execution. The robot is equipped with visual and other sensors to inform the human operator about what is happening at the servicing location, which could be many miles away if radio communications are used.

This two-way communication is known as a real-time feedback loop, and it synergistically combines the superior ability of the human to respond to unanticipated situations with the invulnerability of the robot in environments that would be lethal to humans.

Robots on the Flight Line

The near-term application of this technology, according to Captain Julian, is on the flight line to perform such mission-essential operations as rearming weapon systems and refueling aircraft. These are inherently dangerous operations even in peacetime training exercises—and infinitely more dangerous in wartime, when the maintenance personnel may have to contend with chemical, bacteriological, or radiation (CBR) threats.

In a CBR scenario, personnel have to wear bulky protective garments that degrade performance by limiting communications and reducing fine manipulative dexterity. Their time at the work site is reduced by heat, stress, and fatigue. As a result, required aircraft servicing may be interrupted, delayed, or even prevented.

Although Air Force maintenance crews continually practice these tasks under simulated CBR conditions, the tasks are essentially unstructured. Servicing operations were designed to be completed by humans who can inspect, evaluate, and manipulate objects. The work is unstructured because placement of hardware is inexact, aircraft orientation and attitude may change during loading and refueling operations, and the precise operations to be completed vary from aircraft to aircraft and from day to day.

"Consequently, task completion places heavy emphasis on human recognition of the work site as it is before work is started, human understanding of the work site as it should be at completion, human assessment of what needs to be done, and appropriate real-time adjustments to successfully execute the operation," according to Captain Julian.

Looking beyond the immediate needs for refueling and rearming aircraft, robotic telepresence researchers are investigating the use of robots for minor repairs such as replacing avionics "black boxes," changing wheels and tires, and performing damage assessment.

Even farther in the future would be systems to enable a single operator to control several robots—and eventually perhaps truly autonomous vehicles.

Although simple in principle, the technology of robotic telepresence is itself the culmination of many complex supporting technologies. A report on twenty critical military technologies issued by the Defense Department this past March, which listed machine intelligence and robotics in the fourth position, cited five supporting technologies: parallel computer architectures for high-volume, real-time processing; software producibility; advanced sensors; data fusion to integrate the sensor inputs; and composite materials for production of lightweight operational systems.

The military already has limited experience with robotic telepresence, according to the report. An example is the Army's fiber-optics-guided missile (FOG-M), in which sensors in the missile warhead enable a human operator to direct it toward the target via a two-way optical fiber data link.

"Tele-operated systems may be used as a force-multiplier in which one manned vehicle could control a fleet of tele-operated companion vehicles," the DoD report adds.

The report also notes that machine intelligence and robotics is one technology in which the United States leads the Soviet Union across the board and is generally on a par with all the NATO allies. Japan, with its extensive experience in automotive and other industries, is the overall world leader.

Force, Torque, and Manipulation

At the Armstrong Laboratory, research is concentrating on the role of the human operator in the robotic telepresence system: How much can he do, and what kind of information does he need to do it?

This basic research begins with finding out how humans determine forces and torques, the two essential operations for all manual dexterity. For example, the act of driving a screw into a board involves both. Force is the pressure exerted to keep the screw vertical relative to the board, and torque is the twisting motion applied to make the screw threads bite into the wood.

With a little practice, humans can do this without even thinking about it, but what kinds of signals have to be sent to a robotic hand to reproduce this simple operation? Here is where microprocessors organized into feedback loops with parallel computer architecture and broadband data links can make robotic telepresence a reality—once the requirements for data processing and communication speeds have been determined.

Captain Julian notes that the human cycle time for processing the information needed to move an object from point A to point B is about five hertz, or five cycles per second. That's incredibly slow for a computer, perhaps dangerously slow. "Five hertz is the equivalent of 200 milliseconds [thousandths of a second], and a robot can get into a lot of trouble in 200 milliseconds," he says.

Studies of remote manipulator arms go back nearly fifty years, to the days when the nuclear industry had to handle dangerous radioisotopes in shielded areas with what today are considered primitive jaw grippers. Questions still remain about which human motions should be duplicated. Researchers have determined that it's impractical to try to duplicate all human motions, and they have concentrated on just two: the fine manipulation of the hand and the coarse manipulation of the arm.

The fine manipulation studies use a pair of hands, developed by the University of Utah and the Massachusetts Institute of Technology, controlled by exoskeletons on the operator's hands. The goal is to determine how many degrees of freedom are needed to accomplish various operational tasks.

Once this is done, Air Force researchers plan to investigate two-

hand operation in which one hand exerts forces and torques on an object while the other hand grasps and steadies it. This phase of the research also envisions putting tactile sensors on the robotic hand to measure how much of this kind of information is needed in the feedback loop. Humans can tactilely sense weights as light as one gram in order to hold on to objects, according to Captain Julian, but it doesn't necessarily follow that robots need such a precise resolution.

For the coarse manipulation studies, the Armstrong Lab will use a dual-arm, fourteen-degree-of-freedom exoskeleton controlling two industrial arms with six degrees of freedom. This technology is perhaps somewhat better understood, and an example of an operational system is the Canadian-built remote manipulator arm used on NASA's space shuttle to launch satellites. More sophisticated versions are planned for the space station.

Visual Input

The other big unknown in robotic telepresence concerns the optimal level of visual sensor input data. Humans depend primarily on their eyes to accomplish tasks, and this capability has to be reproduced for the robots.

Visual data are likely to be acquired by a wide-field-of-view, binocular, helmet-mounted sensor capable of projecting three-dimensional images, but questions remain about the advantages and disadvantages of color vision and the types of displays.

This visual input to the human operator may run into tens of megabits per second of digital data, according to Captain Julian, and this may require high-definition television (HDTV) systems *[for more about HDTV, see "Why Is the Pentagon Watching High-Definition TV?", April 1990 issue]*. One attractive possibility is the use of liquid crystal displays that provide extremely high resolution and can even perform logic functions, such as scene correlation, on the screen, much like a semiconductor logic chip.

In addition to tactile and visual data, humans also depend on their ears. Audio research is not part of the laboratory's robotic telepresence studies, but researchers are monitoring other organizations' work in audio communications and warning in feedback loops for possible use in future systems.

The robotic telepresence systems envisioned by current Air Force research are expected to be able to handle weapons loading and aircraft refueling without any changes to the user equipment, but this is not likely to be the case for servicing line replaceable units, such as the avionics modules. Lifting weapons into and out of aircraft is a coarse function similar to those of NASA's remote manipulator arm, according to Captain Julian. Even today's aerial refueling, during which an operator on the tanker aircraft extends a boom by remote control to the aircraft being refueled, is comparable to the planned robotic systems.

"The limit today is that aircraft are designed to be worked on by humans," he says. "They need to be more accessible." The avionics modules, for example, have complex multiplane connectors that have to be twisted off; the use of the newer back-plane connectors that can be simply pulled off would facilitate robotic servicing.

These human-in-the-loop systems are aimed at near-term applications, but what of the future? There are technical limitations that inhibit the development of truly autonomous systems. The principal limitation is the total information-processing power, as measured in millions or billions of computational operations per second, available to effectively fill the role of the human operator. Advances in electronics (and soon in photonics) should close that gap sometime early in the next century. Parallel improvements will be needed in data-fusion techniques and supporting expert systems.

Walking on Mars

The Robotics Institute at Carnegie Mellon University in Pittsburgh, which has been a major USAF study contractor in this field, earlier this year demonstrated what may be the prototype of future autonomous vehicles. Under a NASA study contract, the Institute developed a six-legged, twelve-foot-tall robot designed to walk across the surface of another planet.

The robot, nicknamed the "Ambler," is programmed to recognize rough terrain and step over crevices and large boulders in what William L. Whittaker, one of the principal investigators, describes as "a motion similar to cross-country skiing."

The Carnegie Mellon robot has two sets of stacked legs, with three legs per stack, which separately lift, advance, and return to their original positions. "A single leg reaches out in front of the others, places itself firmly on the ground like a ski pole, and then pulls the machine forward," Mr. Whittaker reported.

Like the robotic telepresence systems under study at the Armstrong Lab, the Ambler uses a set of visual sensors to create three-dimensional maps of its surroundings. Algorithms stored in its on-board computer enable it to seek out areas for study while avoiding hazards.

However, unlike the near-term military applications of robotics, there is no alternative to autonomous operation for unmanned planetary rovers. They must be able to make their own decisions, because of the long transmission times for commands between Earth and planetary surfaces—about forty-five minutes one way in the case of Mars. Carnegie Mellon envisions an operational version weighing about three and a half tons that could reach areas on the moon and Mars inaccessible to wheeled vehicles or too dangerous for humans.

The same technology could also be applied to future autonomous fighting vehicles, and the university has begun to explore civilian possibilities in construction, mining, timbering, hazardous waste management, and emergency response.

The robots are definitely coming —to the Air Force, to the other services, to NASA, and to a variety of industrial users—but don't write off humans just yet. They're still a "good system per cubic inch in terms of power-to-weight ratio," Captain Julian points out. ■

John Rhea is a free-lance writer who specializes in military technology issues and is a frequent contributor to Air Force *Magazine. His most recent article, "Why Can't Computers Think Like Humans?" appeared in the June 1990 issue.*

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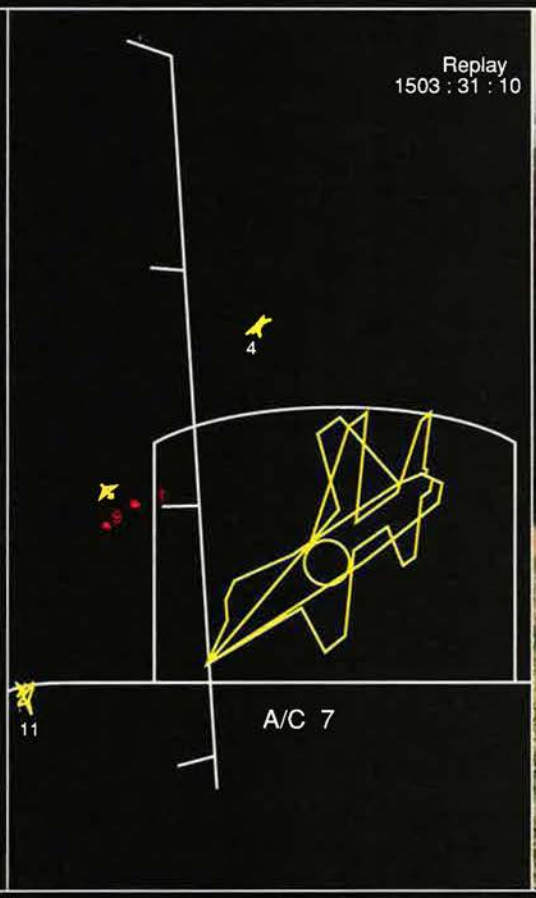

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AFA honors the Academy's Outstanding Squadron of the Year.

The First Is First

By James A. McDonnell, Jr.

AFA President Jack C. Price (right) presents the Outstanding Squadron Plaque to First Squadron Cadet Commanders Peter K. Bailey (left) and Richard W. Carns.

It was a night of firsts. For the first time ever, the First Squadron of the Air Force Academy was honored by AFA as the Outstanding Squadron of the Year. Also for the first time, the "returning cadet" traditionally spotlighted at this annual event was a four-star general: Gen. H. T. Johnson, a member of the first class that graduated from the Academy—and the first of his class to achieve four-star rank.

Center stage at this event, held in Colorado Springs last May, belonged to the First Cadet Squadron, chosen from a field of forty as being superior in academic, athletic, and military achievement. En route to the honor, First Squadron members captured three of the twenty-six graduate scholarships to civilian institutions. Of the squadron's twenty-eight graduating cadets, one went to West Point as an exchange student, one was selected for Euro-NATO flight training, two were on the cadet wing staff, and three were on the group staff. Nineteen are headed for pilot training.

General Johnson, now commander in chief of US Transportation Command and Military Airlift Command, graduated in 1959. In his remarks, he said that a strong defense is required in a world that is changed and safer but not yet safe. He charged the cadets with their duty to understand the nation's democratic values and the specific challenge of military leadership in a democracy.

This is the thirty-first year that AFA, in cooperation with the Lance Sijan Chapter, has sponsored the event. About 600 friends and supporters of the Academy gathered for the tribute. ■

Gen. H. T. Johnson (left), a member of the first Academy class, with AEF Board Chairman James M. Keck.

Reviews

By Jeffrey P. Rhodes, Aeronautics Editor

The Escape Factory: The Story of MIS-X, by Lloyd R. Shoemaker. Five days after the Japanese surrender in World War II, all records, files, artifacts, and even the buildings housing one of the US's most secret units, MIS-X, were ordered destroyed. From October 1942 to August 1945, this group, based outside of Washington, D. C., smuggled coded messages, radios, maps, and other escape-and-evasion materials into and out of POW camps by using items that were included in humanitarian aid packages, such as baseballs, shaving brushes, packs of cards, and Ping-Pong paddles. This covert group facilitated some of the boldest escapes of the war. The author is one of only four surviving members of the group's technical section. This is a heretofore hidden piece of history. St. Martin's Press, New York, N. Y., 1990. 268 pages with photos, appendices, notes, bibliography, and index. $19.95.

General of the Army: George C. Marshall, Soldier and Statesman, by Ed Cray. In 1933, Col. George C. Marshall made a bold prediction. In his farewell address, he told the troops under his command at Fort Moultrie, outside Charleston, S. C., that he was "going places." Few prophecies have ever rung truer. First as the architect of victory in World War II as Army Chief of Staff, then as Secretary of State under Harry Truman, where he proposed and guided the European Recovery Program (he never referred to it as the Marshall Plan) and won the Nobel Prize, and as the third Secretary of Defense, George Catlett Marshall did indeed "go places." Ironically, for all he did, General Marshall never held a troop command. This mammoth, one-volume biography is richly detailed but moves briskly. W. W. Norton & Co., New York, N. Y., 1990. 847 pages with photos, notes, bibliography, and index. $35.00.

High Honor: Recollections by Men and Women of World War II Aviation, by Stuart Leuthner and Oliver Jensen. Sen. Lloyd Bentsen (D-Tex.) writes in the foreword that "the only thing better than hearing a war story is telling one yourself." The twenty-eight men and women whose tales make up this book cover the spectrum from pilots to a war correspondent who covered the war from a Piper Cub to a riveter on the home front. These people remember their machines, the dangers they faced, and their adventures, but forty years after the fact, they have grown thoughtful, and they temper their stories with talk about the war's effect on the rest of their lives and on the world in general. Smithsonian Institution Press, Washington, D. C., 1989. 402 pages with photos and appendix. $19.95.

Home From Siberia: The Secret Odysseys of Interned American Airmen in World War II, by Otis Hays, Jr. Between 1942 and 1945, 291 American USAAF and Navy airmen were (for lack of a better word) imprisoned by a country that was officially an ally. Facing inadequate food, clothing, medical care, and housing, these men were held in Siberia by a Soviet government that was fearful of being forced into fighting a two-front war. Four groups of internees were allowed to "escape" with clandestine Soviet help during the war, and a fifth group of Americans was released at war's end. Little official information about this backwater of the war is available, and the author has done an admirable job in ferreting out the story. Texas A&M University Press, College Station, Tex., 1990. 233 pages with maps, photos, appendices, bibliography, and index. $29.50.

Strategic Atlas: Comparative Geopolitics of the World's Powers (Revised and Updated), by Gerard Chaliland and Jean-Pierre Rageau. This unusual book looks at the world from a different perspective—literally. Rejecting the traditional Mercator projection, wherein all of the landmasses are horizontal (with the reader's home continent in the middle of the map), this atlas instead uses a spherical projection to emphasize the relative locations of the continents and to reflect accurately the size of the oceans. Maps of population, natural and industrial resources, climatic conditions, regional and ethnic conflicts, and comparisons of military strength take up the bulk of the pages, but many statistical abstracts are also included. Harper & Row, New York, N. Y., 1990. 224 pages with maps, charts, and graphs. $17.95.

A Treasury of Military Humor, edited by James E. Myers, and *Wits of War: Unofficial GI Humor-History of World War II,* by Edwin J. Swineford. Wars are not funny, but the reactions of individuals or groups of combatants to war often are. These two volumes chronicle many of the things soldiers, sailors, and airmen did or said to relieve the tension. The first book lists jargon, jokes, anecdotes, and a number of classic cartoons (including those of Bill Mauldin and George Baker) from the five major American wars since 1861. The second book has many of the same features, but also includes British, French, Soviet, and German humor. *Treasury,* Lincoln-Herndon Press, Springfield, Ill., 1990. 348 pages with bibliography. $10.95. *Wits,* Kilroy Was There Press, Fresno, Calif., 1989. 658 pages with bibliography, appendix, and index. $18.50.

Other Titles of Note

F-89 Scorpion in Action, by Larry Davis and Dave Menard, and *FJ Fury in Action,* by Jim Mesko. Looking back at aircraft of the 1950s is popular these days, and these latest additions to the "In Action" series are well done. The books cover the different models of these fighters and, as typical of this series, contain many unusual pictures. Squadron/Signal Publications, Carrollton, Tex., 1990. 50 pages apiece with photos and diagrams. $7.95 each.

The History of the US Nuclear Arsenal, by James Norris Gibson. This useful reference gives the development and deployment history of the various strategic and tactical nuclear missiles and bombs. Launch platforms such as aircraft and submarines are also covered. Brompton Books, Greenwich, Conn., 1989. 192 pages with photos, drawings, glossary, and index. $14.95.

Korean War Almanac, by Col. Harry Summers, Jr., USA (Ret.) After setting the historical stage and a chronology of important events, this ground-breaking reference then covers the three-year struggle from A (Aces) to Z (Zone of the Interior). The encyclopedic section contains 375 entries on the people, weapons, units, and issues of the war. Facts on File, New York, N. Y., 1990. 330 pages with photos, maps, bibliography, and index. $24.95.

World and United States Aviation and Space Records & Annual Report, edited by Wanda Odom. This annual compilation of all recognized aerospace absolute and class records for speed, distance, and altitude includes a new record category (human-powered helicopter flight) and annual reports from the NAA and the various air sport divisions. National Aeronautic Association, Washington, D. C., 1990. 314 pages with photos and pilot index. $13.95.

IN VIDEO—"SR-71 Blackbird: The Secret Vigil." Although now retired, the Lockheed SR-71 reconnaissance aircraft will be regarded as the ultimate "hot aircraft" for years to come. Using archival and recent footage, this tape looks at the history, operations, and political role of the Blackbird during its twenty-five-year career. Also included is a look at the handling and processing of the pictures the crews brought back. 1990, color. Distributed by *Aviation Week* Video, New York, N. Y. $49.95.

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By John L. Frisbee, Contributing Editor

Number Two, With Honor

On that fateful January day in 1945, Maj. Thomas McGuire needed only three more victories to become America's top ace.

In an uncharacteristic personal accolade, the staid *Army Air Forces in World War II* (Vol. V) called Maj. Thomas McGuire "one of the best-liked and -respected pilots in the Fifth Air Force." Men who flew with him say McGuire was an extrovert with a great sense of humor and unsurpassed concern for his men. Time after time, he broke contact on a sure kill to rescue a pilot in trouble. He was a disciplined team player all the way. Master of the P-38, superb tactician, phenomenal shot, and inspirational leader, this slight, twenty-five-year-old fighter pilot had it all—except the title of America's number one ace, which fate denied him.

McGuire began his career as a fighter pilot in the Aleutians, where he never saw an enemy aircraft. In March, 1943, he was sent to the Southwest Pacific as a Lockheed P-38 pilot with the 49th Fighter Group. He joined the 475th Fighter Group in July 1943 and in May 1944 was named commander of its 431st Squadron.

McGuire scored his first victories, a triple, on August 18, 1943, while the group was based at Dobodura, New Guinea. Two months later, there were thirteen victory flags painted on the nose of his P-38, named *Pudgy* for his wife.

The mission of October 17, which added the last three, came close to being his finale. After shooting down three enemy fighters over Oro Bay, he broke off to cover a damaged P-38. Three Zeros came down on his tail, wounding him and setting his plane on fire. McGuire tried to bail out at 12,000 feet, but his feet were caught in the cockpit. Breaking lose at 5,000 feet, he discovered that his parachute rip cord had been severed. Finding a wire dangling behind him, he pulled, and his chute opened at 1,000 feet. His life raft, riddled with holes, sank immediately, but he managed to stay afloat for forty minutes until he was picked up by a PT boat.

Six months after joining the 475th, McGuire had scored sixteen victories and was challenging Maj. Dick Bong, who had been in the theater for nearly a year, for the title of top American ace. When Bong went home on leave in November, McGuire expected to erase the eight-victory gap between them, but bad luck intervened. He was grounded much of the time with malaria and dengue fever.

McGuire ended the year with another triple on December 26 while protecting an Allied invasion convoy off Cape Gloucester, New Britain. As his squadron was under attack by an estimated fifty enemy fighters, he saw enemy dive bombers about to hit the convoy. Relinquishing tactical advantage to the Japanese fighters, he led two flights of P-38s down to destroy ten dive bombers and three fighters. McGuire was awarded the Distinguished Service Cross for his leadership and heroism that day. Then he had a long dry spell lasting until mid-May 1944, during which enemy aircraft seldom were to be found.

As the 475th moved north along New Guinea's coast, then to Leyte in the Philippines, the hunting picked up. On December 13, McGuire's score stood at thirty-one, only seven behind Dick Bong. In the next four days, Bong reached the magic number of forty victories, at which point General Kenney had sworn to send him home for good. While Bong was en route to the States and a round of celebrations, McGuire shot down three enemy aircraft on December 25 and four on the 26th, bringing him to within two of Bong's record. Both days he went to the aid of aircraft in trouble while facing odds of three or four to one. General Kenney knew that on any subsequent mission, McGuire might pass the forty mark to supplant Bong as the leading ace. Not wanting to mar Bong's reception, he grounded McGuire until January 6, 1945.

The next day, McGuire led a flight of four P-38s bound for Mindoro, home to many Japanese aircraft. He was not flying his own *Pudgy V*, but nevertheless he intended to return that day as the top ace. Over Negros Island they were attacked by a lone Oscar flown by Akira Sugimoto, an old hand at the fighter business. In an attempt to shoot this extraordinary pilot off his wingman's tail, McGuire pulled his P-38, still carrying a belly tank, too tight, stalled at 200 feet, and crashed to his death. The full story of that last mission was told for the first time by Carroll Anderson, a squadron mate, in the January 1975 issue of this magazine.

For his "gallant initiative [and] unselfish concern for the safety of others," Maj. Thomas McGuire was awarded the Medal of Honor posthumously. McGuire AFB in New Jersey is named in his honor. Many believe McGuire was the greatest fighter pilot in the Pacific. At any rate, he flew and he died determined to destroy the enemy and to protect his men regardless of cost. What better can be said of any fighting man? ■

Maj. Thomas McGuire is considered by many to have been the greatest fighter pilot in the Pacific.

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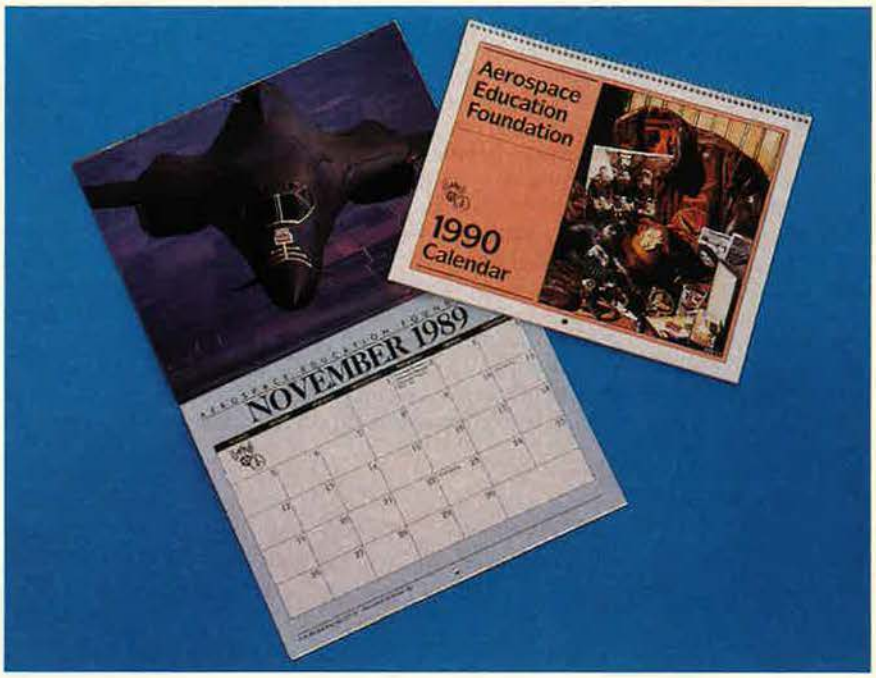

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Viewpoint

By Gen. T. R. Milton, USAF (Ret.), Contributing Editor

The Academy Is an Investment

In the lull between crises, we must keep the right people in uniform while the rest of the country pursues other matters.

The Royal & Ancient Golf Club, together with the ancient public course that adjoins its grey stone clubhouse, is what comes to mind when we speak of St. Andrews, Scotland. Golf's mecca notwithstanding, there is more to St. Andrews than the Old Course and the ever-present ghosts of the game's great players. There is, most notably, St. Andrews University, founded in 1410.

Sir James Barrie, once rector of St. Andrews University, was a prolific playwright who is mostly remembered today for *Peter Pan,* a tribute to the innocence of childhood. He is scarcely remembered at all (save, perhaps, at his university) for a remarkable farewell address he gave to the student body in 1922. The title of his speech was "Courage," and my copy of it, discovered years ago in an old bookstore, is dog-eared and fragile.

In that address, Barrie reflected on the recent carnage of World War I and how determinedly the decades of warnings that war would come had been ignored. World war, he said, had accomplished at least one thing: It had eliminated an entire season, for the nation's spring lay buried in the fields of France.

The lives of the young, of course, are always the price of war. The young people who heard Barrie's speech in 1922 were the early middle-aged of World War II, who saw their young once again caught unprepared. Once again, spring was canceled.

The US Air Force Academy cadet who took me for a sailplane ride the other day was tolerant of his elderly student and absolutely sure of his own competence. We cut loose from our tow plane at 9,000 feet and flew silently over the Academy, all the while practicing stalls and spirals, watching for other gliders, and being ever mindful that our bird had no engine. A few years hence, my instructor will be flying F-16s, perhaps even be a member of the Thunderbirds, for that is the established career pattern of cadet soaring instructors.

The cadets as a whole are a remarkable assemblage of America's youth, our nation's springtime, to borrow Sir James's phrase. As an indication of their clearheadedness, the cadets are remarkably articulate at a time when that faculty is in rare supply. While it is always tricky to generalize, these cadets appear to have a high regard for the old-fashioned virtues of honor, courage, and patriotism. Sir James Barrie would have nodded approvingly at their academic zeal, their sense of national pride, and—it is worth saying—their courage. These young people test that elusive attribute often and in various ways, from the moral courage required by their honor system to the physical courage needed in survival training, parachute jumping, and the other physical tests encountered in the course of an Academy education.

Because the service academies are expensive to operate, they will doubtless come under fire.

The academic load at the Air Force Academy is a heavy one—too heavy in the opinion of some—and is evidence that the Academic Department has won frequent skirmishes with the commandant's office over the major share of cadet time. The result is reflected in an impressive array of scholarship awards, postgraduate candidates, and twenty-four elective majors.

No matter the outcome of the dispute over academic vs. military training, there can be no arguing about the quality of education the Academy offers. In fairness to those who support the heavy academic load, the future employment of these cadets, once they have graduated and entered the service, is not easy to predict.

The fighter force will decline sharply in the next few years, and there will be a limited number of bombers no matter what happens to the B-2, so the first-line combat openings for pilots are going to be scarcer. Today, Air Force Academy graduates represent thirteen percent of the total officer corps and twenty-four percent of the rated force. With the Air Force declining in strength, Academy graduates will supply a significantly higher percentage of both the officer corps and the rated force—unless ROTC colleges campaign effectively for a continuing share in what is left.

In the lull between crises, the important thing is to keep the right people in uniform somehow, worrying about national security while the rest of the country pursues other matters. It is still a source of wonder that the right people stayed in the services during that long period between the World Wars, when defense matters were at the bottom of the nation's priorities. They persisted through years of miserable pay, political neglect, and low budgets because they felt that what they were doing was important and might well be essential one day. A good many of those who soldiered on during those doldrums—MacArthur, Eisenhower, Bradley, Patton, Arnold, and Spaatz, to name a few—were West Point graduates.

There are going to be some hard choices in the next several years as to where to spend, where to cut. Because the service academies are expensive to operate, they will doubtless come under fire.

Nevertheless, the Air Force Academy is the single best investment the Air Force can make in its future. The selection process, the demanding curriculum, the discipline, as well as the intangibles that come from close associations, a shared code of honor, and commitment, make it worth its cost, and then some. ■

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Ten AFROTC graduates receive graduate study grants from the Aerospace Education Foundation.

The Von Kármán Scholarships

THE Aerospace Education Foundation has officially launched the von Kármán Scholarships program, naming the first ten winners of grants. AEF is awarding each recipient $5,000 for graduate-level academic work this fall in aerospace-related fields.

The ten winners—one woman and nine men—become the first beneficiaries of the program set up by AEF in 1989. Competition is open to Air Force ROTC graduates pursuing advanced degrees in science, mathematics, and engineering.

Gerald V. Hasler, AEF president, officially notified the winners by telegram on May 11.

The scholarships commemorate Dr. Theodore von Kármán, science advisor to the Army Air Forces in World War II, who was asked by Gen. H. H. "Hap" Arnold in 1944 to organize and chair a Scientific Advisory Group.

Winners were selected from a pool of applicants by a three-member committee, chaired by AFA National Director James McCoy. Also serving on the panel were former AEF President Don Garrison and John Williams, vice president of academics at Embry-Riddle Aeronautical University.

In future years, the number of scholarships could increase. AEF has placed an initial sum in a special scholarship fund and is building the endowment with contributions from AFA members, chapters, and corporate supporters.

This year's von Kármán scholarship winners:

Stacy J. Cotton, Norton, Mass. BS mechanical aerospace engineering, Worcester Polytechnic Institute. Graduate goal: MS aerospace/astronautical engineering, Stanford University.

Charles F. Destefani, Sunbury, Ohio. BS computer science, Syracuse University. Graduate goal: MS computer and information science, Ohio State University.

Mark J. Keller, Williamsport, Pa. BS aerospace engineering, Penn State University. Graduate goal: MS aerospace engineering, Penn State University.

Fred G. Kennedy, O'Fallon, Ill. BS aeronautical engineering, Massachusetts Institute of Technology. Graduate goal: MS astronautical engineering, Massachusetts Institute of Technology.

Andrew J. Knoedler, Seabrook, Tex. BS aeronautics/astronautics, Massachusetts Institute of Technology. Graduate goal: MS aeronautics and astronautics, Massachusetts Institute of Technology.

John J. Nelson, Minneapolis, Minn. BS aerospace engineering, University of Minnesota. Graduate goal: MS aerospace engineering and mechanics, University of Minnesota.

Andrew M. Nisbet, Alexandria, Va. BS aeronautical engineering, Massachusetts Institute of Technology. Graduate goal: MS aeronautics and astronautics, Massachusetts Institute of Technology.

Gregory D. Peterson, St. Petersburg, Fla. BS computer science; BS electrical engineering, Washington University, St. Louis, Mo. Graduate goal: MS electrical engineering, Washington University.

John S. Seo, West Bloomfield, Mich. BS aerospace engineering, University of Michigan. Graduate goal: MS aerospace engineering, University of Michigan.

Edward D. White III, Tacoma, Wash. BS mathematics, University of Tampa. Graduate goal: Master of Applied Statistics and MA mathematics, Ohio State University. ■


Cotton


Destefani


Keller


Kennedy


Knoedler


Nelson


Nisbet


Peterson


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White

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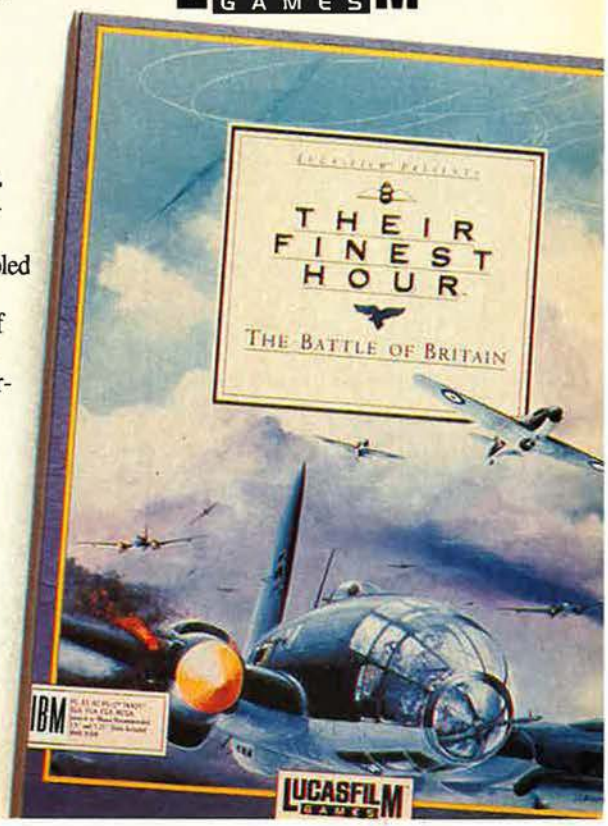

Industrial Associates

Listed below are the Industrial Associates of the Air Force Association. Through this affiliation, these companies support the objectives of AFA as they relate to the responsible use of aerospace technology for the betterment of society and the maintenance of adequate aerospace power as a requisite of national security and international amity.

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AFA/AEF Report

Edited by Daniel M. Sheehan, Assistant Managing Editor

Sam Keith, AFA Chairman, Dies

Sam E. Keith, Jr., Chairman of the Air Force Association Board of Directors, died of a heart attack at his home in Fort Worth, Tex., on July 11. He was seventy-two.

Mr. Keith was President of AFA from 1986 to 1988 and, at the time of his death, was in his second term as AFA's Chairman of the Board. He was a retired General Dynamics executive and former executive vice president of Geoscience and Services, Inc.

A combat veteran of World War II, Mr. Keith also served in Korea. He attended Texas Christian University and Texas A&M University. He is survived by his wife, Mary Sue, a daughter, Kathy Hennigan, of Houston, and two sons, Sam Keith III of Fort Worth and Robert Keith of Los Angeles.

His record with AFA was long and distinguished: service on the Executive, Finance, Audit, and Organizational Advisory Committees; National Vice President (Southwest Region); AFA National Director (elected eight times); Texas State President; Fort Worth Chapter President; Aerospace Education Foundation trustee; and chairman of the Fort Worth Air Power Council, an official AFA organization.

He was a life member of both the Air Force Association and its Aerospace Education Foundation and a Doolittle Fellow of the AEF. He received AFA's Presidential Citation, Exceptional Service award (twice), and Medal of Merit. In 1968, he was the AFA Man of the Year.

Monroe Hatch Named Executive Director

Monroe W. Hatch, Jr., former Vice Chief of Staff of the US Air Force, becomes Executive Director of AFA and its Aerospace Education Foundation October 1. He succeeds John O. Gray.

Among other assignments during his thirty-five-year military career, Hatch was vice commander in chief of Strategic Air Command, Inspector General of the Air Force, and commander of the 14th Air Division.

He was born in New Orleans and graduated from the US Naval Academy. Early in his career, he flew B-47 and B-52 bombers; during the Vietnam War, he was a T-39 pilot and 7th Air Force standardization/evaluation flight examiner at Tan Son Nhut AB, Saigon. In the 1970s and 1980s, he held a series of increasingly responsible staff assignments in the Pentagon and elsewhere.

He is a command pilot with more than 6,000 flying hours. He holds a master's degree in aerospace engineering from the University of Oklahoma and is a graduate of the National War College.

Hatch is married to the former Delores Lewis of Aberdeen, Md. They have two children, a daughter, Lesley, and a son, Monroe III.

AFA's First National Officers and Board of Directors

(This panel of officers and directors acted temporarily until a representative group was democratically elected by the membership at the first National Convention.)

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AFA's "Man of the Year" Award Recipients

(State names refer to winner's home state at time of award.)

YEAR	RECIPIENT(S)
1953	Julian B. Rosenthal (New York)
1954	George A. Anderl (Illinois)
1955	Arthur C. Storz (Nebraska)
1956	Thos. F. Stack (California)
1957	George D. Hardy (Maryland)
1958	Jack B. Gross (Pennsylvania)
1959	Carl J. Long (Pennsylvania)
1960	O. Donald Olson (Colorado)
1961	Robert P. Stewart (Utah)
1962	*(no presentation)*
1963	N. W. DeBenardinis (Louisiana) and Joe L. Shosid (Texas)
1964	Maxwell A. Kriendler (New York)
1965	Milton Caniff (New York)
1966	William W. Spruance (Delaware)
1967	Sam E. Keith, Jr. (Texas)
1968	Marjorie O. Hunt (Michigan)
1969	*(no presentation)*
1970	Lester C. Curl (Florida)
1971	Paul W. Gaillard (Nebraska)
1972	J. Raymond Bell (New York) and Martin H. Harris (Florida)
1973	Joe Higgins (California)
1974	Howard T. Markey (Washington, D. C.)
1975	Martin M. Ostrow (California)
1976	Victor R. Kregel (Texas)
1977	Edward A. Steam (California)
1978	William J. Demas (New Jersey)
1979	Alexander C. Field, Jr. (Illinois)
1980	David C. Noerr (California)
1981	Daniel F. Callahan (Florida)
1982	Thomas W. Anthony (Maryland)
1983	Richard H. Becker (Illinois)
1984	Earl D. Clark, Jr. (Kansas)
1985	George H. Chabbott (Delaware) and Hugh L. Enyart (Illinois)
1986	John P. E. Kruse (New Jersey)
1987	Jack K. Westbrook (Tennessee)
1988	Charles G. Durazo (Virginia)
1989	Oliver R. Crawford (Texas)
1990	Cecil H. Hopper (Ohio)

AFA's Network of Units Overseas

AFA UNIT	LOCATION
United States Air Forces in Europe (USAFE)	
Ankara	Ankara AS, Turkey
Charlemagne	Brunssum, the Netherlands
Dolomiti	Aviano AB, Italy
Eifel	Bitburg AB, West Germany
Fens	RAF Alconbury, United Kingdom
Gateway to Freedom	Berlin, West Germany
Gregory E. Miller	Incirlik AB, Turkey
Hahn AB	Hahn AB, West Germany
Izmir	Izmir AS, Turkey
Lufbery-Campbell	Ramstein AB, West Germany
Maj. Gen. Robert M. White	Heidelberg, West Germany
Netherlands Eagle	Soesterberg, the Netherlands
RAF Bentwaters	RAF Bentwaters, United Kingdom
RAF Mildenhall	RAF Mildenhall, United Kingdom
RAF Upper Heyford	RAF Upper Heyford, United Kingdom
Red Raider	Torrejon AB, Spain
Sembach	Sembach AB, West Germany
Spangdahlem	Spangdahlem AB, West Germany
Wiesbaden	Lindsey AB, West Germany
Zaragoza	Zaragoza, Spain
Pacific Air Forces (PACAF)	
Bataan Memorial	Clark AB, Philippines
Captain Joseph McConnell, Jr.	Osan AB, Korea
Keystone	Kadena AB, Japan
Manila	Manila, Philippines
Misawa	Misawa AB, Japan
Tokyo	Tokyo, Japan
Wolf Pack	Kunsan AB, Korea
Supreme Headquarters Allied Powers Europe (SHAPE)	
General Lauris G. Norstad	Mons, Belgium

AFA Units of the Year

YEAR	RECIPIENT(S)
1953	San Francisco Chapter (Calif.)
1954	Santa Monica Area Chapter (Calif.)
1955	San Fernando Valley Chapter (Calif.)
1956	Utah State AFA
1957	H. H. Arnold Chapter (N. Y.)
1958	San Diego Chapter (Calif.)
1959	Cleveland Chapter (Ohio)
1960	San Diego Chapter (Calif.)
1961	Chico Chapter (Calif.)
1962	Fort Worth Chapter (Tex.)
1963	Colin P. Kelly Chapter (N. Y.)
1964	Utah State AFA
1965	Idaho State AFA
1966	New York State AFA
1967	Utah State AFA
1968	Utah State AFA
1969	*(no presentation)*
1970	Georgia State AFA
1971	Middle Georgia Chapter (Ga.)
1972	Utah State AFA
1973	Langley Chapter (Va.)
1974	Texas State AFA
1975	Alamo Chapter (Tex.) and San Bernardino Area Chapter (Calif.)
1976	Scott Memorial Chapter (Ill.)
1977	Thomas B. McGuire, Jr., Chapter (N. J.)
1978	Thomas B. McGuire, Jr., Chapter (N. J.)
1979	General Robert F. Travis Chapter (Calif.)
1980	Central Oklahoma (Gerrity) Chapter (Okla.)
1981	Alamo Chapter (Tex.)
1982	Chicagoland-O'Hare Chapter (Ill.)
1983	Charles A. Lindbergh Chapter (Conn.)
1984	Scott Memorial Chapter (Ill.) and Colorado Springs/Lance Sijan Chapter (Colo.)
1985	Cape Canaveral Chapter (Fla.)
1986	Charles A. Lindbergh Chapter (Conn.)
1987	Carl Vinson Memorial Chapter (Ga.)
1988	General David C. Jones Chapter (N. D.)
1989	Thomas B. McGuire, Jr., Chapter (N. J.)
1990	General E. W. Rawlings Chapter (Minn.)

H. H. Arnold Award Recipients

Until 1986, AFA's highest Aerospace Award was the H. H. Arnold Award. Named for the World War II leader of the Army Air Forces, it is presented annually in recognition of the most outstanding contributions in the field of aerospace activity. In 1986, the Arnold Award was redesignated AFA's highest honor to a member of the armed forces in the field of National Security. It continues to be presented annually.

YEAR	RECIPIENT(S)
1948	Hon. W. Stuart Symington, Secretary of the Air Force
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift
1950	Airmen of the United Nations in the Far East
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command
1952	Senators Lyndon B. Johnson and Joseph C. O'Mahoney
1953	Gen. Hoyt S. Vandenberg, former Chief of Staff, USAF
1954	Hon. John Foster Dulles, Secretary of State
1955	Gen. Nathan F. Twining, Chief of Staff, USAF
1956	Senator W. Stuart Symington
1957	Edward P. Curtis, Special Assistant to the President
1958	Maj. Gen. Bernard A. Schriever, Commander, Ballistic Missile Division, ARDC
1959	Gen. Thomas S. Power, Commander in Chief, Strategic Air Command
1960	Gen. Thomas D. White, Chief of Staff, USAF
1961	Hon. Lyle S. Garlock, Assistant Secretary of the Air Force
1962	Dr. A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories
1963	The 363d Tactical Reconnaissance Wing, TAC, and the 4080th Strategic Wing, SAC
1964	Gen. Curtis E. LeMay, Chief of Staff, USAF
1965	The 2d Air Division, PACAF
1966	The 8th, 12th, 355th, 366th, and 388th Tactical Fighter Wings and the 432d and 460th Tactical Reconnaissance Wings
1967	Gen. William W. Momyer, Commander, Seventh Air Force, PACAF
1968	Col. Frank Borman, USAF; Capt. James Lovell, USN; and Lt. Col. William Anders, USAF—Apollo 8 Crew
1969	*(no presentation)*
1970	Apollo 11 Team (J. L. Atwood, Lt. Gen. Samuel C. Phillips, USAF, and Astronauts Neil Armstrong, Col. Edwin E. Aldrin, Jr., USAF, and Col. Michael Collins, USAF)
1971	Dr. John S. Foster, Jr., Director of Defense Research and Engineering
1972	Air Units of the Allied Forces in SEA (Air Force, Navy, Army, Marine Corps, and the Vietnamese Air Force)
1973	Gen. John D. Ryan, USAF (Ret.), former Chief of Staff, USAF
1974	Gen. George S. Brown, USAF, Chairman, Joint Chiefs of Staff
1975	Hon. James R. Schlesinger, Secretary of Defense
1976	Senator Barry M. Goldwater
1977	Senator Howard W. Cannon
1978	Gen. Alexander M. Haig, Jr., USA, Supreme Allied Commander, Europe
1979	Senator John C. Stennis
1980	Gen. Richard H. Ellis, USAF, Commander in Chief, Strategic Air Command
1981	Gen. David C. Jones, USAF, Chairman, Joint Chiefs of Staff
1982	Gen. Lew Allen, Jr., USAF (Ret.), former Chief of Staff, USAF
1983	Ronald W. Reagan, President of the United States
1984	The President's Commission on Strategic Forces (the Scowcroft Commission)
1985	Gen. Bernard W. Rogers, USA, Supreme Allied Commander, Europe
1986	Gen. Charles A. Gabriel, USAF (Ret.), former Chief of Staff, USAF
1987	Adm. William J. Crowe, Jr., USN, Chairman, Joint Chiefs of Staff
1988	The men and women of the GLCM Team
1989	Gen. Larry D. Welch, USAF Chief of Staff
1990	Gen. John T. Chain, Commander in Chief, Strategic Air Command

W. Stuart Symington Award Recipients

Since 1986, AFA's highest honor to a civilian in the field of National Security has been the W. Stuart Symington Award. The award, presented annually, is named for the first Secretary of the Air Force.

YEAR	RECIPIENT
1986	Hon. Caspar W. Weinberger, US Secretary of Defense
1987	Hon. Edward C. Aldridge, Jr., Secretary of the Air Force
1988	Hon. George P. Shultz, Secretary of State
1989	Hon. Ronald W. Reagan, former President of the United States
1990	Hon. John J. Welch, Assistant Secretary of the Air Force (Acquisition)

Aerospace Education Foundation Officers

YEAR	PRESIDENT	CHAIRMAN OF THE BOARD
1961–63	—	Dr. W. Randolph Lovelace II
1963–64	John B. Montgomery	Dr. W. Randolph Lovelace II
1964–66	Dr. Lindley J. Stiles	Gen. Laurence S. Kuter, USAF (Ret.)
1966–67	Dr. B. Frank Brown	Dr. Walter J. Hesse
1967–68	Dr. Leon M. Lessinger	Dr. Walter J. Hesse
1968–69	Dr. L. V. Rasmussen	Dr. Walter J. Hesse
1969–71	Dr. L. V. Rasmussen	J. Gilbert Nettleton, Jr.
1971–73	Dr. Leon M. Lessinger	J. Gilbert Nettleton, Jr.
1973–74	Dr. Wayne O. Reed	George D. Hardy
1974–75	Dr. William L. Ramsey	George D. Hardy
1975–81	Dr. William L. Ramsey	Sen. Barry Goldwater
1981–84	Dr. Don C. Garrison	Sen. Barry Goldwater
1984–86	George D. Hardy	Sen. Barry Goldwater
1986–87	Eleanor P. Wynne	George D. Hardy
1987–88	Lt. Gen. James M. Keck, USAF (Ret.)	George D. Hardy
1988–89	Lt. Gen. James M. Keck, USAF (Ret.)	George D. Hardy
1989–90	Gerald V. Hasler	Lt. Gen. James M. Keck, USAF (Ret.)

Christa McAuliffe Memorial Award Winners

YEAR	RECIPIENT	SPONSOR
1986	Allen T. King	Fort Wayne–Baer Field Chapter, Ind.
1987	Betty Ann Mosen	Sacramento Chapter, Calif.
1988	John W. Baranca	Salt Lake Chapter, Utah
1989	Dr. Ben P. Millspaugh	Mile High Chapter, Colo.
1990	Sue Darnell	Lexington Chapter, Ky.

AFA's Regions, States, and Chapters

The figures on the right indicate the number of affiliated members as of June 30, 1990. Listed below the name of each Region is the name of the National Vice President for that Region.

CENTRAL EAST REGION **15,812**
R. Donald Anderson

Delaware 1,278
Blue Hen 61
Delaware Galaxy 906
Diamond State 193
Henlopen Area 32
University 37
Wilmington 49

District of Columbia 1,648
Nation's Capital 1,648

Kentucky 787
General Russell E. Dougherty 553
Lexington 234

Maryland 3,306
Baltimore* 897
Central Maryland 417
College Park Airport 64
Thomas W. Anthony 1,928

Virginia 8,483
Danville 37
Donald W. Steele, Sr., Memorial 3,930
General Charles A. Gabriel 482
Jack Manch 103
Langley 2,531
Leigh Wade 111
Lynchburg 126
Richmond 376
Roanoke 316
Tidewater 310
William A. Jones III 161

West Virginia 310
Chuck Yeager 310

FAR WEST REGION **34,589**
Robert A. Munn

Arizona 5,552
Barry Goldwater 192
Cochise 126
Frank Luke 1,441
Green Valley 148
Phoenix Sky Harbor 1,474
Prescott 104
Tucson 2,067

California 24,557
Antelope Valley 932
Bakersfield 77
David J. Price/Beale 854
Fresno* 548
General B. A. Schriever Los Angeles 1,510
General Curtis E. LeMay 1,377
General Doolittle/Los Angeles Area* 2,707
General Robert F. Travis 2,365
Golden Gate* 678
High Desert 710
Maj. Gen. Charles I. Bennett, Jr. 876
Monterey Bay Area 327
Pasadena Area 492
Redwood Empire 402
Riverside County 1,307
Robert H. Goddard 1,300
Sacramento 3,222
San Bernardino Area 2,056
San Diego 1,264
Tennessee Ernie Ford 1,289
Ventura County 264

Guam 357
Guam–Arc Light 357

Hawaii 1,583
Hawaii* 1,550
Maui 33

Nevada 2,540
Dale O. Smith 439
Thunderbird 2,101

GREAT LAKES REGION **20,175**
Walter G. Vartan

Illinois 5,273
Chicagoland-O'Hare 1,329
Greater Rockford 54
Illini 663
Land of Lincoln 214
Quad Cities 168
Richard E. Carver 172
Scott Memorial 2,260
West Suburban 413

Indiana 1,971
Central Indiana 430
Fort Wayne–Baer Field Area 176
Grissom Memorial 513
Gus Grissom 173
Lawrence D. Bell Museum 36
Lester W. Johnston 31
South Bend 308
Southern Indiana 188
Terre Haute–Wabash Valley 116

Michigan 3,553
Battle Creek 316
General Claire Chennault 261
Hoyt S. Vandenberg 390
Huron 565
James H. Straubel 331
Kalamazoo 230
Keweenaw 13
Lake Superior–Northland 813
Lloyd R. Leavitt, Jr. 136
Mid-Michigan 82
Mount Clemens 350
PE-TO-SE-GA 66

Ohio 8,166
Buckeye Skypower 232
Capt. Eddie Rickenbacker Memorial* 666
Cincinnati 389
Cleveland 577
Frank P. Lahm 299
Mid-Ohio 365
Steel Valley 229
Wright Memorial* 5,389

Wisconsin 1,212
Badger State 199
Billy Mitchell 709
Madison 304

MIDWEST REGION **8,955**
Raymond W. Peterman

Iowa 669
All-Iowa 430
Eastern Iowa 81
Richard D. Kisling 158

Kansas 1,373
Lt. Erwin R. Bleckley 898
Contrails 47
Topeka 428

Missouri 2,357
Central Missouri 538
Harry S. Truman 557
Ozark 189
Spirit of St. Louis 1,073

Nebraska 4,556
Ak-Sar-Ben 4,250
Lincoln 306

NEW ENGLAND REGION **5,965**
Joseph A. Zaranka

Connecticut 1,397
Central Connecticut 176
Charles A. Lindbergh 215
First Connecticut 230
Flying Yankees 157
General Bennie L. Davis 63
General George C. Kenney 88
Igor Sikorsky 170
Northern Connecticut 235
Sergeant Charlton Heston 63

Maine 816
Eastern Maine 245
Major Charles J. Loring, Jr. 410
Southern Maine 161

Massachusetts 3,104
Boston 287
Laurence G. Hanscom 350
Major John S. Southrey* 332
Minuteman 301
Otis 194
Paul Revere 1,173
Pioneer Valley 128
Taunton 143
Worcester* 196

New Hampshire 1,130
Amoskeag 284
Pease 846

Rhode Island 238
Metro Rhode Island 238

Vermont 280
Burlington 280

NORTH CENTRAL REGION **3,795**
John E. Kittelson

Minnesota 1,443
General E. W. Rawlings 1,198
Richard Bong 245

North Dakota 1,277
General David C. Jones 613
Happy Hooligan 161
Red River Valley 503

South Dakota 1,075
Dacotah 266
Paha Sapa Waziata 29
Rushmore 780

NORTHEAST REGION **13,896**
Kenneth C. Thayer

New Jersey 4,621
Admiral Charles E. Rosendahl 150
Aerospace Founders 30
Atlantic City Area 193
Brig. Gen. Frederick W. Castle 188
Garden State 22
Hangar One 153
High Point 84
Hudson* 114
John Currie Memorial 68
Mercer County 167
Middlesex 106
New Jersey Public Affairs 40
Passaic-Bergen* 281
Sal Capriglione 115
Teterboro-Bendix 74
Thomas B. McGuire, Jr. 2,297
Tri-County 60
Union Morris 419
Wings 60

New York 5,293
Albany* 270
Brooklyn "Key" 411
Chautauqua 79
Colin P. Kelly 823
Forrest L. Vosler 333
General Daniel "Chappie" James, Jr., Memorial 152
Genesee Valley 253
H. H. Arnold 324
Hudson Valley 149
Iron Gate 293
Lawrence D. Bell 470
Lloyd Schloen–Empire 49
Nassau-Mitchel 293
New York Air Reserve & CAP 39
Niagara Frontier 141
Plattsburgh 368
Queens 241
Suffolk County 200
Thomas Watson, Sr., Memorial 167
Westchester-Falcon 238

Pennsylvania 3,982
Altoona 76
Beaver Valley 87
Brandywine 153
Bucks County 23
Colonel Stuart E. Kane, Jr. 194
Eagle 92
Erie 109
Freedom 387
Greater Pittsburgh* 546
Jimmy Stewart 39
Joe Walker 148
Lehigh Valley 291
Lt. Col. B. D. "Buzz" Wagner 82
Metropolitan Philadelphia* 438
Mifflin County* 105
Olmsted 403
Pocono Northeast 180
Steel Valley 102
Total Force 293
York-Lancaster 234

NORTHWEST REGION **8,792**
Alwyn T. Lloyd

Alaska 1,752
Anchorage 1,193
Fairbanks Midnight Sun 559

Idaho 908
Boise Valley 518
Magic Valley 99
Snake River Valley 291

Montana 752
Big Sky 646
Bozeman 106

Oregon 1,263
Eugene 353
Klamath Basin 96
Portland* 814

Washington 4,117
Greater Seattle 1,320
Inland Empire 1,062
Tacoma 1,735

ROCKY MOUNTAIN REGION **9,640**
Jack G. Powell

Colorado 5,853
Colorado Springs/Lance Sijan 3,140
Flatirons 208
General Robert E. Huyser 99
Long's Peak 150
Mel Harmon 130
Mile High 2,056
Weld County 70

Utah 3,072
Gold Card 371
Ogden 778
Rocky Mountain 516
Salt Lake 508
Ute 724
Wasatch 175

Wyoming 715
Cheyenne Cowboy 715

SOUTH CENTRAL REGION **12,518**
Everett E. Stevenson

Alabama 3,252
Birmingham 442
Gadsden 37
Mobile 348
Montgomery 2,093
Tennessee Valley 332

Arkansas 2,272
David D. Terry, Jr. 1,330
Fort Smith 91
General Ira C. Eaker 634
Ouachita 51
Razorback 166

Louisiana 2,683
Alexandria 461
Ark-La-Tex 1,420
Baton Rouge 306
Greater New Orleans Area 496

Mississippi 2,193
Golden Triangle 650
Jackson 180
John C. Stennis 1,363

Tennessee 2,118
Chattanooga 131
Everett R. Cook 428
General Bruce K. Holloway 549
H. H. Arnold Memorial 461
Lt. Gen. Frank Maxwell Andrews 549

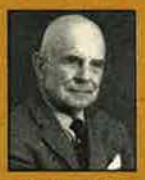
SOUTHEAST REGION **26,647**
Roy P. Whitton

Florida 13,669
Cape Canaveral 1,470
Central Florida 1,304
Citrus Belt 174
Eglin 2,724

Falcon	366
Florida Gulf Coast	305
Florida Highlands	196
Gainesville	155
General James R. McCarthy	269
General Nathan F. Twining	480
Gold Coast	449
Indian River	90
Jerry Waterman	1,416
John C. Meyer	256
John W. DeMilly, Jr.	622
Miami	474
Morgan S. Tyler	252
Ocala	89
On Wings of Eagles	94
Panama City	1,342
Peace River	122
Spacecoast	52
Southwest Florida	244
Tallahassee	250
West Palm Beach	474
Georgia	5,564
Athens	145
Atlanta	551
Carl Vinson Memorial	3,126
Chattahoochee Valley	76
Coosa Valley	62
Dobbins	837
Savannah	252
South Georgia	448
Southeast Georgia	57
North Carolina	3,881
Blue Ridge	217
Cape Fear	125
Durham–Chapel Hill	117
Eastern Carolina	78
Foothills	64
Havelock–Cherry Point	42
Kitty Hawk	74
Piedmont	387
Pope	952
Roanoke Valley	41
Scott Berkeley	1,214
Tarheel	317
Triad	253
Puerto Rico	268
San Juan	268
South Carolina	3,265
Charleston	1,021
Columbia	486
Ladewig-Shine Memorial	517
Strom Thurmond	320
Swamp Fox	921
SOUTHWEST REGION	**32,875**
O. R. Crawford	
New Mexico	3,317
Albuquerque	1,591
Fran Parker	681
Llano Estacado	845
Oklahoma	6,329
Altus	842
Central Oklahoma (Gerrity)	4,013
Enid	1,034
Tulsa	440
Texas	23,229
Abilene	947
Aggieland	161
Alamo	8,309
Austin	1,914
Concho	554
Corpus Christi	159
Dallas	1,266
Del Rio	500
Denton	219
Fort Worth	4,532
Ghost Squadron	161
Heart of the Hills	169
Houston	1,284
Lee Glasgow–Waco	227
Lubbock	608
Northeast Texas	314
Panhandle AFA	147
Paso Del Norte	224
Permian Basin	174
Wichita Falls	1,360

*These Chapters were chartered prior to December 31, 1948, and are considered original charter chapters. The Major John S. Southrey Chapter of Massachusetts was formerly the Chicopee Chapter.

AFA's National Presidents


James H. Doolittle
(1946–47)


Thomas G. Lanphier, Jr.
(1947–48)


C. R. Smith
(1948–49)


Robert S. Johnson
(1949–51)


Harold C. Stuart
(1951–52)


Arthur F. Kelly
(1952–53)


George C. Kenney
(1953–54)


John R. Alison
(1954–55)


Gill Robb Wilson
(1955–56)


John P. Henebry
(1956–57)


Peter J. Schenk
(1957–59)


Howard T. Markey
(1959–60)


Thos. F. Stack
(1960–61)


Joe Foss
(1961–62)


John B. Montgomery
(1962–63)


W. R. Lovelace II
(1963–64)


Jess Larson
(1964–67)


Robert W. Smart
(1967–69)


George D. Hardy
(1969–71)


Martin M. Ostrow
(1971–73)


Joe L. Shosid
(1973–75)


George M. Douglas
(1975–77)


Gerald V. Hasler
(1977–79)


Victor R. Kregel
(1979–81)


John G. Brosky
(1981–82)


David L. Blankenship
(1982–84)


Martin H. Harris
(1984–86)


Sam E. Keith, Jr.
(1986–88)


Jack C. Price
(1988–90)

AFA's Board Chairmen

(Pictured are Chairmen who never served as National President)

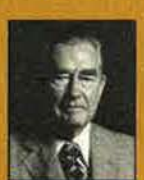

Edward P. Curtis
(1946–47)


Carl A. Spaatz
(1950–51)


James M. Trail
(1958–59)


Julian B. Rosenthal
(1959–60)


Jack B. Gross
(1963–64)


Daniel F. Callahan
(1979–81)


Edward A. Stearn
(1985–86)

Aerospace Education Foundation Fellows

(The following is a listing of Individual Fellows who have become Fellows since the last such listing in the September 1989 issue of this magazine.)

Individual Jimmy Doolittle Fellows

(Listed in order of affiliation. Represents $1,000 contribution)

NAME	SPONSOR
(1989)	
M. N. "Dan" Heth	Fort Worth Chapter
Les J. Rose	Langley Chapter
Gen. Alfred G. Hansen, USAF	Iron Gate Chapter
Benjamin S. Catlin	Officers and Directors, Air Force Association
Ernest E. LaPorte	The Aerospace Corp.
Lt. Gen. George L. Monahan, Jr., USAF	Iron Gate Chapter
Charles J. Tanner, Jr.	Central Florida Chapter
Kathryn G. Chapman	Gerald S. Chapman
Margaret Durazo	Virginia State AFA
(1990)	
Hon. Anne N. Foreman	Central East Region
Dr. Reeves L. Smith	Personal
Edward O. Buckbee	Alabama State AFA
Gen. H. T. Johnson, USAF	Altus Chapter
Esther F. Gregory	Thomas B. McGuire, Jr., Chapter
Eunice B. Spruance	William B. Spruance
Harold G. Wolff	Chicagoland-O'Hare Chapter
Maj. Gen. Donald A. Logeais, USAF	New Jersey State AFA/AEF
Thomas J. McKee	Iron Gate Chapter
James D. van Hoften, Ph.D.	Cape Canaveral Chapter
James M. Stewart	James D. Conrad
Lt. Gen. Robert L. Rutherford, USAF	Iron Gate Chapter
A. Raymond Brooks	Union-Morris Chapter
Tom Fowler	Langley Chapter
Col. Kenneth Wofford, USAF (Ret.)	General E. W. Rawlings Chapter
Col. William B. Morrison III, USAF	Thomas B. McGuire, Jr., Chapter
David R. Cummock	Marguerite H. Cummock
USAF Strolling Strings	New Jersey State AFA/AEF
Lt. Gen. Gordon E. Fornell, USAF	Paul Revere Chapter
Vice Adm. Albert J. Herberger, USN (Ret.)	Air Force Ball of Mid-America
Gary M. Young, Sr.	Air Force Ball of Mid-America

Individual Ira Eaker Fellows

(Listed in order of affiliation. Represents $1,000 contribution)

NAME	SPONSOR
(1989)	
William A. Belanger	Anheuser-Busch, Inc.
Richard M. Skinner	Officers and Directors, Air Force Association
Paul Markgraf	General E. W. Rawlings Chapter
CMSgt. Stan Janesik, USAF (Ret.)	Nevada State AFA and the Thunderbird and Dale O. Smith Chapters
Donald E. Zweifel	Trustee of the Vietnam Veterans Historical Association
Gen. James P. McCarthy, USAF	General Ira C. Eaker Chapter
Andrew M. Trushaw, Jr. *(in memoriam)*	Massachusetts State AFA
(1990)	
Anthony J. DeLuca	Central East Region
Gen. Merrill A. McPeak, USAF	Iron Gate Chapter
Lt. Gen. George L. Monahan, Jr., USAF	Iron Gate Chapter
Maj. Gen. Richard M. Scofield, USAF	Iron Gate Chapter
Capt. Manley "Sonny" Carter, USN	Carl Vinson Memorial Chapter
Rev. Msgr. Terrence J. Murphy	General E. W. Rawlings Chapter
Col. Dave Dean, USAF	General E. W. Rawlings Chapter
Maj. Gen. Doyle E. Larson, USAF (Ret.)	General E. W. Rawlings Chapter
William L. Ryon, Jr.	Maryland State AFA
Maj. Gen. Richard F. Gillis, USAF	Carl Vinson Memorial Chapter
David C. Noerr	New Jersey State AFA/AEF
CMSgt. Charles K. Ray, USAF	Air Force Ball of Mid-America
Eric W. Alexander	Air Force Ball of Mid-America
Charles A. Zraket	Paul Revere Chapter

Individual Barry Goldwater Fellows

(Listed in order of affiliation. Represents $5,000 contribution)

NAME	SPONSOR
(1989)	
W. R. Timken	Mrs. H. H. Timken, Jr.
(1990)	
USAF Chiefs of Staff	Central Florida Chapter
USAF Chief Master Sergeants	Central Florida Chapter

Aerospace Education Foundation 1989–90 AFJROTC Contest Winners

Subject: "Education: Our First Line of Defense"

First-place Winner ($1,000)

Winston Churchill High School, Potomac, Md.
(Category: Essay)

Individual Category Winners ($500)

Videotape: Scotch Plains–Fanwood High School, Scotch Plains, N. J.

Essay: Winston Churchill High School, Potomac, Md.

Sound/Slide: West Anchorage High School, Anchorage, Alaska

Artwork: Scotch Plains–Fanwood High School, Scotch Plains, N. J.

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When you join **Army and Air Force Mutual Aid Association** you receive:

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- $5,000 of life insurance for all members.
- Free storage of documents in our vault.
- Help with organizing your estate documents.
- Lifetime assistance to your family if something happens to you.

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We advise on government benefits. At time of need we help file claims.

Membership is open to commissioned and warrant officers of the Army and Air Force. You can remain a member after separation or retirement.

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"Your organization provided the peace of mind that allowed me to 'carry on' with my life in a 'military tradition.' My husband would have been proud."
Helen C. Phillips, member's widow

"I consider myself very fortunate to belong to the Association and I consider it to be one of the most important organizations to which an active duty or retired officer can belong."
COL James L. Russell, Jr., Ret.

"I would like to thank you for your efficient and faithful support over the many years that I have been a member. You have continually provided helpful and relevant information and kept me up-to-date on the important issues impacting me and my family. My sincere thanks. Long live the Association!"
COL Berdon M. Bell, Ret.

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1-800-336-4538

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Army and Air Force Mutual Aid Association
Ft. Myer, Arlington, Virginia 22211-5002

For more information about AAFMAA check status below:

You must be a commissioned officer, warrant officer or cadet:

☐ Fulltime active duty ☐ National Guard/Reserve
☐ Retired (under age 60)
☐ Cadet: USMA, USAFA, ROTC Contract/Scholarship, or OTS/OCS

Name _____ DOB _____

Rank _____ Soc. Sec. No. _____

Street _____

City _____ State _____ ZIP _____

Phone ( ) _____ ( ) _____
work home

Service: ☐ Army ☐ Air Force

No one else does what we do!

AF 9/90

An Air Force Association
National Symposium

The US Air Force Today and Tomorrow

Now in its fifteenth year, this in-depth report on our USAF, its commands, and its future aerospace requirements is one you won't want to miss. In this year of decision, the focus will be on how USAF's capabilities and requirements will affect national security and the defense industry in the years ahead. Invited participants include:

The Honorable Donald B. Rice, Secretary of the Air Force
Gen. Michael J. Dugan, Chief of Staff, USAF
Gen. John T. Chain, Jr., CINC, Strategic Air Command
Gen. H. T. Johnson, CINC, US Transportation Command, Military Airlift Command
Gen. Donald J. Kutyna, CINC, NORAD, US Space Command
Gen. Merrill A. McPeak, CINC, Pacific Air Forces
Gen. Robert C. Oaks, CINC, US Air Forces Europe
Gen. Robert D. Russ, Commander, Tactical Air Command
Dr. James A. Thomson, President & CEO, The RAND Corporation
Gen. Ronald W. Yates, Commander, Air Force Systems Command

Registration for all Los Angeles Symposium events is $300.00 ($325 for non-AFA members). NOTE: These prices remain unchanged from 1989.

Coming in January 1991—a comprehensive review of Tactical Warfare capabilities. A major National AFA Symposium in Orlando, Fla.—January 31–February 1, 1991.

For information and registration for all Symposia, call Jim McDonnell or Dottie Flanagan at (703) 247-5810 or 5805.

October 25–26, 1990

Hyatt at Los Angeles Airport, Calif.

Registration Form

A 1990 Air Force Association National Symposium
"The US Air Force—Today and Tomorrow"

Hyatt at Los Angeles Airport
Los Angeles, Calif.
October 25-26, 1990

Registration closes Tuesday, October 16, 1990. No refunds for cancellations after that date.

Mail this form to: Air Force Association
ATTN: Dottie Flanagan
1501 Lee Highway
Arlington, VA
22209-1198
(703) 247-5805

NAME (Print) _____

TITLE _____

AFFILIATION _____

ADDRESS _____

CITY, STATE, ZIP _____

TELEPHONE: (CODE) _____ (NO.) _____

My check covering the Symposium fee for AFA individual or Industrial Associate member of $300, payable to the Air Force Association, is enclosed. The fee includes one (1) Reception/Buffet Ticket. (Note: Fee for non-member is $325).

☐ Mark here if an extra guest Reception/Buffet ticket is desired. Enclose $110 for the additional ticket.

Unit Reunions

Las Vegas Army Airfield
Las Vegas Army Airfield veterans who were assigned to the Air Corps Gunnery School during World War II (later the Las Vegas Army Gunnery School) will hold a reunion October 22–24, 1990, in Las Vegas, Nev. **Contact:** Joseph C. Wright, 1209 S. Commerce St., Las Vegas, NV 89102. Phone: (702) 382-9601.

2d Bomb Squadron
Members of the 2d Bomb Squadron, 22d Bomb Group, will hold a reunion October 3–5, 1990, at the Hilton East Hotel in Wichita, Kan. **Contact:** Charlie Mason, 1415 Briarwood, El Dorado, AR 71730. Phone: (501) 863-5085.

8th Air Force Historical Society
The 8th Air Force Historical Society will hold its reunion September 30–October 4, 1990, in Las Vegas, Nev. **Contact:** Aida V. Kaye, 495 N. E. 157th Terrace, Miami, FL 33162.

14th Transport Section
Members of the 14th Transport Section and the 322d Troop Carrier Squadron will hold a reunion October 16, 1990, at the Clarion Hotel in New Orleans, La. **Contact:** Joseph H. Tucker, 3744 Conrad Dr., Baton Rouge, LA 70805. Phone: (504) 355-0007.

22d Bomb Group
Members of the 22d Bomb Group (M/H), 5th Air Force, who served during World War II along with the 2d, 19th, 33d, and 408th Bomb Squadrons will hold a reunion October 15–18, 1990, in Las Vegas, Nev. **Contact:** John E. Clark, P. O. Box 560967, Rockledge, FL 32956-0967.

25th Bomb Group
Members of the 25th Bomb Group will hold a reunion October 10–13, 1990, in San Antonio, Tex. **Contact:** Bob Herzog, 4 Colonial Lane, Larchmont, NY 10538. Phone: (914) 834-7383.

Class 38-C
Members of Class 38-C (Kelly Field, Tex.) will hold a reunion October 8–10, 1990, at the Dunes Hotel in Las Vegas, Nev. **Contact:** Sam Wiper, 4632 Bountiful Way, Las Vegas, NV 89121. Phone: (702) 458-3528.

Class 42-A
Members of Class 42-A of Ellington, Foster, and Kelly Fields will hold a reunion October 28–30, 1990, in Las Vegas, Nev. **Contact:** R. H. Ross, P. O. Box 70, Brownwood, TX 76804. Phone: (915) 646-7581.

51st Fighter Squadron
Members of the 51st Fighter Squadron, 6th Air Force, who served in Panama during World War II will hold a reunion October 12–14, 1990, at the Confederate Air Force Airsho in Harlingen, Tex. **Contact:** Hall S. Bond, 2610 Magnolia Dr., Irving, TX 75062-5315. Phone: (214) 255-1077.

90th Air Refueling Squadron
Members of the 90th Air Refueling Squadron (KC-97s) stationed at Castle AFB, Calif., between 1953 and 1955 are planning to hold a reunion November 9–12, 1990, in Merced and San Francisco, Calif. **Contact:** Tony Rourke, 7726 Eichler Dr., Houston, TX 77036. Phone: (713) 771-5120.

96th Bomb Group
The 96th Bomb Group, 8th Air Force (World War II), will hold a reunion in conjunction with the 8th Air Force Historical Society on September 30–October 4, 1990, in Las Vegas, Nev. **Contact:** Thomas L. Thomas, 1607 E. Willow Ave., Wheaton, IL 60187. Phone: (708) 668-0215.

Readers wishing to submit reunion notices to "Unit Reunions" should mail their notices well in advance of the event to "Unit Reunions," AIR FORCE Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

103d Observation Squadron
The 103d Observation Squadron (World War II) will hold a reunion November 9–10, 1990, in Willow Grove, Pa. **Contact:** Jack Morris, 3431 Midvale Ave., Philadelphia, PA 19129. Phone: (215) 843-8142.

366th Fighter Group
The 366th Fighter Group will hold a reunion September 27–29, 1990, in Dayton, Ohio. **Contact:** John Peterson, P. O. Box 392, Harrodsburg, KY 40330.

376th AREFS
Members of the 376th Air Refueling Squadron will hold a reunion October 12–14, 1990, in Atlanta, Ga. **Contact:** John R. Deyton, 5960 Lynfield Dr., College Park, GA 30349. Phone: (404) 344-8338.

460th Bomb Group
Members of the 460th Bomb Group and the 55th Bomb Wing who served in Italy during World War II will hold a reunion October 25–30, 1990, at the DeSoto Hilton Hotel in Savannah, Ga. **Contact:** Robert F. Cutler, 19135 US Hwy. 19 N., #A-16, Clearwater, FL 34624. Phone: (813) 536-1018.

465th Tactical Fighter Squadron
The 465th Tactical Fighter Squadron is planning to hold a reunion September 7–8, 1990, at Tinker AFB, Okla., Officers Club that will include both enlisted and officer squadron members from 1972 to the present. **Contacts:** Capt. Mark Wilson, USAF, 507th Tactical Fighter Group, Tinker AFB, OK 73145-5000. Phone: (405) 734-3260. AUTOVON: 884-3260. 1st Lt. Rich Curry, USAF. Phone: (405) 734-3078. AUTOVON: 884-3078.

7330th Flying Training Wing
The 7330th Flying Training Wing stationed at Fürstenfeldbruck AB, West Germany, between 1954 and 1957 will hold a reunion October 4–7, 1990, at Fort McGruder Inn in Williamsburg, Va. **Contact:** Father William Travers, American Embassy Bonn, Box 270, APO New York 09080.

Class 50-A
I would like to hear from members of Class 50-A (Williams AFB, Ariz.) who would be interested in holding a reunion. **Contact:** Edwin D. Stoltz, 25792 Hwy. 20-A, Archbold, OH 43502. Phone: (419) 445-6269.

380th Combat Support Group
For the purpose of planning a reunion, I would like to hear from personnel of the 380th Combat Support Group who served at Plattsburgh AFB, N. Y., between 1969 and 1971. **Contact:** George Gregory, 2 Berkshire Rd., Maplewood, NJ 07040. Phone: (201) 763-3183.

Bob Stevens'

"There I was..."

"WE FEW"

THE ROLE ENLISTED PILOTS PLAYED IN AVIATION HISTORY HAS BEEN HONORED AT MANY BASES THROUGHOUT USAF. SOME 3,000 MEN-BEGINNING IN 1912 UP THROUGH CLASS 42-J (OCT. 1942)-HAVE BEEN IDENTIFIED. THE AAC ENLISTED PILOTS ASSOC. IS DEDICATED TO KEEPING THIS PROUD HERITAGE ALIVE. CHEERS, LADS!

SOME ENLISTED PILOTS WERE PUT IN RATHER UNUSUAL NCO/OFFICER SITUATIONS. LIKE INSTRUCTING, FOR EXAMPLE -

A FEW FLYING SGTS. WERE "BI-WINGED," HAVING RUSHED TO THE RAF/RCAF AFTER INITIALLY BEING REJECTED BY THE USAAF. (AFTER 7 DEC '41, WE WANTED 'EM BACK!)

IN THE RCAF, WHITE "FLASHES" ON CAPS INDICATED THE WEARER WAS A FLIGHT CREW SELECTEE - THIS LABEL ATTRACTED ATTENTION!

IF YOU TRAINED AS AN AVIATION STUDENT (EM OR F/O ON GRADUATION) YOU WERE IN WITH SOME PRETTY GOOD COMPANY - CHUCK YEAGER & BOB HOOVER TO MENTION A COUPLE -

TEST PILOTS GIVE HIGH MARKS TO THE V-22.

Four V-22 aircraft have flown a combined total of more than 160 hours.

The first government flight evaluation of the V-22 Osprey has been completed. Three Marine Corps test pilots evaluated the aircraft during thirty flight hours.

Their preliminary findings: "...the V-22 Tiltrotor demonstrated excellent potential for its intended missions."

Tiltrotor technology is an American first in aviation. It gives the V-22 unmatched capabilities in speed, range and versatility.

Designed from the outset to meet the requirements of all four branches of the military service, the V-22 Osprey is one of the most cost-effective and operationally effective aircraft ever built.

BELL BOEING

The Tiltrotor Team

A JOINT SERVICE PROGRAM

OSPREY UPDATE

NO. 1 JUNE 1990

COUNTDOWN TO FIRST FLIGHT

History in the making:

Tooling fixtures removed June 30, 1990.

The C-17 stands on its own.

The proud team building the C-17 has recently moved this nation's newest airlifter from the giant steel tooling fixtures surrounding it during assembly. Now standing on its own landing gear for the first time, the C-17 is a dramatic display of American ingenuity at work.

Eighty-five hundred people—aircraft engineers, builders and support staff—have undertaken one of the most formidable tasks in the history of military airlift. Their dedication, patience and willingness to persevere in the face of any challenge are making it a success. Evidence of their achievement grows with each new milestone reached.

Its rugged landing gear will allow this new aircraft to land large payloads on remote airstrips around the world. Carrying over 80 tons, it will fly as far as 2,400 nautical miles without refueling —and land on a runway just 3,000 feet long.

Out of the joining tool now, this flexible airlifter is another step closer to first flight. And the dedicated team building it has another reason to be proud of their work.

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