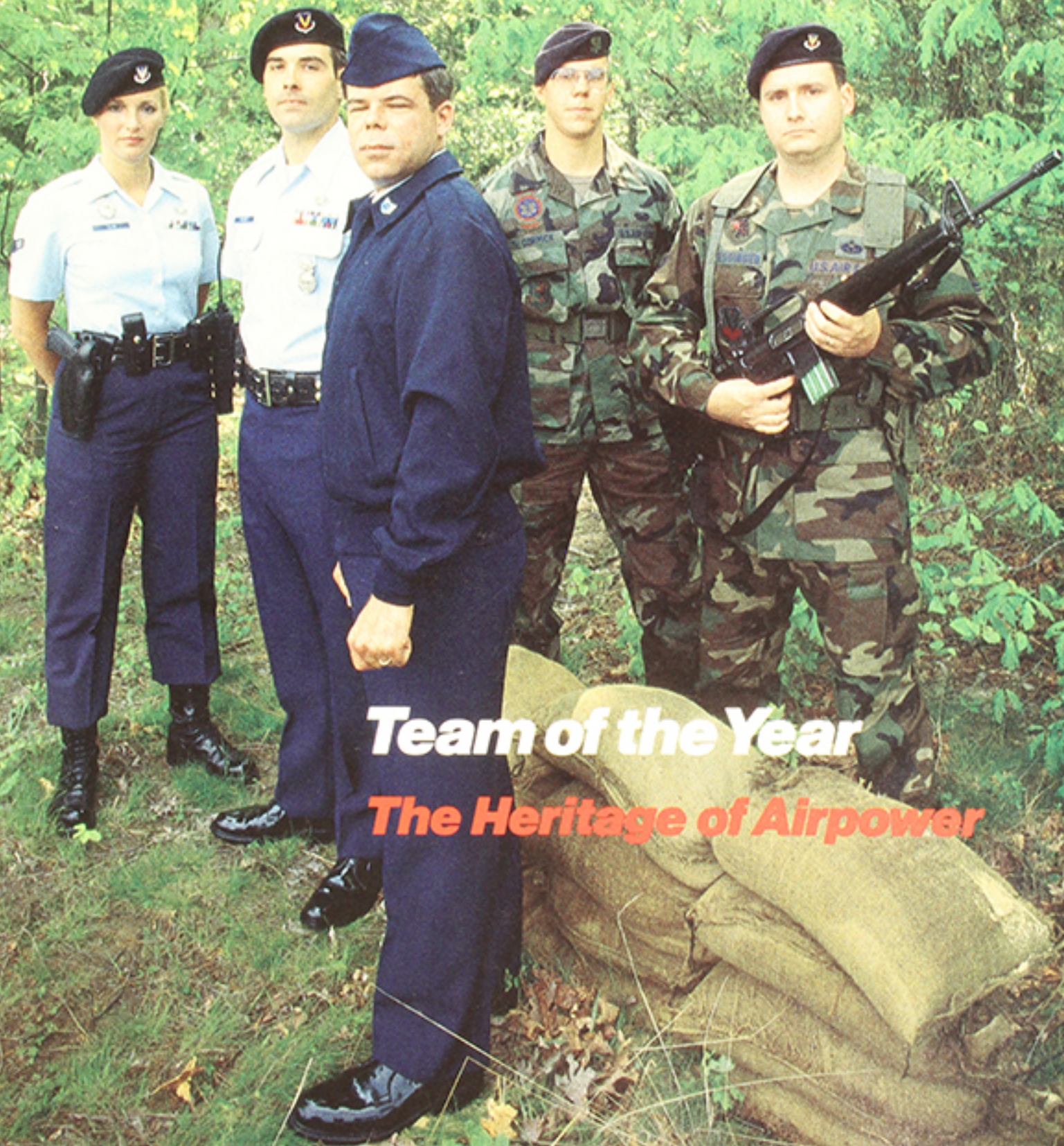


SEPTEMBER 1989/\$5

AIR FORCE

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MAGAZINE



Team of the Year

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About the cover: AFA's Team of the Year for 1989, five of the Air Force Security Police's finest, assembles at the training grounds at Andrews AFB, Md. A special section, "People and Heritage," begins on p. 52. (Photo by Paul Kennedy)

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AIR FORCE Magazine (ISSN 0730-6784) September 1989 (Vol. 72, No. 9) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, Va. 22209-1198. Phone (703) 247-5900. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** \$21 per year; \$48 for three-year membership. **Life Membership:** \$300. **Subscription rate:** \$21 per year; \$25 per year additional for postage to foreign addresses (except Canada and Mexico, which are \$8 per year additional). Regular issues \$2 each. Special issues (Soviet Aerospace Almanac, USAF Almanac issue, and Anniversary issue) \$5 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send change of address to Air Force Association, 1501 Lee Highway, Arlington, Va. 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1989 by Air Force Association. All rights reserved. Pan-American Copyright Convention.

Son of Packard

By John T. Correll, EDITOR IN CHIEF

ALL those clamoring for change in Pentagon procurement should get their fill from a plan published in July by Secretary of Defense Richard Cheney. Mr. Cheney was carrying out orders from President Bush, who, in his first address before a joint session of Congress, promised to "fully implement" the recommendations of the 1986 Packard Commission. Packard called for streamlining the bureaucracy, upgrading the acquisition work force, and a long list of other measures.

Mr. Cheney's plan strips down the roles of the big acquisition commands to supplying services and house-keeping for a permanent corps of acquisition specialists. Each service department will have such a corps, directly controlled by civilian officials in the Pentagon and effectively insulated from the regular military chain of command.

A Defense Contract Management Agency replaces the individual service agencies. An executive committee, headed by Mr. Cheney and consisting of the Pentagon's top civilian leaders and the Chairman of the Joint Chiefs of Staff, will be formed "to serve as the key policymaking body of the Department of Defense." The Under Secretary of Defense for Acquisition gets added power, taking him closer to the "acquisition czar" status that Congress so obviously wants him to have.

Mr. Cheney says that in addition to improving defense management, his plan could save the taxpayers \$30 billion over the next five years by eliminating and consolidating organizations and layers of management. Pressed for details, the principal author of the plan—Mr. Cheney's executive assistant, Paul S. Stevens—acknowledged that the savings estimate was "picked out of the air." Other parts of the vision are also lacking in substance.

There isn't much here to make system acquisition any better, faster, or cheaper. The plan concentrates on the services, which had already done a great deal to improve their end of the process, but only feints at the worst problems: micromanagement by Congress, program and budget instability, and a serpentine tangle of legislation.

Defense procurement is governed by 4,000 laws and 30,000 pages of regulations, with oversight exercised by thirty congressional committees, seventy-seven subcommittees, and four panels. On an average day, the Pentagon gets 450 written inquiries and another 2,500 by telephone from Capitol Hill. The Department of Defense spends more than 3,000 man-hours a day preparing reports for Congress.

Mr. Cheney is working up a White Paper further detailing this. He says he will try persuasion, and, if that

doesn't work, embarrassment, to elicit more reasonable behavior. Mr. Cheney is chasing elephants with a flyswatter. Congress is well aware of the micromanagement statistics, but shows no sign of being either persuaded or ashamed.

Proposals are due from the individual services October 1 on how they will establish their acquisition corps and "clear reporting channels" for them. Each corps will consist of civilians and military officers selected after ten to twelve years of service and "significant operational experience." Thereafter, officers will spend their entire careers in acquisition, but somehow be assured promotion potential "up to the highest flag ranks."

Working-level members of the corps will report to Program Executive Officers (PEOs) chosen by the service Secretary and rated on job performance by the civilian Acquisition Executive in the Pentagon. The heads of Air Force Systems Command product divisions could not serve as PEOs, as they do now.

The fate of the acquisition commands will be settled before the next Defense budget submission. One idea making the rounds last month was the consolidation of Air Force Systems Command and Air Force Logistics Command into one organization.

These actions bespeak a strange logic that weapons development should be a function apart, separate from the military mission to organize, train, and equip forces. The plan creates a force within the force, a hierarchy of specialists who answer only to other specialists. Mr. Cheney says mainstream military forces will have plenty of opportunity to be heard. Still, it is difficult to escape the conclusion that they are to participate indirectly and from the sidelines.

The caliber of acquisition personnel may be questionable in some of the services, but that is not the case in the Air Force. We at this magazine have covered Systems Command for years and can confirm emphatically that its program managers know their business. They are not semicompetent amateurs who needed an acquisition corps riding to their rescue.

For all of its defects, the much-maligned defense acquisition system produces the finest weapons in the world. It has kept us five years ahead of the Russians and ten years ahead of everybody else. No other system has yet done it better or at less cost. The shortcomings—magnified many times over in the popular imagination—have little to do with organizational structures or unclear reporting channels.

It remains to be seen whether the streamlined, upgraded, fully implemented successor spun off from the Packard reforms can do as well. ■



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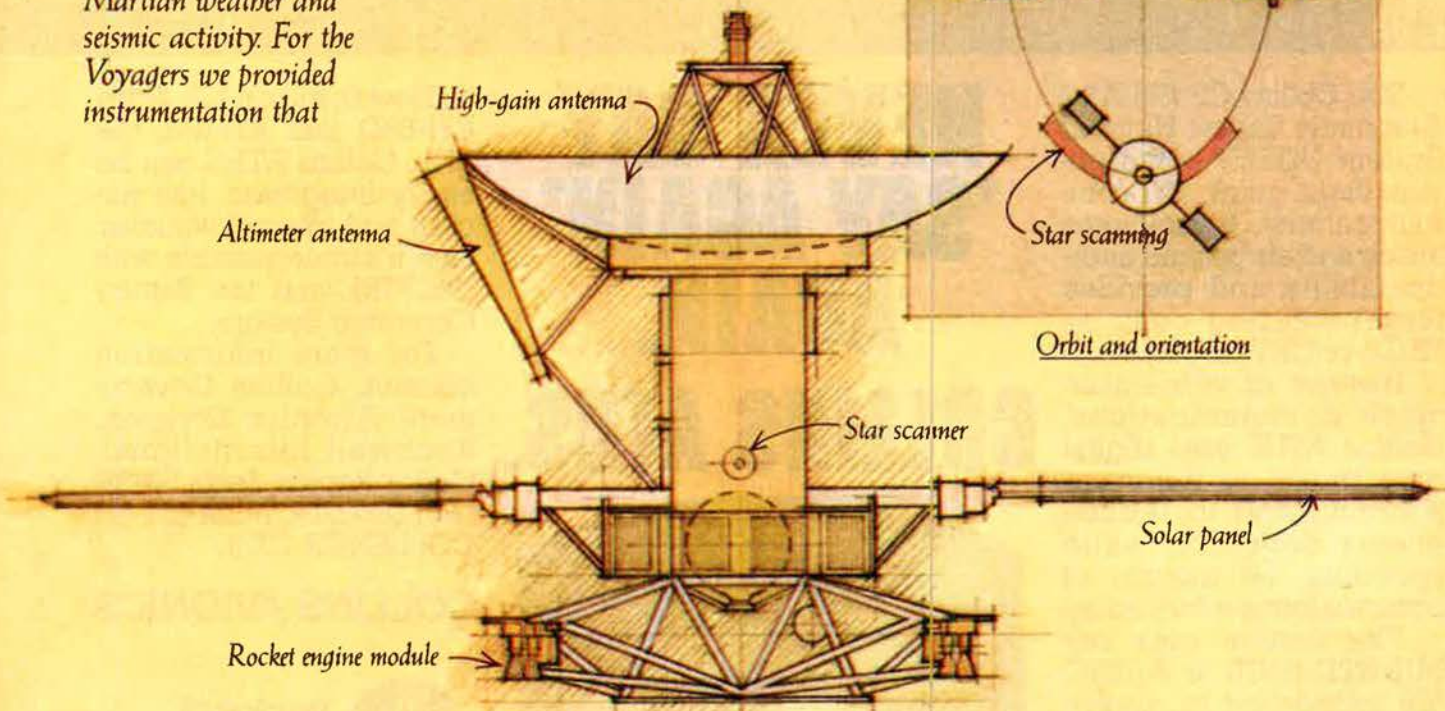
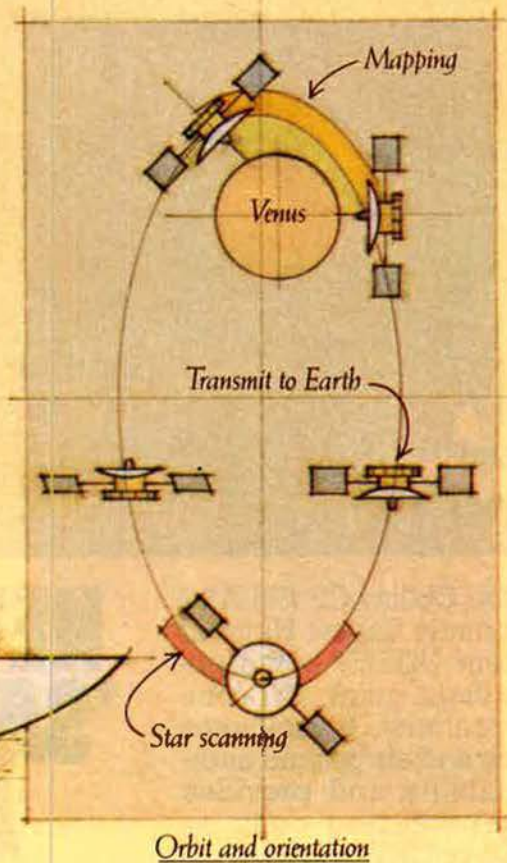
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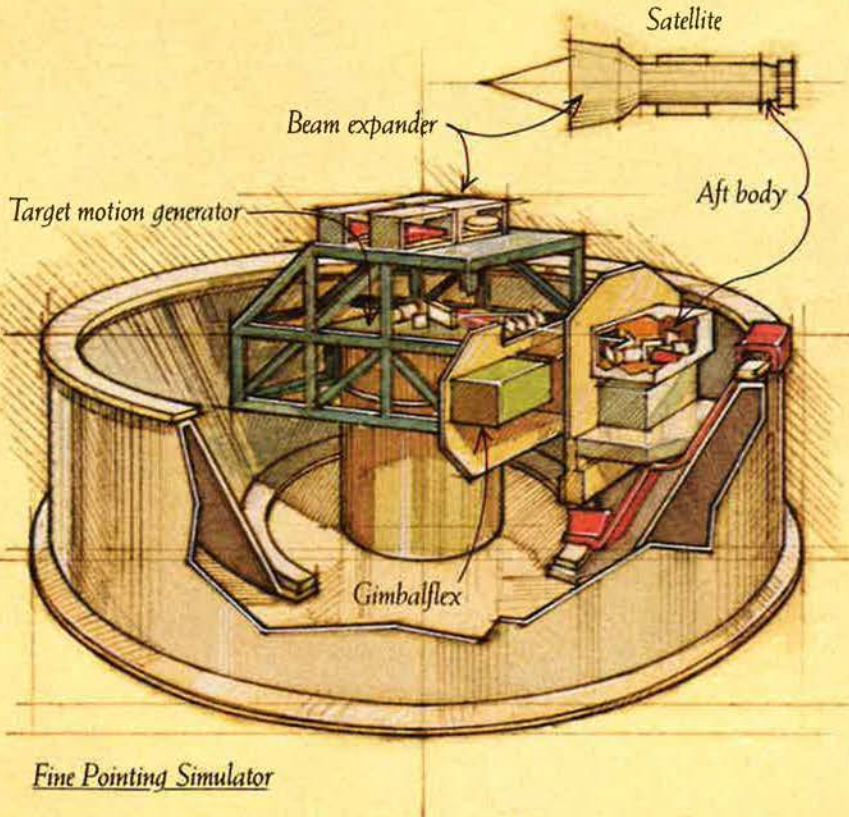
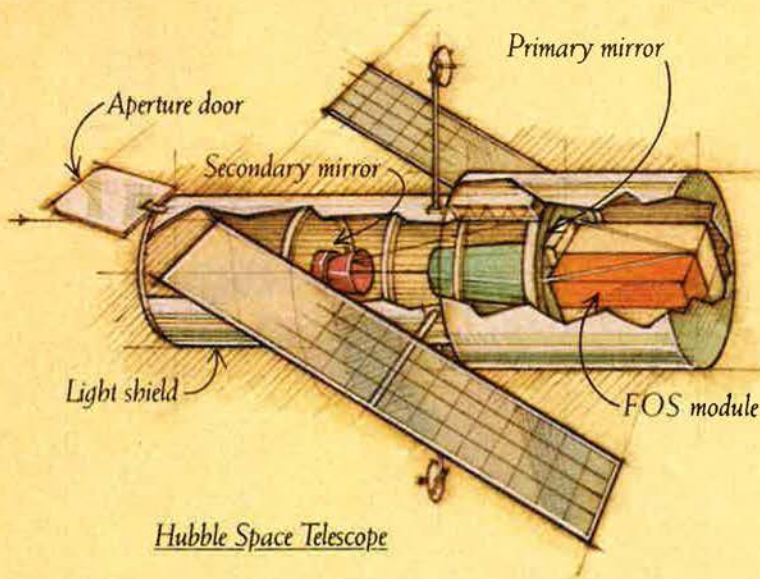
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Erroneous Figures

The article "Which Ones Are the Bad Guys?" by Maj. Gen. William A. Gorton, USAF (Ret.) [see June '89 issue, p.72], was a fair, balanced piece. However, there are a few errors that need to be corrected.

General Gorton states that the US portion of the Mark XV program will cost nearly \$7 billion. The recent independent cost analysis projected tri-service development and production at \$3.1 billion (FY '88). The entire life-cycle cost (including R&D and production) is forecast to be \$5.2 billion (FY '88). He also states that the recent FSD contract awarded to Bendix was for \$708 million. The actual contract value is \$162 million.

Brig. Gen. Noah E. Loy, USAF
Director of Avionics and
Electronic Combat Programs
Washington, D. C.

Navy Designations

I was impressed by Mr. Dudney's assessment of the US Navy's current might and the uncertain future it faces with on-again, off-again support from both Congress and the Administration [see "Back Into Harm's Way," July '89 issue, p. 44]. However, I couldn't help but notice that your caption writer erroneously identified the VA-105 pilot's aircraft as an "A-7D." The A-7D is an Air Force model of Vought's Corsair II. I'm sure he meant "A-7E," produced at the same time for the Navy. Also, the last I knew, VA-105 called itself the "Gladiators," not the "Gunslingers."

One last point regarding captions. I believe the Grumman F-14A shown in the photo on p. 48 is a VF-31 aircraft. To the best of my knowledge, there is no VF-131 in the Navy's fighter community, at least not one calling itself the "Tomcatters."

Herb Cook
Fort Worth, Tex.

Personnel Crisis

I thoroughly enjoyed your article "The Quiet Crisis in Civilian Personnel" in the July '89 issue of AIR FORCE Magazine [p. 60]. Unfortunately, much, if not all, of what you say is true. There are, however, two additional

points to be made that were not covered in the article.

First, as a military technician with more than thirteen years of civil service, I am still not sure that I'll have a retirement worth anything seventeen years from now. Congressional action has so eroded the retirement benefits that the bright civil servant is bailing out while he still has a chance for a better retirement package elsewhere. He'll probably run for Congress, where he can retire with less than ten years of service, instead of thirty.

Second, the civil service promotion system is wide open to the "Old Boy" network, the "Peter Principle," and plain old abuse. Merit, skill, knowledge, and experience take a backseat to the entrenched buddy system. I've seen it happen so many times [and] today it is . . . accepted at all levels of management. Blow the whistle and you get fired. If the Air Force, or any government agency for that matter, wants to keep its best and brightest, then the retirement system and promotion system need to be included as part of any program designed to improve the civil-service program.

Uncle Sam is lucky. I like my job, and the pay is not that bad. Then again, I don't have to depend on Uncle Sam for my retirement either, and not all civil servants are *that* lucky.

Maj. Karl H. Kromer,
Delaware ANG
Newark, Del.

Tapping Resources

The July issue of our magazine is especially hard-hitting. The article by

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

Mr. Canan, "The Climate of Distrust" [see "Washington Watch," p. 21] really hits the nail on the head.

There just has to be a better way, not only to get qualified people into government service, but also to avoid punishing them for the service they do render. This problem deserves quite a lot of very high-level consideration if our citizens are ever to regain a sense of confidence in our government.

On the other hand, General Milton's article, "Old Men, Young Men, and Flying" [see "Viewpoint," p. 59], reminded me that even though many of us do reach the age and years to retire, and receive our pay in retirement, we must not forget that it is a form of retainer. As a retired Army artillery officer with Army aviation experience during the Korean War, I know that I am subject to recall.

As a final point, I notice that our Association has very few women in the top echelons. Our nominees for the Board of Directors included only one, our national vice presidents none, our national directors two, and the candidates for the four national office positions are all men. . . . In the Alamo Chapter, where I am a Life Member and longtime treasurer, we have very effective and active female leadership. It wasn't very long ago that our chapter president was a retired female general officer. Our current vice president (soon to be president) is a woman.

I offer these comments to suggest that as we seek to increase membership to better represent the entire Air Force, perhaps we should attempt to increase the number of women in key leadership roles.

Lt. Col. Edward R. Hicks,
USA (Ret.)
Randolph AFB, Tex.

Enlisted Pilots

Congratulations to Bruce Callander on his article "Enlisted Pilots," June '89 issue, p. 98. How true, how true were his comments concerning the ostracism and hostility by not only the rated and nonrated officers and the cadets, but to a certain degree, by the enlisted ranks as well, toward us

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

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Circulation audited by
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Airmail

"dogface" misfits. As a whole, my class, 42-D (Kelly), outflow and were scholastically equal to the cadets. The reason: We were dedicated and wanted to fly. We were already in the Army and not trying to dodge the draft as so many of the cadets were doing at that time (1941 and 1942). Be that as it may, if I had it all to do over again, I would go the very same route.

James H. MacWilliam, Lee Arbon, Rex Medcalf, and many others have worked long, hard, and arduous hours, days, and months researching the archives and official records to locate and communicate with all of us who survived to form what is now the "Army Air Corps Enlisted Pilots Association" (AACEPA). According to the "Roster of the Sergeant Pilots," July 1988, there are (including the "Early Birds" who earned their wings during the period 1912-33) approximately 1,250 of us still around, and 560 are deceased (Lost From the Formation). Not all are members of the association, but all have been located through the efforts of the men named above. Not mentioned in Mr. Callander's article was that since its forming, the AACEPA has erected memorials to those "Lost From the Formation" at Kelly AFB, Tex., Harlingen (Confederate Air Force), Tex., the Air Force Academy, Luke AFB, Ariz., Scott AFB, Ill., and McChord AFB, Wash. The next one will be at the Air Force Museum at Wright-Patterson AFB, Ohio, during our forty-eighth-year reunion October 10-14, 1990. . . .

Lt. Col. William H. Lyle, Jr.,
USAF (Ret.)
Lubbock, Tex.

It surprised me that in all the letters about enlisted pilots, enlisted bombardiers were not mentioned.

In late 1943, I was assigned to the 58th Bomb Wing Development Detachment at Smoky Hill AAF as a B-29 central fire-control specialist at the rank of Pfc. [I served with] Corp. Ray Hodges, who was a bombardier with a B-24 group and had flown combat missions against the Japanese forces on Kiska and Attu and had been decorated for his efforts. Ray related that our B-24s had flown low-level strafing runs on the Japanese positions, thereby causing great consternation among the Japanese, who thought we had some special new type of aircraft.

George W. Heller
Indianapolis, Ind.

Have just read your June 1989 issue of AIR FORCE Magazine and was extremely interested in Bruce Callan-

der's article about "Enlisted Pilots."

My father was the first—Vernon Burge. He passed away September 6, 1971, but he did see man go to the moon!

We are all very proud of Daddy and so enjoyed the article. . . .

Marjorie B. Waters
San Antonio, Tex.

The Family Argues Back

I read with interest the article by Col. Robert F. Venkus in your July issue [see "This Is a Family Argument," p. 75]. Though it struck a nerve with me, a soon-to-retire (less than two years remaining) military aviator, there were a few noticeable omissions.

First, the "Family Argument" to which Colonel Venkus refers needs to include Congress. If a promise is made, it must be kept. There are too many instances to cover in a reasonable space, but to cover just a few: the constant cuts in weapon systems that make career planning a joke, the failure to keep promises of educational benefits, the pay raises that never manage to keep up with inflation, and the continual changes in [manpower] strength that undermine the individual service's abilities to keep internal policies consistent. If Congress and its constituents can't make up their minds, how can we expect the ping-pong situation of a military aviator to be satisfactory?

Second, I have repeatedly heard of the "limitation of lieutenant colonel" for career aviators. That is, quite frankly, a joke, because there are not many true "career aviators" out there who have ever made it past the rank of major anyway. The attempts of General Welch and other equally well-meaning individuals will not [succeed] in the near future. . . . The facts of life make a sham of the intent. Unless Congress is willing to increase lieutenant colonel positions to the point where aviators without disciplinary problems on their records can be reasonably assured of retirement at lieutenant colonel, [we should] quit trying to fool the line into thinking that that is a viable probability. The odds are less than fifty percent.

To offer an alternative, the Air Force should consider the elimination of the [promotion-zone categories] and allow all in a given rank to compete equally. If wing commanders were allocated promotion DP [definite promote] categories by the total number eligible and not just in-promotion-zone individuals, the allocations would flow to the field naturally (since

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the "Golden Boys" tend to migrate to headquarters positions). This would also keep the real percentage for promotion to a given rank from being hidden from the field.

Third, the leadership has got to quit playing games with our pilots. We force lieutenant colonel/major pilots to go on one-year remotes in order to keep from sending younger pilots, and the younger pilots begin to wonder what's in store for them if they stay. We offer majors who are about to retire at twenty years the option to stay to twenty-four, yet we are never going to give them another longevity raise and will reduce their flight pay once they pass eighteen years of service. Our flight-surgeon system has made life difficult at best for many of our pilots with its policy of "qualified for all or nothing."

Finally, we haven't bought a new plane other than a fighter in significant quantities since Vietnam. The truth is, our most recent nonfighter buys were almost token, stopgap measures, pending the time we were willing to spend money. The fighters are capable and needed, but they are not going to win the war without the other aircraft types alongside. Our B-52s and KC-135s are thirty-plus, as are our T-37s. The T-38 is close behind. The C-130s have been generally upgraded but are getting old.

To cite an example, the T-37 was designed for 5,000 hours of flight time. We continue to fly T-37s to 18,000 hours. We are about to do a modification that could take some of these aircraft to 26,000 hours. We are talking about a 1957-63 vintage aircraft that flies three to four times per day, five to six days a week, past the year 2000. We are talking about an aircraft and not a car, but would you drive the best-built car across country more than forty years after it was built without rare and extraordinary maintenance and circumstances? That's what we are talking about with the T-37, with the T-38 to reach that point shortly thereafter. Though the B-52 models are younger, their concept of operations will not allow them to operate much longer either, and we're asking our pilots to take them into a war!

I can't give any easier answers than those that our leaders propose, but there must be some common sense out there somewhere that says the continued aggravation of our pilots will only make the situation worse. Our airline industry is beginning its second modernization since Vietnam.

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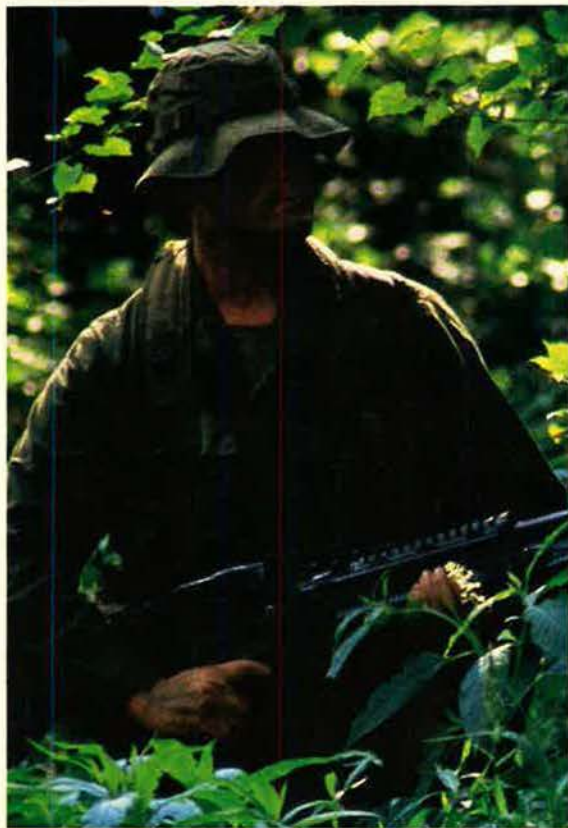
I have put in nearly twenty years and could have "deserted" my country for a "lucrative airline job" many times. I would fit into General Welch's definition as well as would many others I know. I don't always fit the mold, but I am a patriot. I will fight to the death for my country. . . . Though I may die in the cause, I will try to use my 1950s vintage aircraft to deliver weapons, food, and material to the front lines . . . hoping that the 1970s vintage

fighters can keep me aloft long enough.

I am a professional Air Force pilot and damned proud of it. It just ain't always easy to say that anymore!

Maj. Alva E. Bendure,
 USAF
 Chandler, Ariz.

General Milton's article [see "Viewpoint: Old Men, Young Men, and Flying," July '89 issue, p. 59] was



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very timely. The pilot commitment has now increased to ten years after pilot training, for a total of eleven years. Convicted murderers often receive a shorter sentence!

Yes, General, pilots are bailing out at an alarming rate, but it is not due to a sudden lack of commitment. The opportunities are just too great to pass up. In your day, if a pilot got out, he could go fly KC-97s in the Guard or Reserve. Today he can fly an F-15, F-16, A-7, F-4, C-141, C-5, KC-10, etc. If he does not have his assignment of choice on active duty, he can probably find it in the Guard or Reserve. That is part of the fallout of our Total Reserve Forces concept.

With increased reliance on our Air Reserve Forces (ARF), it's probably a good thing that the airlines are hiring. Can you imagine the ARF manned by an entirely nonprior-service corps? In fact, most pilots join the ARF shortly after separating from active duty. Why? Because they like the flying and the camaraderie. They don't want to waste their active-duty time, and they still feel a commitment to the Air Force and their country. Old pilots don't just fade away. They become state senators and prominent citizens who support our armed forces.

I think the General has avoided addressing the causes of our retention problem. I am not experienced enough to list and solve all of them, but I bet a think tank like the RAND Corp. could shed some light. Perhaps it is time to completely restructure and revolutionize our thinking on pilots. Since the days of the Army Air Corps, we have paid a nominal incentive called "flight pay," but it didn't have to be substantial, for after all, they got to fly. Other than flight pay, all officers of the same rank are paid equally. To this day, if flight pay were abolished, most pilots would elect to stay in the cockpit. But would they stay in the active-duty Air Force? I doubt it.

If you want to retain our best pilots, I think it is going to take two things. Pilots are going to have to be treated as a special entity and not forced into career-broadening assignments in order to be promoted. Second, it is going to take a lot of money. In the 1930s, the pilots wanted the regular commission for security. Today, they want the dollars for that same security. If the active duty won't provide it, the airlines and ARF will. Pilots want to fly, and they want to be compensated for it. An F-15 squadron commander should not be making only \$400 per month more than the chief of

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The Air Force is unique in that it is the only service in which the officers shoulder the bulk of the combat arms. Yes, we would have to revolutionize our thinking, but it would save us money in the long run. This is a hard point to sell to Congress and the public, but with reduced accident rates and training costs, irrespective of increased readiness, the country would save money. Our only other choice is

to accept the *status quo* and increase our training capabilities.

I think [General Milton's] proposal [to increase the time an Academy graduate must serve] is counterproductive. I put in ten years on active duty and have served the last eight years as an Air Force Academy/ROTC Liaison Officer. I have sent seventeen young men and women to the Academy, and only one has ever quit. I don't ask them to give me a career. I ask them for their four best years at

USAFA and then whatever service commitment they incur. I tell them not to worry about the service commitment, because that is the reward they get by successfully completing the Academy. If during their service commitment the Air Force can't convince them that the Air Force is right for them, then they can resign. They will have served their country, gotten a great education, and worked with the finest people in this country. I put the onus on the Air Force to do its part.

The increased commitment has already cost us several top students, some to the Navy, which has a shorter pilot commitment. Imagine telling a seventeen-year-old kid he has to sign away the next fifteen years of his life to be a pilot. And now you want me to make it seventeen years and fourteen for an engineer? We are already running off some of the finest students in the country, students who would really like to go to the Academy.

Is our program so bad that we have to conscript these students for half of their lives? If I thought so, I would quit as a Liaison Officer today. As things stand today, we are going to lose a lot

of our engineers and pilots. Is it not better we start with the cream of the crop? If we want to keep bringing in seventy percent pilot-qualified students, you're going to see C students under your plan. You don't need to be intelligent to be an airline pilot, just experienced. To fly an F-15 or F-16 in today's sophisticated wartime environment, you need some technical background and above-average intelligence.

Finally, I take great exception to General Milton's description of life as an airline pilot. I look forward to every day I fly and have not yet encountered "long years of boring toil." As for [your charge of] "little responsibility," you know not whereof you speak. Whether it's [the duty of dealing with] unruly passengers, mechanical difficulties, weather, the FAA, bomb threats, or crew coordination, as the captain, I have all the responsibility I had always hoped for. That was a cheap shot, and it missed its mark.

We have some problems in the Air Force, but I don't think it is in the people we bring in. I think the Air Force leadership has to do its part in

convincing them that the Air Force is where they belong.

Maj. Rodney L. Jones,
USAFR
Scottsdale, Ariz.

Regarding the "Viewpoint" article by General Milton on the shortage of future leaders because of the exodus of pilots from today's Air Force, I just want to ask the General if he has seen the "Non-Bonus Aviator" patch that has been proudly worn by a number of navigators that states "For Love of Country—Not Money"?

Capt. William P. Wilhelm,
USAF
Mather AFB, Calif.

General Milton's Viewpoint, "Old Men, Young Men, and Flying," left the reader with the impression that future Air Force woes will be the fault of today's young Air Force pilots who are unwilling to assume leadership roles due to their lack of interest in anything that doesn't pull Gs and smell like JP-4. Among General Milton's noteworthy comments was the phrase, "leadership remains basic to effective airpower." What General Milton failed to mention is the sorry state of present leadership, especially at the squadron level, that is turning young pilots away from leadership roles and Air Force careers.

I recently separated from the Air Force after eight years of flying because of the eroding effect of [poor] leadership on morale, retention, and readiness. General Milton's opinion that commanders are too concerned with the "big picture" gives far too many squadron commanders far too much credit. My experience has been that they are not concerned with the "big picture," only with *their* picture. Their vision extends only to the next higher-headquarters inspection, the next exercise, or the next visit of anyone who can somehow further their career. Does it matter that they're driving their people out of the Air Force? Do they make any attempt to use their influence to get their people what they deserve? Do they really do anything to increase the short-term or long-term readiness of their unit? Are they in any way judged on any of these "big picture" issues?

Squadron commanders want to be wing commanders. This is no secret. If their unit looks good for their short two-year stint of reinventing the wheel, they just might make it—after, of course, a mandatory trip to the bowels of the Pentagon to regain [a view of] the "big picture." While long-

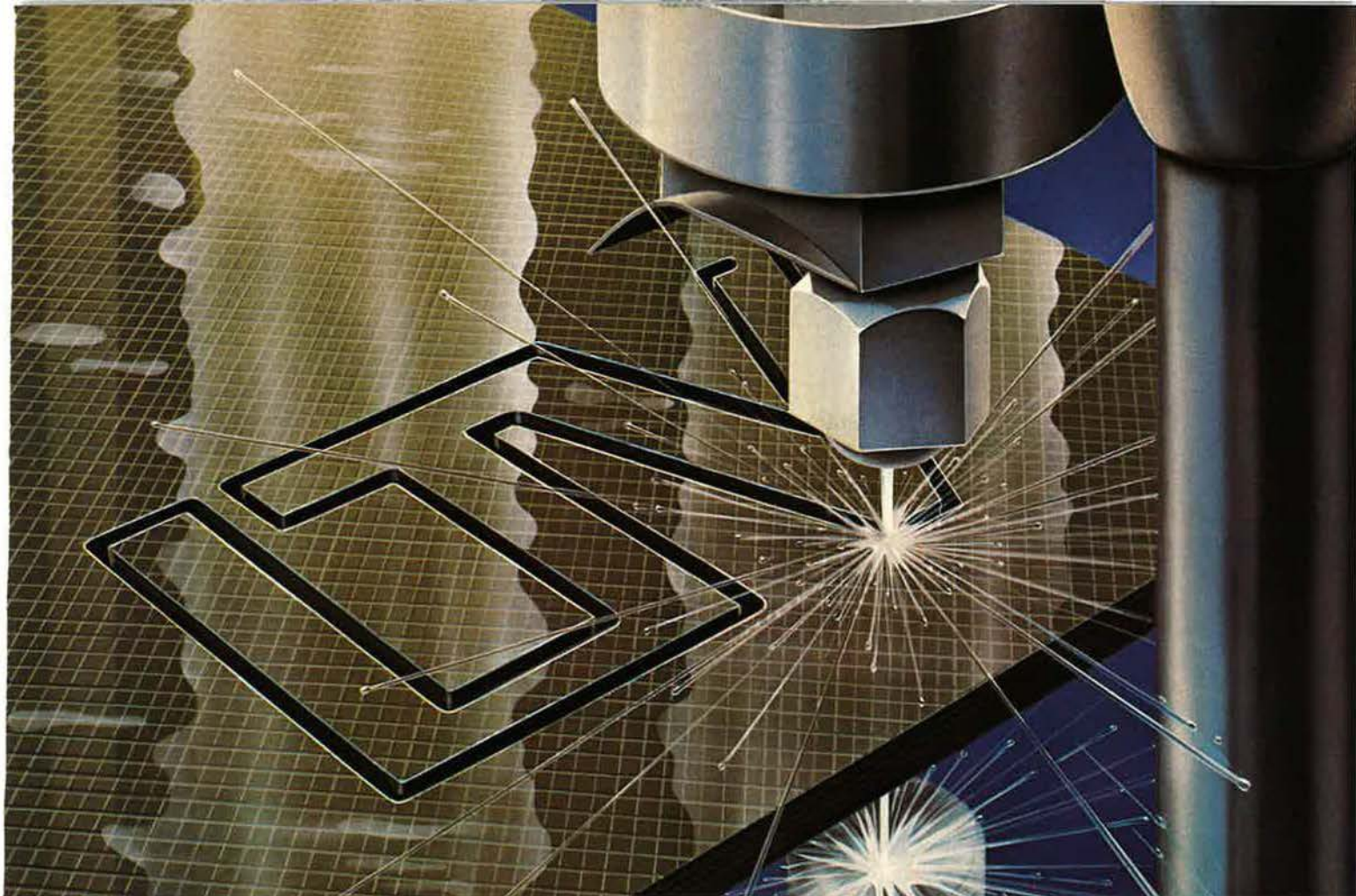
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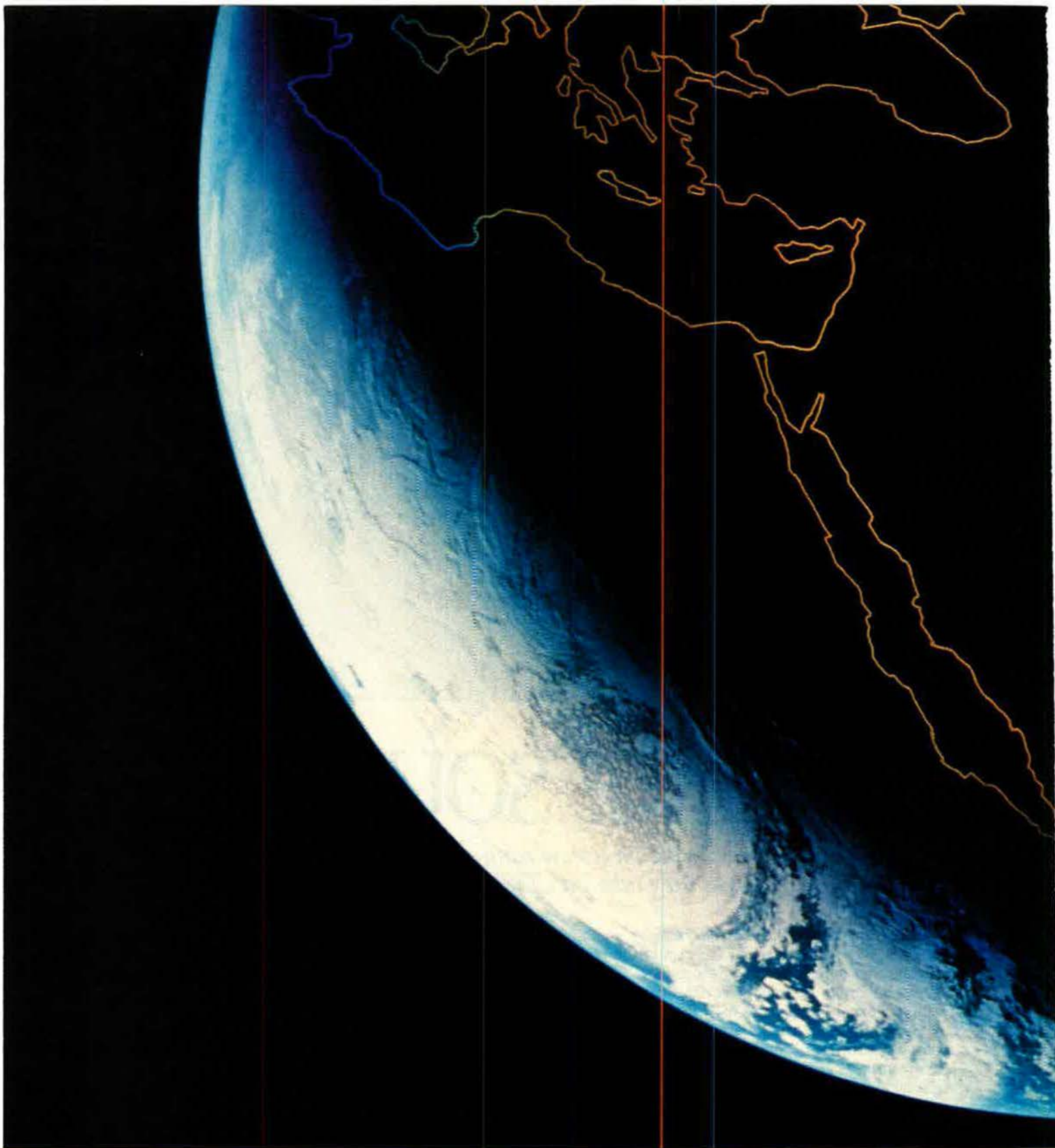
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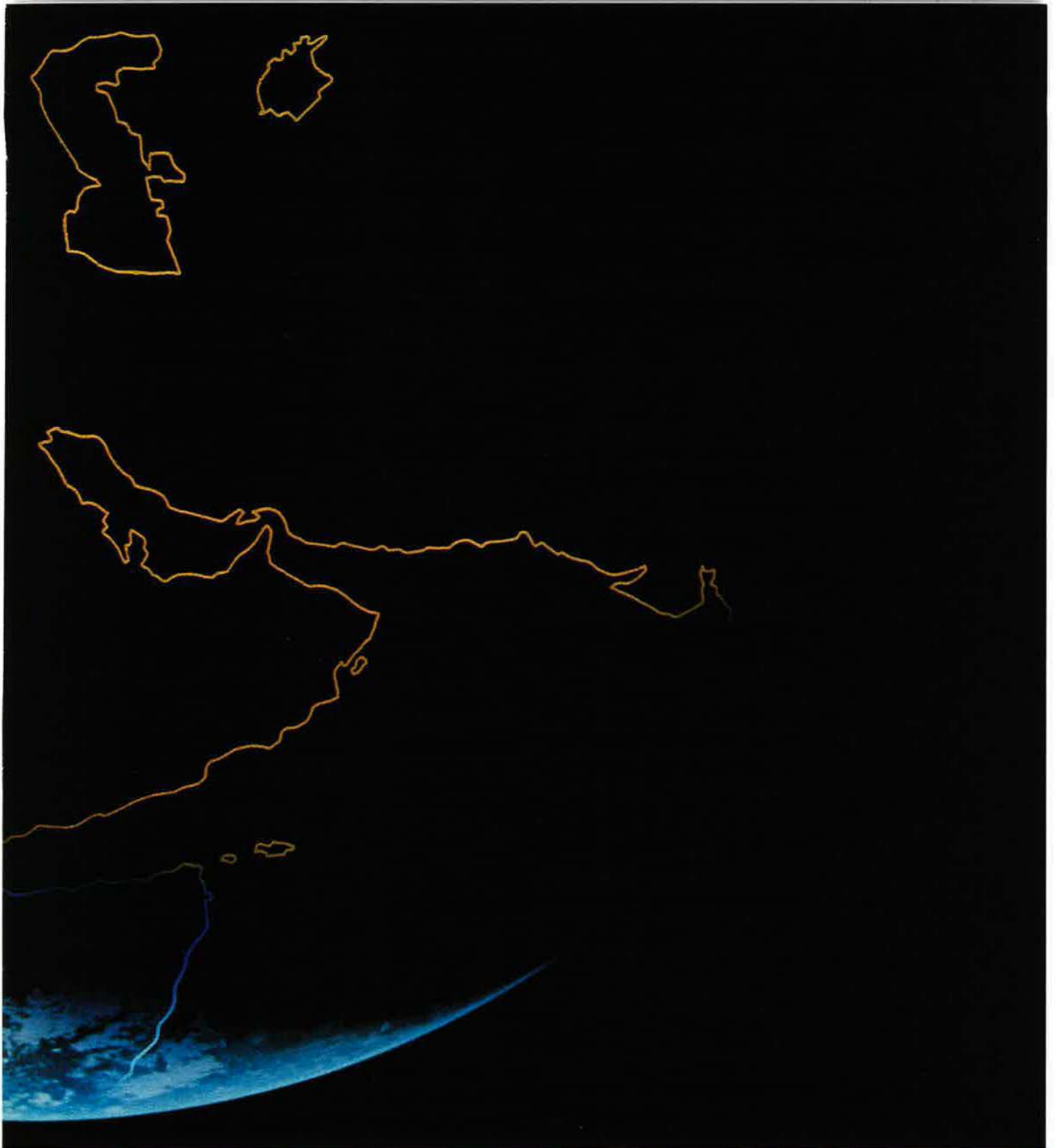


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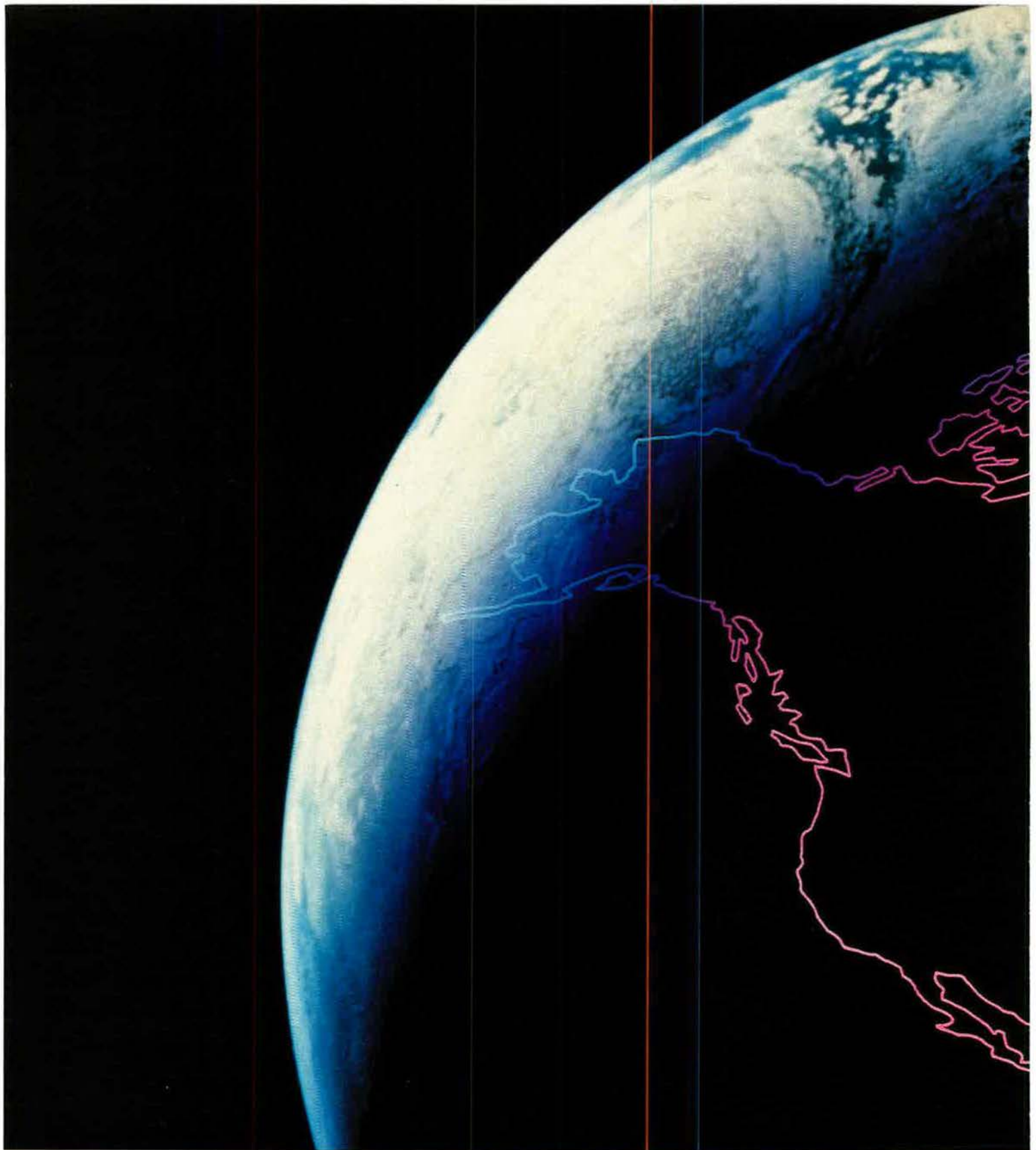
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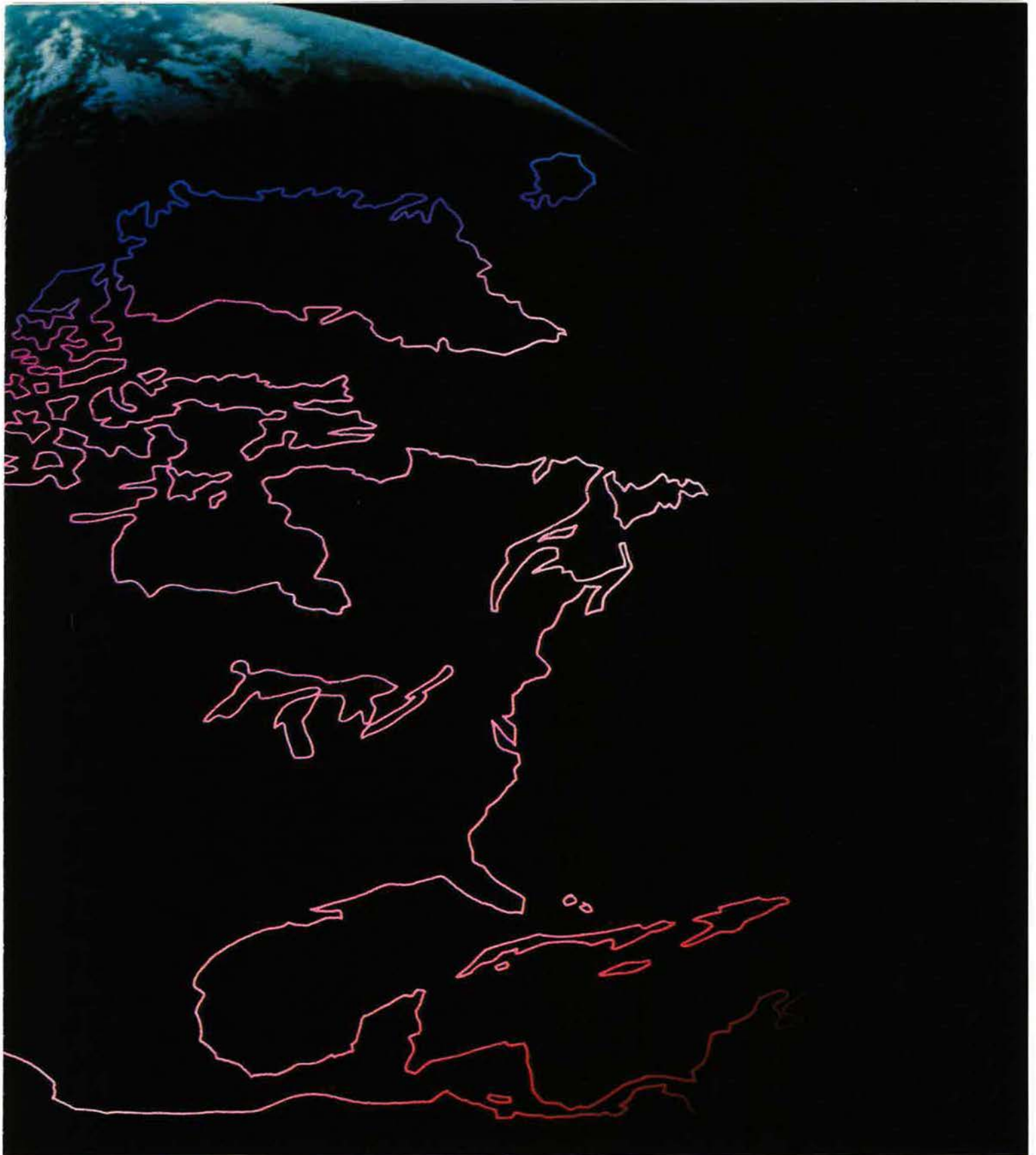
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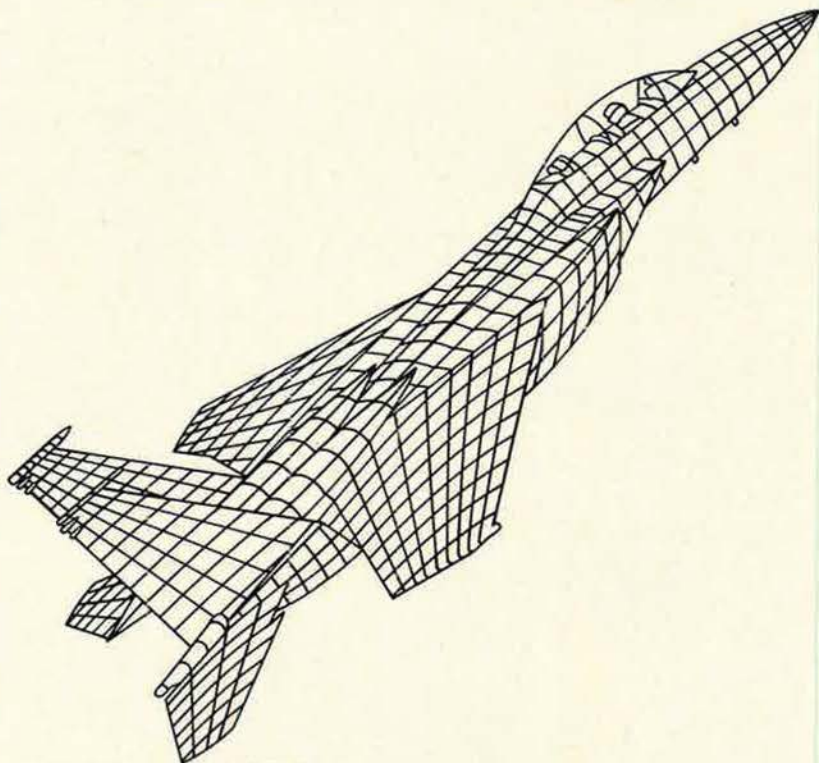


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term progression for the unit and its people should be every commander's goal, these concepts are arguably the furthest thing from the mind of a commander who is trying to make himself and his squadron look good. But with today's method of evaluating their effectiveness, who can blame them?

I have had commanders who didn't operate in a totally selfish manner, but two out of five is not a good percentage. Senior Air Force leadership needs to take a closer look at the examples that squadron commanders are setting for their young flyers and at the ways the performance of their units is judged. An excellent [inspection] rating is great, but if a flying squadron loses experienced people because of the seven straight weekends of bean-counting spent preparing for the [inspection], the price is too high.

Leadership is basic to effective airpower. So is followership. I simply found I could not continue to follow ineffective leaders in their quest for promotion, nor could I allow myself to develop the "leadership" style so prevalent in today's Air Force.

Michael J. Hittmeier
Clovis, N. M.

The statistics show there is a lack of commitment by all officers, not just Academy grads, and, as General Milton suggests in his article, "clearly something is amiss." But the problem isn't the Academy training or the graduates, as he would have us believe. Maybe years ago a cadet fresh out of high school already had his mind made up about a twenty-year career. I doubt it, but they certainly don't now. And herein lies the problem—the Air Force is a great place to start, but a lousy way of life.

The training in leadership and morality at the Academy is the finest, but it isn't applicable in "the real Air Force." Today's generals and senior staff aren't leaders—"They're politicians, and bad ones at that," to quote a former SAC staff officer. He went on to say, "The senior officers get promoted at the expense of the junior officers, and the junior officers get promoted at the expense of their friends." . . . To support a system you have lost faith in takes something other than commitment.

Saving dollars everywhere possible is promoted heavily to the troops, and they have responded admirably, but those savings are wiped out many times over by bad decisions at senior levels. . . . Our "leaders" can find plenty of funds to train replacements

and buy "bargaining chips," but not for their own troops. They just keep telling you to do more with less.

I'm sorry, but the standards taught at the Academy are too high for today's Air Force. I couldn't remain committed to gross mismanagement and inconsistency, so like many grads I sought out the other option, the country's National Guard. The Guard leadership understands its people aren't locked in by yearly commitments and retains them by being loyal and responsive to them instead. The full-timers in my unit don't have a yearly commitment, and can't collect retirement until age sixty, but they aren't bailing out like the active duty.

Yes, there is a lack of commitment—a lack of commitment by the Air Force to its people. That's why Academy grads are "bailing out for the airlines."

John A. Sam Herchak
Phoenix, Ariz.

Seeking a Consensus

In the June 1989 Editorial [see "Maybe We Need a Sputnik," by John T. Correll, p. 4], "Ripe Technologies" by General Marsh, and the article by Bruce Callander on "Enlisted Pilots," recurring themes seem to pop up in which discussion, debate, and consensus need to be brought to the forefront.

First, [an] approach—on a long-term as well as a short-term basis—needs to be coordinated among various factions in our society about overall defense and strategic objectives as an instrument of our foreign and domestic policy and about the systems, financial resources, and consensus [necessary] to achieve these objectives.

Second, no investment in technology and systems can successfully accomplish our objectives without [the addition of] a substantial investment in human resources, both in initial and developmental training and in maximum utilization of trained personnel.

Third, with regard to maximization of human resources, creative methods need to be developed to assimilate the unskilled and uneducated, as well as a substantial portion of . . . women and minorities.

I would like comments on my letter to you from the readers to start a dialogue and to arrive at a consensus on how best to weave these three themes into a coordinated program with policies for implementation.

Jay Schechter
AFPRO Det. 5
Pratt & Whitney
East Hartford, Conn.

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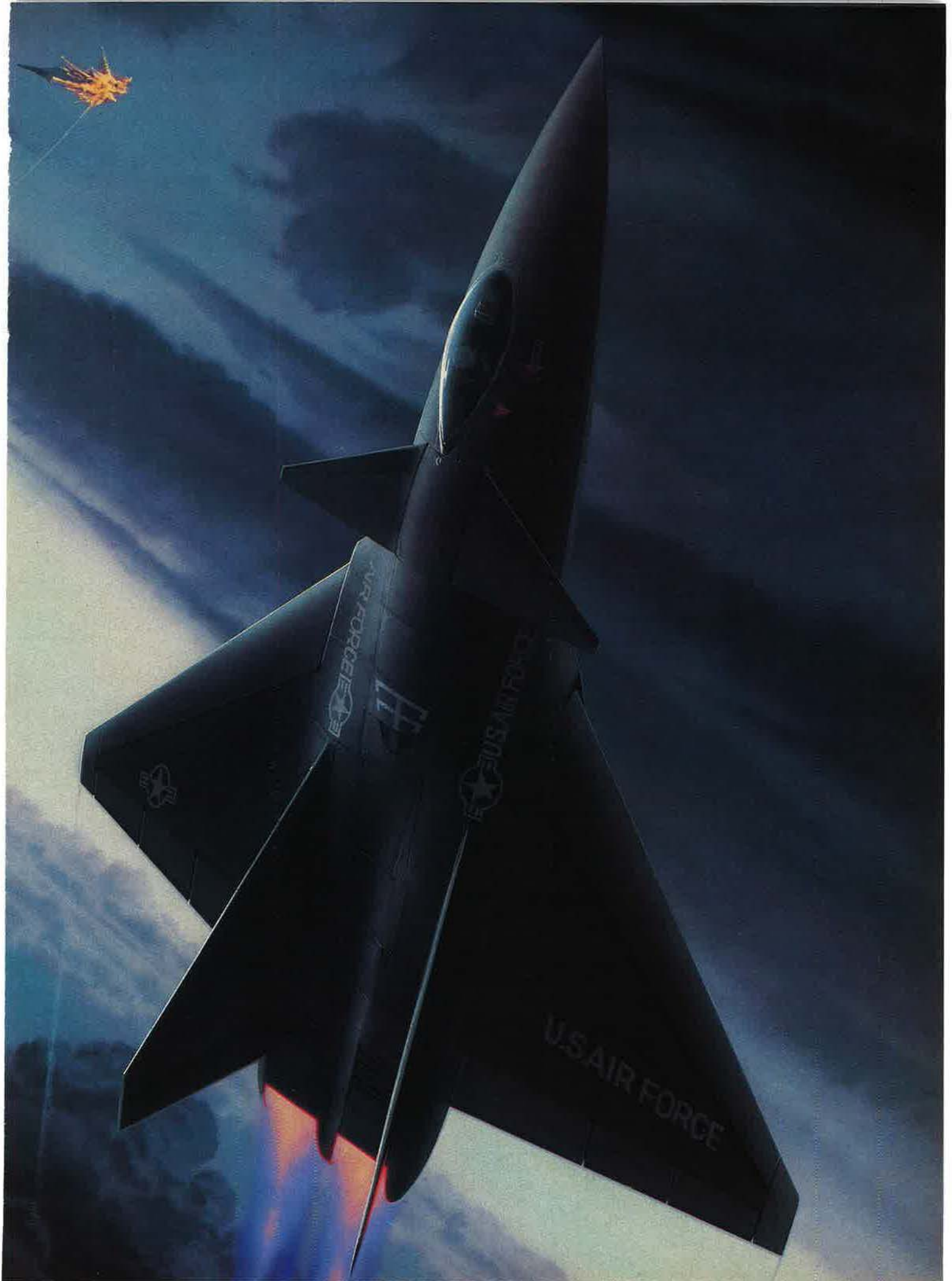
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The B-2 Is Still Flying

By Robert S. Dudley, EXECUTIVE EDITOR

The batwinged bomber, with aggressive backing from the Pentagon, maneuvered through this round of congressional review better than some expected. Further questions and more flak lie ahead.



Washington, D. C. Donald B. Rice, the new Secretary of the Air Force, is sending a surprising message to the nation in general and to the Congress in particular: All things considered, the B-2

bomber's prospects are looking rather bright.

The word from the top is that the case for building the revolutionary plane has emerged relatively intact from the summer budget wars. That certainly did not seem to be true during weeks of congressional attacks on the warplane. Some thought the batwinged B-2 had been sent into a fatal nosedive.

"My reading is more optimistic," the service's new civilian leader maintained in a talk with AIR FORCE Magazine. "I recognize that we have a lot of work to do. . . . [But] I think we're seeing the fuss and feathers of the initial reaction. . . . My sense is that, as people spend more time on the issue, they understand the need [for the B-2] and the value better."

Indeed, claims the Secretary, some skeptical lawmakers are coming around. This assertion, he adds, is based not on wishful thinking but on hard, day-to-day experience. "I've been dealing just about every day with members of Congress from both houses," says the former RAND Corp. executive. "I do think I see a trend of increased understanding of what this is all about."

Secretary Rice's cautious optimism is getting an early test this month as Congress completes work on Fiscal Year 1990 defense funding. The high-profile, radar-evading B-2 once again shapes up as the center of attention.

While the Senate has agreed to fund production of eight bombers over the next two years if they meet specific performance goals, the more skeptical House approved only four and warned that it may try to kill the program unless its \$70.2 billion cost is cut. A compromise must be worked out by October 1. Whether the final result tilts more toward the Senate or House view will say much about the B-2's future.

The outcome, though impossible to predict, is now seen as likely to favor the Senate stance, given the fact that

Washington observers predict that the debate over the B-2 will sputter for years.

Sen. Sam Nunn (D-Ga.), influential Chairman of the Armed Services Committee, has emerged as a powerful B-2 backer. Even in the House, support for the B-2 has proved more robust than had been expected.

The Air Force, for its part, is now shooting to receive a "good continuation outcome." What this means, explains Secretary Rice, is a 1990 B-2 budget that sustains research and development and "does a good job, if not a perfect job," of financing bomb-

er production. The Senate's \$4.4 billion authorization does that.

If the B-2 bomber does receive this level of short-term support—and the Secretary clearly believes that it will—the Air Force will move into the second part of its strategy to sell the B-2. This, says the Secretary, will be "to let the [B-2] system prove itself over the next six months to a year," well before the next congressional budget cycle reaches a critical decision point.

The Secretary expresses confidence that technical worries about the B-2 will be resolved. "We're now right at the beginning of the flight-test program," he explains. "The first six months of the test program will explore something like eighty percent of the envelope. I think we'll effectively lay to rest the remaining questions about the airworthiness of this air vehicle design."

Equally important is the prospect of showing that USAF has a handle on B-2 costs. Explains Secretary Rice: "During that same period, we will accumulate significantly more data on the cost of building the first few air vehicles. That'll help a lot, I think, with the confidence that [Congress] can have in our cost estimates."

Even so, Washington observers predict that the debate over the B-2 will sputter for years. On Capitol Hill, the noisy summer of arguments over the bomber—the first public debates since the B-2's inception in 1981—crystallized questions that are likely to plague the program. At least seven issues were previewed.

- **Cost:** Many lawmakers question whether any fleet of aircraft, no matter how technologically superior it may be, can be worth the \$70.2 billion cost estimated for the planned force of 132 B-2 bombers. The problem, they add, is especially great at a time of stagnant defense budgets.

In response, Secretary Rice claims that such critiques lack context and are virtually meaningless.

For example, he notes, much is made of the high cost per year—up to \$8 billion—of B-2 procurement. "That's been referred to as if it is precedent-shattering," says Secretary

Rice. "In fact, it is not. We have had, in constant dollars, higher funding years on the B-1 bomber. Peak for the Minuteman [intercontinental-range ballistic missile] was higher than any year for the B-2."

Nor, claims the Air Force leader, is the B-2 the most expensive single weapon program ever, as is frequently claimed. He points out that the Navy's Trident strategic submarine program, which includes the D5 missile program, is more costly and still "correctly enjoys wide support" in both the Pentagon and Congress.

The B-2 is not even the all-time budget-buster. By the Secretary's calculations, the percentage of relevant defense budgets devoted to procurement of the B-1 and B-52 bombers (1.6 percent and 1.4 percent, respectively) exceeds that planned for the B-2 (1.3 percent).

Especially irritating to B-2 proponents is what they view as gross misstatements of the B-2's unit cost. By dividing the full program cost by the number of B-2s, critics arrive at a per-plane price tag of about \$530 million. Excluding money already spent on R&D, however, the "fly-away" cost of each B-2 comes to just \$274 million, only about twenty percent more than that of a less capable B-1.

The Secretary believes that such facts are sinking in on Capitol Hill, with beneficial effect. "When we get away from the focus on the grand total, with all the inflation in," he says, "and recognize that a significant amount already is expended, and we've gotten a great deal of return on that large R&D investment, and that that return is embodied not only in this special system, then all these factors will help the Members begin to understand the cost numbers, in a better context, to make these figures less scary than they seemed."

• **Numbers:** Even at the more realistic unit cost of \$274 million, lawmakers say, the B-2 is not cheap. In turn, they question whether the Air Force truly needs all 132 bombers it plans to buy for a full-fledged force. They are searching for ways to reduce the fleet's numerical size.

The Senate, even though it has given strong support thus far to the B-2, voted to require the Pentagon to report by early next year on the financial and military consequences of cutting back the B-2 fleet from 132 bombers to as few as sixty. The House, spurred by Rep. Les Aspin (D-Wis.), the Armed Services Committee Chairman, goes even further. It wants the Air Force to recast the B-2 plan so that the US

does not end up buying the full fleet. "The big question," says Representative Aspin, "is how many B-2s you need."

Air Force leaders seem to be hardening their stance on this question. They say the US needs all, or nearly all, of the 132 B-2s originally planned.

Without the planned complement, warn service officials, the United States might wind up by the turn of

The bomber's role in the SIOP is paramount.

the century with a penetrating bomber force containing as few as 200 aircraft, compared to 350 today. By that time, only about ninety B-1 and 100 B-52H bombers are to be in service, plus whatever number of B-2s may be built.

The more telling point, Secretary Rice suggests, is that cutting B-2 numbers won't really save much money.

"The problem," he notes, "may be that, at a smaller quantity, it will still make sense to accomplish that procurement on something like the same schedule laid out now. We will then have the problem that this smaller quantity [of B-2s] will be divided into the sunk costs and the costs of production, and the unit cost will be even higher."

• **Mission:** To many in Congress, the Air Force has not made a compelling case that the B-2 has a specific mission—or at least not one that it alone can perform. Some charge that USAF has contrived missions on the fly to justify production.

Rep. Ronald V. Dellums, a California Democrat and prominent B-2 foe, put the case forcefully in a recent issue of the *Washington Post*: "The Pentagon initially said the B-2's prime missions were to serve as a deterrent and to strike Soviet fixed-site installations and 'relocatable' targets. . . . When evidence surfaced that the B-2

could not accomplish these missions, the Pentagon redefined its role." Thus was born "a new mission for the B-2: attacking Third World targets of opportunity, such as Libya."

Actually, asserts Secretary Rice, the prime mission of the B-2 has always been clear: The aircraft will provide enduring penetration capability for the nuclear bomber force so that it will be able to reach targets in the Soviet Union in the future, despite heavy Soviet investment in air defense fighters and SAMs. The bomber's role in the Single Integrated Operational Plan is paramount.

Harder to resolve is the secondary question of attacking "relocatable targets"—in particular, mobile nuclear missiles in the Soviet Union. In a 1987 report, the Joint Chiefs of Staff stated that the B-2 would be able to attack "the full range of . . . relocatable targets." This year, however, the Air Force conceded that this won't be possible for a long time.

The reality, Air Force insiders insist, is that the story has gotten garbled. They claim the service itself never advanced the concept of attacking relocatable targets as *the* B-2 mission, or even argued that this was possible in the near term. What USAF did claim, and continues to claim, is that the B-2 offers the "best potential" in the future for carrying out this difficult and demanding operation.

• **Utility:** Apart from responding to these criticisms, the Air Force finds itself obliged to answer a fundamental question about the B-2: Why, in an age of fast-flying, superaccurate land-based and seaborne missiles, does the US need a bomber force at all? Other than to provide robustness to the US nuclear triad, does it have any unique utility?

Secretary Rice points out that the manned bomber can cover about sixty percent of the current SIOP targets and that it is by far the most versatile of the nation's long-range nuclear weapons.

In addition, the bomber provides a devastating combination of accuracy and weapons yield, and thus is effective against very hard targets, such as command and control centers. It is also the best weapon the US has for hitting such area targets as rail yards and dispersed forces.

Its operational benefits aside, Secretary Rice goes on, the slower-flying bomber provides another vital element of US strategy-crisis stability. The Secretary's words:

"The penetrating bomber is well-recognized as *the* most stabilizing

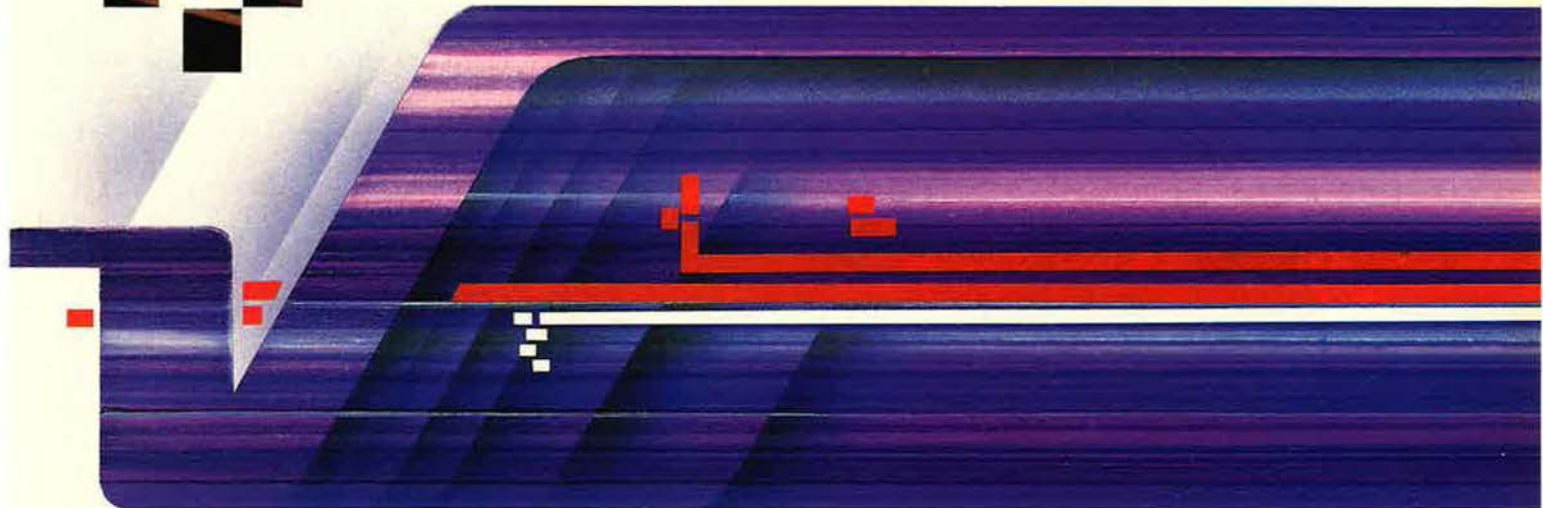


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element of the strategic force structure. That is because it is the system that best deters an attacker without raising fear of a first strike. It promises assured, devastating retaliation without itself having any believable potential as a first-strike system. That is almost the very definition of a stabilizing system."

With this factor in mind, negotiators at the START talks have emphasized counting rules that greatly enhance the value of the penetrating bomber and tend to penalize reliance on ballistic missiles.

"The whole thrust of the arms-control effort," notes Secretary Rice, "has been to reduce reliance on the fast flyers, on the ballistic missiles, and shift, relatively speaking, to the slower flyers. . . . It would be hard to see how we could pursue the type of arms-control strategy that we have if we could not count on having the penetrating bomber as one element of the strategic force posture."

• **Standoff bombers:** Even among those who accept the need for a robust bomber force, there are questions about whether the B-2 is the variety of bomber required.

They maintain that, with the advent of long-range, precision-guided, nuclear-armed cruise missiles, the need actually to penetrate Soviet airspace has declined. A force of bombers equipped with this type of "standoff" weapon, they say, would be adequate and far less expensive than penetrating aircraft.

Secretary Rice's answer to this charge: "If we did that [gave up the penetrator], we would not be a very long step away from giving up the bomber force itself."

The reason, he explains, is simple. If the Soviet Union were relieved of the need to defend against attacks of all types and from all directions, Moscow could focus its attention on stopping the remaining, standoff portion of the air threat.

"What they would do in that case would be to go after the carrier. The main focus would be on reaching out and getting the carrier," says Secretary Rice. "After all, they would have enough warning that, if they concentrated on that mission, and developed systems oriented to that, they could engage cruise missile carriers far enough out to catch large numbers

before they reached a launch point."

The result, the Secretary concludes, is that the standoff bomber force would be driven further and further back, eventually being forced to launch weapons from the environs of North America.

"I don't mean to be predicting easy success for the Soviets," says Secretary Rice, "but we would make their job very much easier. In time, that could undermine our confidence in the bomber force altogether."

• **The B-1B:** For how many more years will the current force of ninety-seven B-1B bombers be able to pierce heavy Soviet air defenses effectively? Five years? Ten years? More? Might it be kept effective long enough—perhaps fifteen years—to obviate altogether the need to build the B-2 fleet as the nation's prime penetrating force?

For some experts, Representative Aspin prominent among them, this is the gut issue, and its central mystery is the true pace of Soviet air defense improvements. "If you ask, what is the single piece of information that you would really want to have in order to make this [B-2] decision," says the



Wisconsin Democrat, "you would want to know where Soviet air defenses are going to go over the next fifteen years.

"The case for the B-2 rests very heavily on [predicted] improvements in Soviet air defenses. If Soviet air defenses are increasing, as those . . . Air Force briefings say that they are, that's one thing. If not, well. . . ."

Representative Aspin suspects that the Air Force may be providing inflated estimates of the progress of Soviet air defenses in order to promote the B-2. He wants the Pentagon to impanel a committee of outside experts to analyze Soviet defenses and determine whether the B-1, suitably updated, can fill the bill for a longer period.

Secretary Rice's answer to Representative Aspin's implied question is unequivocal: No, the B-1 can't do the B-2's job.

"An independent, unbiased, technically competent outside group," he claims, "would conclude . . . that the advance in air defense capability is real, that you can see the new capabilities embodied in new systems that the Soviets are deploying, and that the culmination of those improvements in a capability that would significantly diminish the ability of the

B-1 to penetrate can be confidently predicted."

Exactly when that point will occur, he concedes, cannot be determined with precision, but it will happen soon enough. "In my own mind," says Secretary Rice, "and in the judgment of Air Force leadership, we need to hedge against that date being as early as just beyond the mid-1990s to as far as just beyond the year 2000. It's in that range of uncertainty."

As a result, he claims, the B-2 is the *only* option available for coping with Soviet air defenses in the late 1990s and beyond.

● **Stealthiness:** Though the B-2 is billed as the plane that will be virtually invisible to radar sensors, there are doubters who claim that the technology of low-observables is being oversold.

A number of experts—within and outside Congress—are suspicious of Air Force claims that the B-2's radar-foiling shape and radar-absorbing surfaces can make obsolete the Kremlin's \$350 billion air defense network.

Anthony R. Battista, a recently retired senior staff member of the House Armed Services Committee and a certified defense heavyweight,

is not shy about publicizing such misgivings. "This entire claim about radar obsolescence [in light of the B-2's capabilities] is simply not true," Battista wrote in a letter to his former bosses on the panel. "The B-2 does not render Soviet air defense systems obsolete." He provided few details but suggested that existing radar and other types of detection systems could cause problems for the B-2.

The Air Force is close-mouthed about the details of the B-2's stealthiness, other than to say that the B-2 design will give it a radar cross section of less than one square foot. Air Force documents note that seventy percent of the B-2's radar-signature testing will be completed in two years. Actual tests proving its stealthiness against radars will not be completed until 1993.

Air Force confidence, however, shows no sign of wavering. That was illustrated in the words of Gen. Larry Welch, the Air Force Chief of Staff, at a hearing last July: "We are not saying there is no possible future counter to stealth. I am saying that, in spite of all our efforts and consultations with everyone we know of who has suggested a technical approach to do that, we have found no such way." ■

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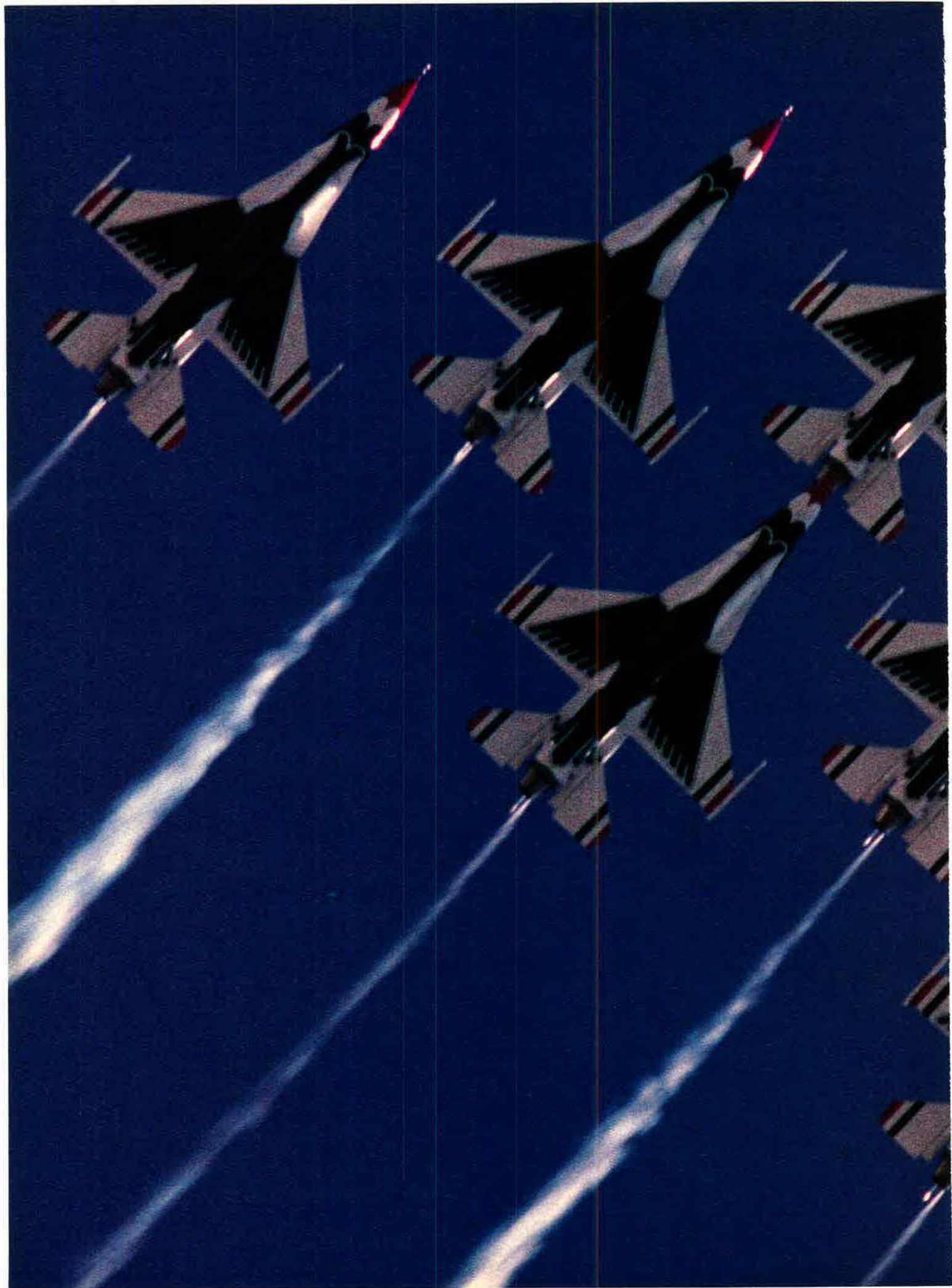
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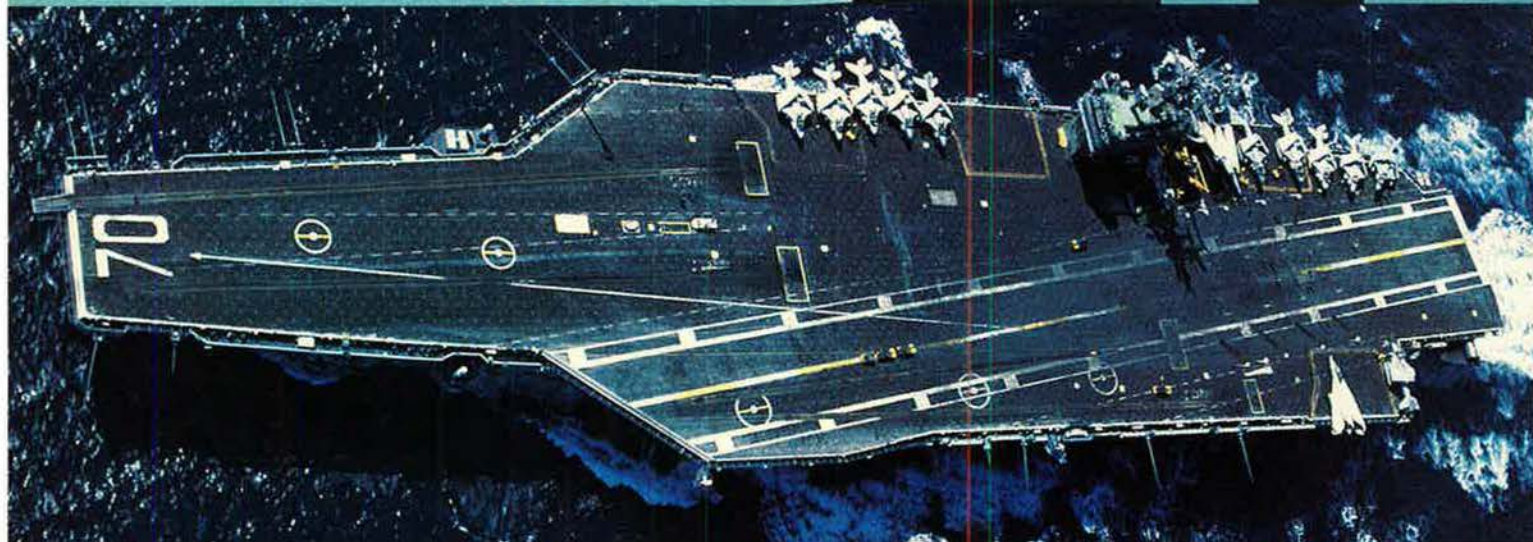
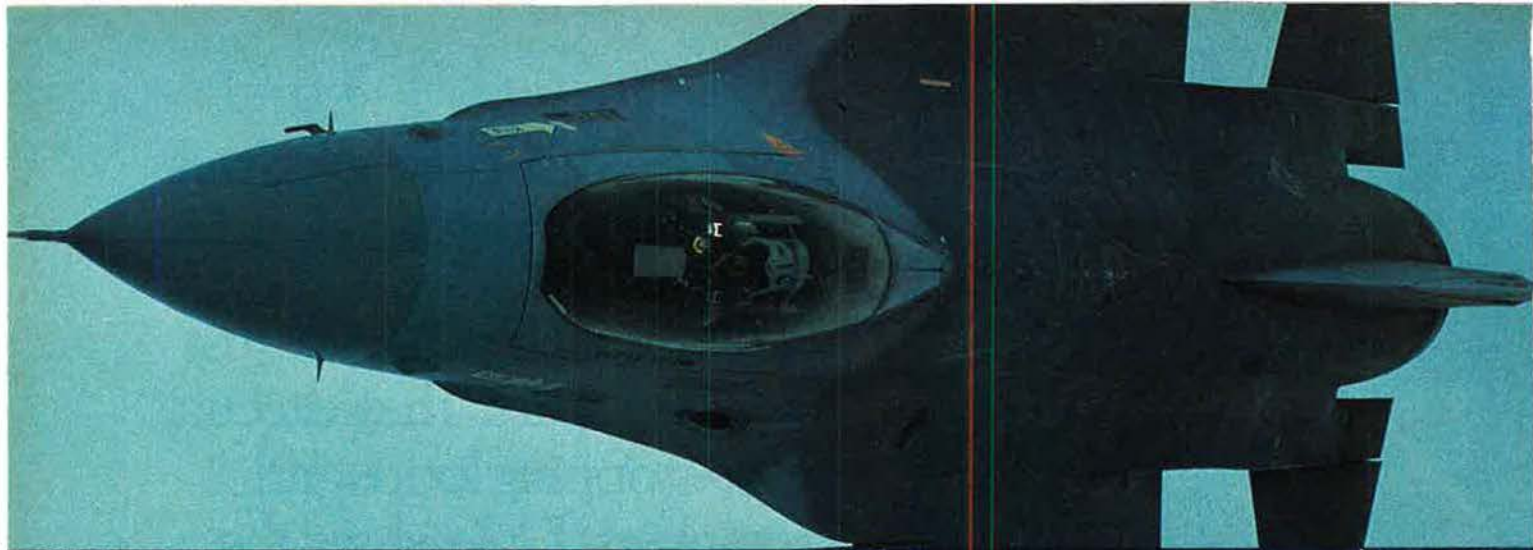




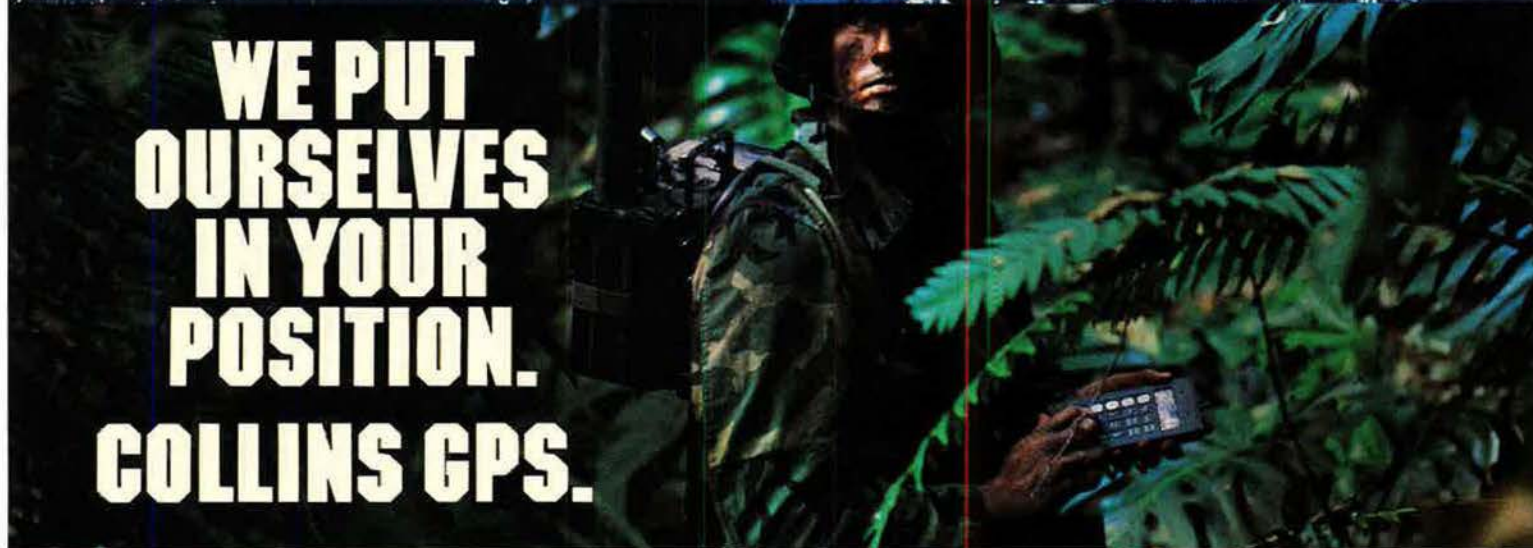
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By Brian Green, CONGRESSIONAL EDITOR

Washington, D. C.

House Guts B-2, ICBMs

The House of Representatives passed a Fiscal Year 1990 authorization bill that cuts nearly \$1 billion from the \$4.7 billion B-2 Stealth bomber program and bans further B-2 procurement until the Administration submits a plan to reduce overall program costs. The House also cut \$500 million from the Peacekeeper rail-garrison program, eliminated funds for the Small ICBM, and cut the \$4.9 billion SDI program by \$1.8 billion.

The bill as approved guts the Administration's strategic modernization program and threatens to unravel the compromise between congressional leaders and the Administration on ICBM modernization. Rep. Les Aspin (D-Wis.), Chairman of the House Armed Services Committee, characterized the House bill as a "Mike Dukakis defense budget."

An amendment by Rep. John Spratt (D-S. C.) to cut \$500 million from the \$1.8 billion requested for the Peacekeeper ICBM passed by a vote of 224 to 197. Rep. Bill Dickinson (R-Ala.), who made his support for the Small ICBM contingent on full funding for the Peacekeeper, accused Peacekeeper opponents of "playing games" and led House Republicans in a successful effort to delete the \$100 million request for the Small ICBM.

Representative Aspin and Rep. Mike Synar (D-Okla.) cosponsored the amendment to reduce B-2 program costs. The B-2 program had been cut by \$800 million by the House Armed Services Committee, and the Aspin-Synar amendment imposed another reduction of \$470 million in B-2 procurement, but restored \$300 million in R&D. It also barred B-2 procurement until Secretary of Defense Dick Cheney submits a plan for a less expensive program. Any such plan would almost surely reduce the number of bombers to be procured to fewer than the 132 now programmed.

Other key House actions include:

- Rejection of a Dickinson amendment to approve the procurement

budget submitted by Secretary Cheney.

- Restoration of funds for the V-22 Osprey vertical takeoff plane (\$508 million) and the F-14D Navy fighter (\$908 million), both programs canceled by the Bush Administration.

- An increase in funding for the National Aerospace Plane, from \$100 million requested to \$285 million. The Air Force was restored as the program's lead agency.

The bill would fund defense at \$305.2 billion, a slight decline from the \$305.5 billion requested. There is early speculation that if the House cuts survive the House-Senate authorization conference, the President will veto the bill.

Senate Authorization

The Senate, at this writing, continues work on its version of the authorization bill and has approved \$4.4 billion for the B-2. An amendment by Senate Armed Services Committee (SASC) Chairman Sen. Sam Nunn (D-Ga.) and ranking SASC Republican Sen. John Warner (R-Va.) would block expenditure of FY '90 B-2 procurement funds until a comprehensive set of conditions has been met, including successful completion of early B-2 flight testing and low-observable testing, reviews of the tests, and reports by the Defense Science Board and the Director of Operational Test and Evaluation. The amendment passed 98 to 1.

The SASC version of the bill now under consideration funds defense at \$305.5 billion. It sustains the termination of the F-14D, but restores \$255 million for the V-22 flight-test program. The committee also upheld the FY '91 cancellation of the F-15E fighter. However, the committee called for a report from the Secretary of Defense on the technical progress of the Navy A-12 and certification that no technical problems would interfere with the integration of the A-12 into the Air Force as the long-range ground attack follow-on to the F-15. The committee also cut \$75 million from the Advanced Medium-Range Air-to-Air Missile (AMRAAM) because of "lack

of stability in the production design and software package."

Other SASC actions include:

- Approval of the six C-17 airlifters and 150 F-16 fighters requested.

- Full funding of the Advanced Tactical Fighter program.

- Full funding for the rail-garrison Peacekeeper and the SICBM.

- Approval of a 3.6 percent civilian and military raise.

START Threatened by B-2 Opposition

Gen. John T. Chain, Jr., Commander in Chief of Strategic Air Command, said that he would oppose a strategic arms-reduction treaty based on the current START (Strategic Arms Reduction Talks) formula if the B-2 Stealth bomber were canceled. Air Force Chief of Staff Gen. Larry Welch said that it was "inconceivable that we could continue our current negotiating position without the B-2."

General Welch said that a new assessment of military requirements would have to be made and a new negotiating position formulated and that no clear timetable for reaching a position could be stated. According to General Welch, the Joint Chiefs of Staff predicated their support for the current START framework on modernization of all three legs of the strategic triad. General Welch and General Chain testified before the Senate Armed Services Committee (SASC).

Under START's counting rules, a penetrating bomber such as the B-2 that carries only gravity bombs and short-range attack missiles would count as only one warhead, regardless of the number of such weapons on the plane. Each warhead on cruise-missile-carrying bombers and ballistic missiles would count toward the START limit of 6,000 warheads.

Sen. Tim Wirth (D-Colo.) accused the Air Force of playing "a very high-stakes poker game" by linking the fate of the B-2 so directly to arms-control talks on the eve of key congressional votes. General Welch and General Chain argued that their views and those of the JCS were well-known. ■



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*GE Aircraft Engines
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By Jeffrey P. Rhodes, AERONAUTICS EDITOR

Washington, D. C.

★ The eagerly awaited first flight of the Northrop B-2A Advanced Technology Bomber was successfully carried out on July 17. The crew, Northrop Chief Test Pilot Bruce J. Hinds (aircraft commander) and Air Force Col. Richard S. Couch, the director of the B-2 Combined Test Force, took off from Air Force Plant 42 in Palmdale, Calif., at 6:37 a.m. and landed at the Air Force Flight Test Center at Edwards AFB, Calif., at 8:29 a.m.

The B-2 became airborne at about 160 knots and used approximately 5,000 feet of Plant 42's 12,000-foot runway. The airplane climbed slowly and eventually reached an altitude of 10,000 feet, where functional checks of the B-2's basic subsystems were performed. The plane never exceeded 200 knots. The bomber landed in a nearly level attitude and used about 5,000 feet of runway on rollout. Two F-16Bs from Edwards flew chase on the flight.

The sortie was scheduled to last 140 minutes, but all flight objectives were met, and the aircraft landed twenty-eight minutes early. The landing gear remained down, but will be retracted on the next sortie, scheduled to follow the first flight within four to six weeks. The aircraft flew with a pair of auxiliary air intake doors open on each nacelle during the flight. The doors allow more air to reach the four General Electric F118-GE-100 engines during low-speed flight.

The flight was originally scheduled for July 15, but a faulty fuel gauge scrubbed the takeoff. Low-speed taxi tests were completed on July 10, and high-speed tests were concluded three days later.

Ten other B-2As are currently under construction at Northrop's B-2 Division at Palmdale. The Air Force and Northrop also released more names of subcontractors for the B-2. The list includes 156 firms in twenty-six states. Although the rest of the subcontractors' names were not released, the Air Force said that firms from forty-six states are involved with the B-2.

Contracts for B-2-related construction at Whiteman AFB, Mo. (the first



July 17 saw the first flight of what will very likely be the United States' last new manned bomber of the twentieth century. The Northrop B-2A Advanced Technology Bomber was flown from Air Force Plant 42 in Palmdale, Calif., to Edwards AFB, Calif., by Northrop pilot Bruce Hinds and USAF Col. Richard S. Couch.

B-2 base), totaling \$12.1 million, have recently been awarded by the Army Corps of Engineers. A total of \$141.3 million was appropriated for construction at Whiteman for FY '88 and FY '89. The FY '90 request is \$100.5 million at Whiteman, with an additional \$31.8 million at the Oklahoma City Air Logistics Center, the primary B-2 depot.

★ Another of this column's periodic roundup of missile happenings:

The Air Force plans to begin flight tests in 1991 of the LGM-118A **Peacekeeper** intercontinental ballistic missile launched from railcars. Up to five missiles are to be launched from Vandenberg AFB, Calif., to the Army's Kwajalein Missile Test Range in the Pacific during 1991-92 to test the rail-garrison concept.

Two Army commands will be assisting the Air Force as Peacekeeper rail garrison nears deployment. Army Troop Support Command (TROSCOM) will offer the Air Force independent technical advice as the two-locomotive, seven- to fourteen-railcar trains are developed. Army Materiel

Command and TROSCOM will provide intermediate- and depot-level maintenance for the trains once they are fielded. Twenty-five rail-garrison trains are to be based at F. E. Warren AFB, Wyo., and other bases that will be selected from a list of ten possible sites.

The Air Force has pinned blame for the May 11 failure of the MGM-134A **Small ICBM** on the second-stage nozzle. The first stage worked properly, but the missile developed control problems thirty seconds after the second stage ignited. The missile flew another minute, during which the third stage separated and ignited and the warhead shroud separated in proper sequence, but the control problems from the second stage's malfunction could not be corrected, and the missile was destroyed by the range safety officer. Despite the failure, the missile achieved eighty percent of its test objectives, the Air Force said.

The 169th and last MGM-31 **Perishing 1A** intermediate-range ballistic missile was destroyed at the Longhorn Army Ammunition Plant near Karnack,

Tex., on July 6. The Pershing 1A thus becomes the first US model of nuclear weapon to be completely destroyed under the terms of the Intermediate-range Nuclear Forces (INF) Treaty. With its warhead and guidance set removed, the missile was strapped down, and both of its stages were ignited. The casing was then crushed, witnessed by Soviet observers.

The Convair Division of General Dynamics recently delivered its 1,000th AGM/BGM-109 **Tomahawk** cruise missile. The milestone total includes both conventional and nuclear sea-launched missiles for the Navy and ground-launched missiles for the Air Force. The Air Force missiles, officially called Gryphons, are no longer in production, and the ones deployed are being destroyed under the terms of the INF Treaty. In a related note, the Navy successfully carried out the latest Tomahawk test on July 8. The unarmed missile was launched from a submarine submerged off the North Carolina coast, flew 300 miles to engage a ship target, and was recovered after a parachute landing at Camp Lejeune, N. C.

During recent Senate Armed Services Committee deliberations on the defense budget, it came to light that the success rate of the Air Force's AGM-129A **Advanced Cruise Missile (ACM)** in tests is "around fifty percent" (to quote the committee's report). General Dynamics is the lead contractor for the AGM-129A, and McDonnell Douglas is the second-source manufacturer.

The Air Force successfully carried out the 138th follow-on operational test (FOOT) launch of the Boeing LGM-30F **Minuteman III ICBM** on July 6. The unarmed missile was launched from Vandenberg AFB, Calif., by a crew from the 321st Strategic Missile Wing at Grand Forks AFB, N. D., and flew 4,200 miles to the Kwajalein Missile Test Range in about thirty minutes. The 137th FOOT shot took place earlier this year from Vandenberg by a crew from Minot AFB, N. D.

The team of McDonnell Douglas and Hughes was awarded a \$5 million contract on July 11 for the demonstration and validation phase of the Navy's **Advanced Interdiction Weapon System (AIWS)**. AIWS is a low-cost, multipurpose family of air-launched weapons designed for short- to medium-range standoff missions. The weapons are scheduled to become operational in the mid-1990s.

The first developmental flight test of the AGM-84E Standoff Land Attack Missile (**SLAM**) was successfully carried out at the Pacific Missile Test Center range near Point Mugu, Calif.,



The team of McDonnell Douglas and Hughes was awarded a Navy contract for the demonstration and validation phase of the new Advanced Interdiction Weapon System, shown here being launched from an F/A-18. The baseline AIWS is an aerodynamically efficient, inertially guided glide weapon.

on June 24. SLAM, a derivative of the McDonnell Douglas Harpoon anti-ship missile, was launched from an A-6E and was controlled by an F/A-18 pilot. The missile scored a direct hit.

The Rockwell **AGM-130** rocket-powered glide bomb scored a direct hit on a target building at Eglin AFB, Fla., on June 21 in the first of nine initial operational test and evaluation launches. The weapon was launched from an F-4E at an altitude of 500 feet. The AGM-130 climbed to 2,000 feet and then completed a glide-boost-glide profile before hitting the target 14.5 miles from the launch point.

The first flight test of a Raytheon-built AIM-120A Advanced Medium-Range Air-to-Air Missile (**AMRAAM**) succeeded at Eglin on June 15. The missile was launched from an F-15 against a low-flying QF-100 drone in an electronic countermeasures environment. The first flight of a Raytheon-built AIM-54C **Phoenix** long-range air-to-air missile was successfully carried out in May.

Finally, the team of Texas Instruments and Martin Marietta was awarded an \$80 million Army contract for full-scale development of the Advanced Antitank Weapon System-Medium (**AAWS-M**). The shoulder-launched, fire-and-forget AAWS-M is capable of penetrating reactive armor and weighs forty pounds, including launcher. TI and Martin Marietta will eventually split up and bid yearly on AAWS-M production. The Army has a requirement of 58,000 AAWS-Ms, which will replace the FGM-77 Dragon antitank weapon.

★ **APPOINTED**—Astronaut **George D. "Pinkie" Nelson** has been appointed assistant provost and an associate professor of astronomy at the University of Washington in Seattle. He resigned from NASA on June 30. Mr. Nelson flew on three space shuttle missions—41-C (1984), 61-C (1986), and STS-26 (1988). He, along with James "Ox" van Hoften and T. J. Hart, were responsible for the first successful recovery, repair, and redeployment of a satellite (Solar Max) on the 41-C flight.

★ **HONORS**—Capt. **Kenneth J. Vantiger**, an F-111 pilot with the 27th Tactical Fighter Wing at Cannon AFB, N. M., was awarded the **1988 Koren Kolligian, Jr., Trophy** in ceremonies on June 15. In February 1988, Captain Vantiger's F-111 experienced a serious control malfunction on initial approach to Eglin AFB, Fla. He regained control and left the pattern to analyze the situation. After he configured it for landing, the aircraft began pitching violently. Captain Vantiger successfully landed the F-111 and brought it to a stop without further damage. The trophy, presented annually since 1958, is awarded to the person who best copes with an in-flight emergency.

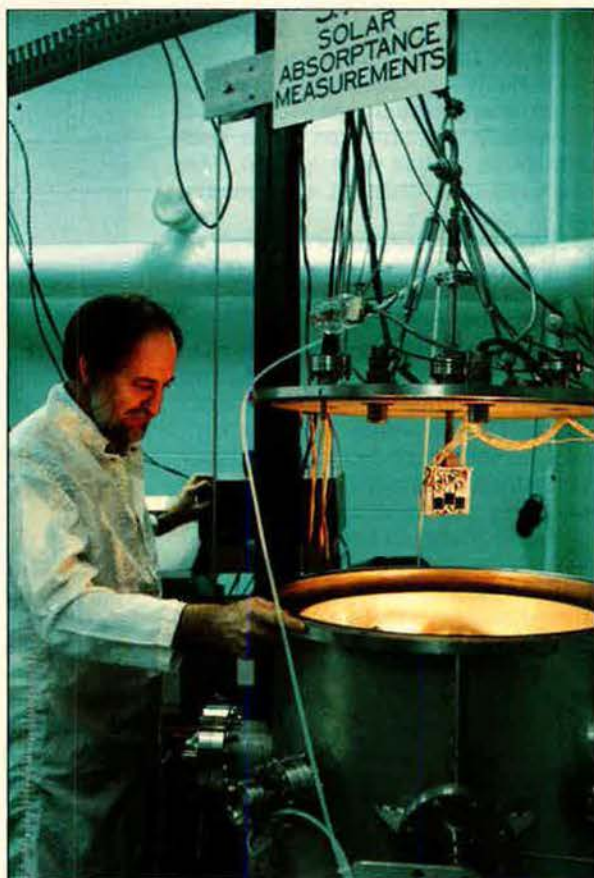
MSgt. Robert R. Swaney, First Sergeant of the 509th Organizational Maintenance Squadron at Pease AFB, N. H., has been named **USAF First Sergeant of the Year**. He was cited for designing and implementing a dependent-care program, exhibiting leadership during Red Flag and

Mighty Warrior deployments, and raising morale.

Naval Air Systems Command (NAVAIR) received the first **Presidential Award for Quality and Productivity Improvement** in June. Initiated in 1988, the award has rigorous criteria covering all aspects of organizational management, including strategic planning, performance measurement and analysis, human resource management, use of technology, quality assurance, and achievement of results. NAVAIR was cited for improved performance over the past four years throughout its 48,000-person workforce.

The **Aviator's Valor Awards for 1988** were presented in June to **USAF Col. Roger L. Grimsley**, **Navy Cmdr. John J. Waickwicz**, and **Army CW3 Dennis McBrayer**. Colonel Grimsley was cited for staying with a crippled RF-4C at great personal risk until it had cleared populated areas near Bergstrom AFB, Tex. Commander Waickwicz was recognized for the daring open-ocean rescue of twenty-four sailors from the submarine *USS Bonfish* (SS-582) after it caught fire. Warrant Officer McBrayer was honored for his skillful rescue of an Air Force Academy cadet stranded high

At Arnold Engineering Development Center, Arnold AFB, Tenn., engineer Bobby Wood monitors a solar absorptance measurements chamber as part of studies aimed at extending the working life of satellites in space. The instrument measures outgassing, the release of gases trapped in pores of materials, which can age space vehicles.



September Anniversaries

- **September 1, 1919:** Lt. Lester B. Sweely, an Air Service Reservist, demonstrates dive bombing at the Aberdeen Proving Ground in Maryland. He drops a 300-pound bomb from a DH-4B.
- **September 28, 1924:** The crews of the Douglas World Cruisers *Chicago* and *New Orleans* (see April through August "Anniversaries") return to Seattle, Wash., completing the first trip around the planet via airplane. Actual flying time during the 175-day, 27,553-mile trip was 371 hours and eleven minutes.
- **September 30, 1929:** At Frankfurt, Germany, Fritz von Opel travels just over a mile in the world's first flight of a rocket-powered airplane. The Rak-1 tops eighty-five mph, but crashes.
- **September 1, 1939:** At 4:34 a.m., Lt. Bruno Dillley leads three Ju-87 Stuka dive bombers in an attack against the Dirschau Bridge. The German invasion of Poland, the first act of World War II, begins six minutes later.
- **September 8, 1944:** The German V-2, the world's first ballistic missile, is first used in combat. Two strike Paris, and two more are launched against London.
- **September 23, 1949:** President Harry S. Truman announces that the Soviet Union has successfully exploded an atomic bomb.
- **September 30, 1949:** Official end of the Berlin Airlift. US transport crews flew in 1,783,826 of the 2,343,301.5 tons delivered to the beleaguered city. All told, 277,264 sorties were made; thirty-one Americans died in twelve crashes.
- **September 12, 1959:** The Soviet Union launches Luna 2, the first man-made object to reach the moon.
- **September 21, 1964:** The North American XB-70A Valkyrie Mach 3 research plane makes its first flight, with company pilot Alvin White and USAF pilot Col. Joseph Cotton at the controls.
- **September 28, 1964:** The USS *Daniel Webster* (SSBN-626), the first submarine equipped with the Lockheed UGM-27C (A3) Polaris sea-launched ballistic missile, departs Charleston, S. C., on its first patrol.
- **September 1, 1974:** Maj. James V. Sullivan and Maj. Noel Widdifield set a New York to London speed record of 1,806.964 mph in a Lockheed SR-71A. The trip takes one hour, fifty-four minutes, and fifty-five seconds; the record still stands.
- **September 4, 1984:** The first production Rockwell B-1B bomber is rolled out at Air Force Plant 42 in Palmdale, Calif.

in the Rocky Mountains. The Aviator's Valor Awards are presented by American Legion Post 743.

The National Aeronautic Association has named **Walter J. Addems**, **Frank V. Ehling**, **Donald D. Engen**, **Najeab Halaby**, **D. P. Hetterman**, **Egbert P. Lott**, and **Jack G. Real** as the **Elder Statesmen of Aviation honorees for 1989**. The Elder Statesmen awards are presented to those who have made a lifetime of contributions to the development of aviation in the US.

The nation's highest civilian award, the **Presidential Medal of Freedom**, was presented to retired Air Force **Gen. James H. Doolittle** in White House ceremonies on July 6. General Doolittle, the first president of the Air Force Association, is ninety-two. Others honored were C. Douglas Dillon, George Kennan, former Sen. Margaret Chase Smith, and (posthumously) Lucille Ball.

★ **PURCHASES**—Air Force Systems Command's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, awarded **General Electric** (\$6,680,000), **Logicon** (\$5,926,231), and **Loral Defense Systems** (\$5,900,000) contracts for initial development of an aircrew training system

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(ATS) to provide real-time mission rehearsal for **Special Operations Forces**. The SOF ATS will train crews operating MC-130E/H Combat Talons, AC-130H/U Spectre gunships, and MH-53J Pave Low III and MH-60G Pave Hawk helicopters. Down-select will be in 1990, and one contractor will then design and support the system. The SOF ATS will be based at Hurlburt Field, Fla.

In a related note, **General Electric's Simulation and Control Systems Department** in Daytona Beach, Fla., was awarded a \$32 million contract to upgrade **CH-3E helicopter flight simulators into MH-53J weapon system trainers**. The upgrade will use GE's Compu-Scene V image-generation system to provide high-quality, realistic visual and sensor images.

The Air Force has recently awarded several contracts for the **Advanced Launch System** heavy-lift space booster. Rockwell's **Rocketdyne Division** (\$38.5 million) and **Aerojet Technologies** (\$39.9 million) both received contracts to develop rocket engine combustion devices, while **Morton Thiokol** received a \$22.7 million contract to conduct solid-propulsion integration and verification for ALS.

Air Force Systems Command's Space Systems Division at Los Angeles AFB, Calif., awarded **General Electric** a \$93.1 million contract for the **next generation of Navstar Global Positioning System (GPS) satellites**. The contract calls for qualification of GE's spacecraft components and parts for the Block IIR (replacement) satellites. The Block IIR satellites will maintain the twenty-one-satellite



General Electric's Simulation and Control Systems Department will upgrade the Air Force's CH-3 simulator into an MH-53J weapon systems trainer. The MH-53J WST will use GE's Compu-Scene V image-generation system to provide realistic scenes (as shown here) to train pilots, copilots, and flight engineers.

constellation (the number was recently reduced to eighteen operational satellites and three on-orbit spares) into the next century. In a side note, the two Rockwell-built Block II satellites launched thus far have picked up unofficial nicknames taken from deceased rock and roll singers. The first GPS satellite is called "Elvis," and the second (launched June 10) is called "Janis." The GPS constellation will provide highly accurate navigational fixes to civilian and military users.

Well-dressed fighter pilots will soon

be wearing new hard hats to work. AFSC's Aeronautical Systems Division awarded **Gentex** two contracts worth a total of \$667,000 for **final development of the new-generation HGU-53/P helmet**. The new helmet will have a "flattop" contour derived from a new Air Force head-measurement system that allows a closer fit. Besides being less cumbersome, the new helmet has a center of gravity closer to that of the head, thus improving overall balance. It will also have a radially operated visor and a thermoplastic liner custom fitting system. Development is scheduled to be finished in November.

Kollsman received a \$27 million Air Force contract in late June for **two new air combat maneuvering instrumentation (ACMI) ranges**. The ranges will be built at Elmendorf AFB, Alaska, and Volk Field ANGB, Wis., and are scheduled to be operational in mid-1991. All previous ACMI systems, which allow for both real-time monitoring and replay of practice air-to-air missions, were built by Cubic. Kollsman, which currently supplies the aircraft information subsystem (AIS) pods for the ACMI ranges, is teamed with Applied Data Technology on the new ranges.

★ **DELIVERIES**—Testing of the first Air Reserve Component-Survivability Augmentation for Transport Installation Now (**ARC-SATIN**) equipment on an Air Force Reserve C-130H was **completed** earlier this year. ARC-

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The Air Force's fleet of Boeing T-43A navigation trainers is sporting a new look these days. This "cleaner" livery replaces the white and gray scheme that has been in use since the military version of the 737-200 commercial liner joined the Air Force in the 1970s. The T-43s are based at Mather AFB, Calif.

SATIN detects heat-seeking missiles fired at the aircraft from the ground or another aircraft and then deploys a flare-like device hotter than the airlifter's exhaust to draw the missile away. The first eight C-130s to be fitted with the Lockheed-built ARC-SATIN equipment are assigned to the 94th Tactical Airlift Wing's 700th Tactical Airlift Squadron at Dobbins AFB, Ga.

The first production T-38A Talon trainer delivered to the Air Force recently started a new job at NASA—maintaining flight proficiency and transporting astronauts. The T-38 (serial number 59-1594) has had a varied career. It was used in the T-38 flight test program and as a chase plane in the C-141 test program at Edwards AFB, Calif. In 1974, the T-38 was transferred to the Navy, first to NAS Miramar, Calif., as a Top Gun adversary aircraft. It was then converted into a drone at the Naval Air Weapons Center at China Lake, Calif. Before being transferred to NASA earlier this summer, the aircraft was used for pilot proficiency exercises at NAS Fallon, Nev.

Although its two new occupants have not yet arrived, the newly completed Air Force One Maintenance and Support Complex was recently occupied by the 89th Military Airlift Wing at Andrews AFB, Md. The 564-

foot-long, 354-foot-wide, 110-foot-high, hexagonal hangar has 151,000 square feet of high bay space and will

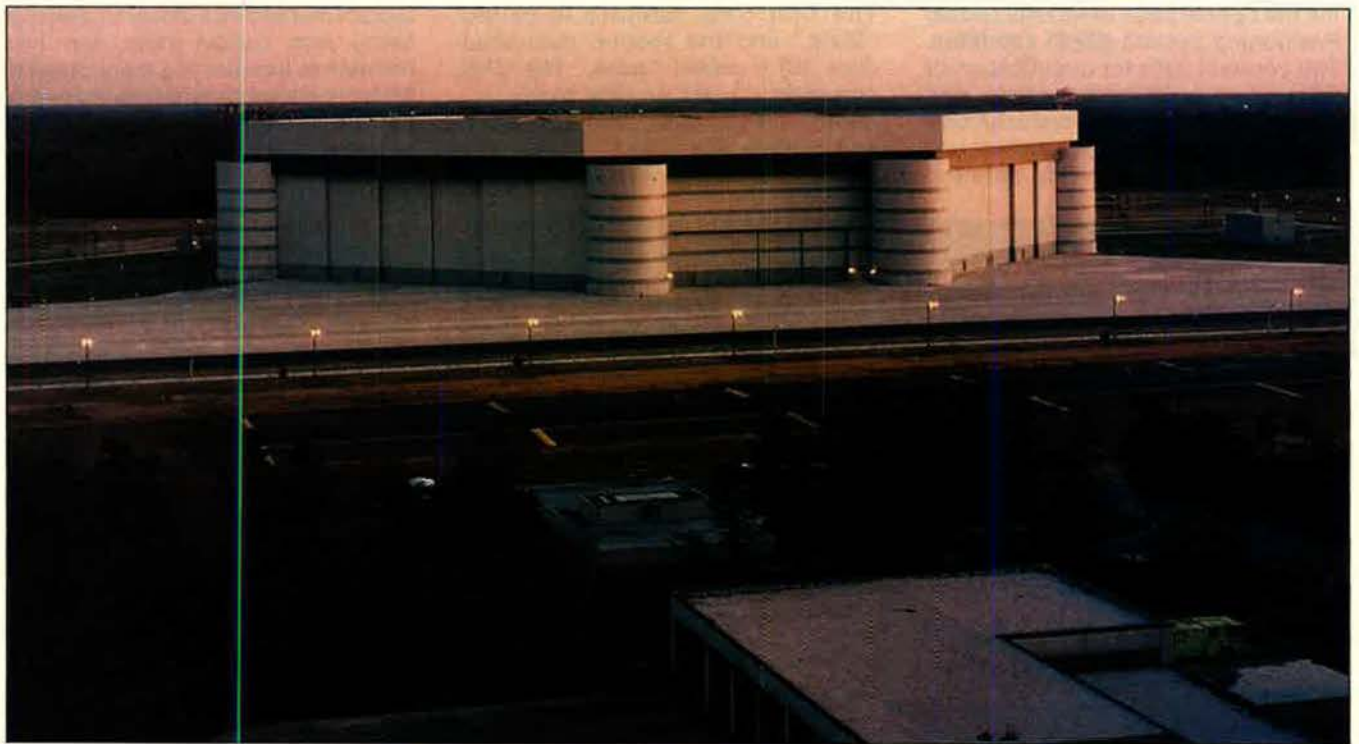


Nobody in the Air Force, neither T-41 pilot nor SR-71 pilot, flies without help from the people in the fuels section. A1C Pam Beaudoin handles the nozzle and hose of an R-9 refueling unit, preparing to fuel one of the T-38s of the 12th Flying Training Wing at Randolph AFB, Tex.

accommodate not only the two new Boeing VC-25A (747-200B) aircraft to be used for Presidential transport, but a Gulfstream C-20B as well. The complex also includes a 43,000-square-foot wing housing administrative and support spaces for approximately 100 flight, security, maintenance, and other personnel. The complex was designed by the Washington office of Daniel, Mann, Johnson & Mendenhall and was built by the George Hyman Construction Co. of Bethesda, Md. The complex has already won several design awards.

The Air Force announced in early June that **eighteen LTV A-7D/K Corsair II aircraft assigned to the 4450th Tactical Group will be transferred to the Air National Guard.** The Air Force also said that four Northrop AT-38A aircraft from the 479th Tactical Training Wing at Holloman AFB, N. M., will be transferred to the 4450th TG. Officially assigned to Nellis AFB, Nev., the 4450th TG operates the Lockheed F-117A Stealth fighter at the Tonopah Test Range Airfield in Nevada.

The **hypersonic propulsion wind tunnel** at the General Applied Science Laboratory on Long Island, N. Y., was commissioned on June 13. The new facility, called Hypulse, is currently the only one in the US capable of producing airflow speeds up to



Dominating the skyline at Andrews AFB, Md., is the new Air Force One Maintenance and Support Complex. The \$47.5 million hangar will house both of the new Boeing VC-25A (747-200) aircraft to be used for Presidential transport, as well as a Gulfstream C-20B. The complex is constructed of two-piece metal trusses with a three-ply, built-up roof and sidewalls of preinsulated sandwich metal panels over masonry and concrete. The facility was built in twenty-one months.

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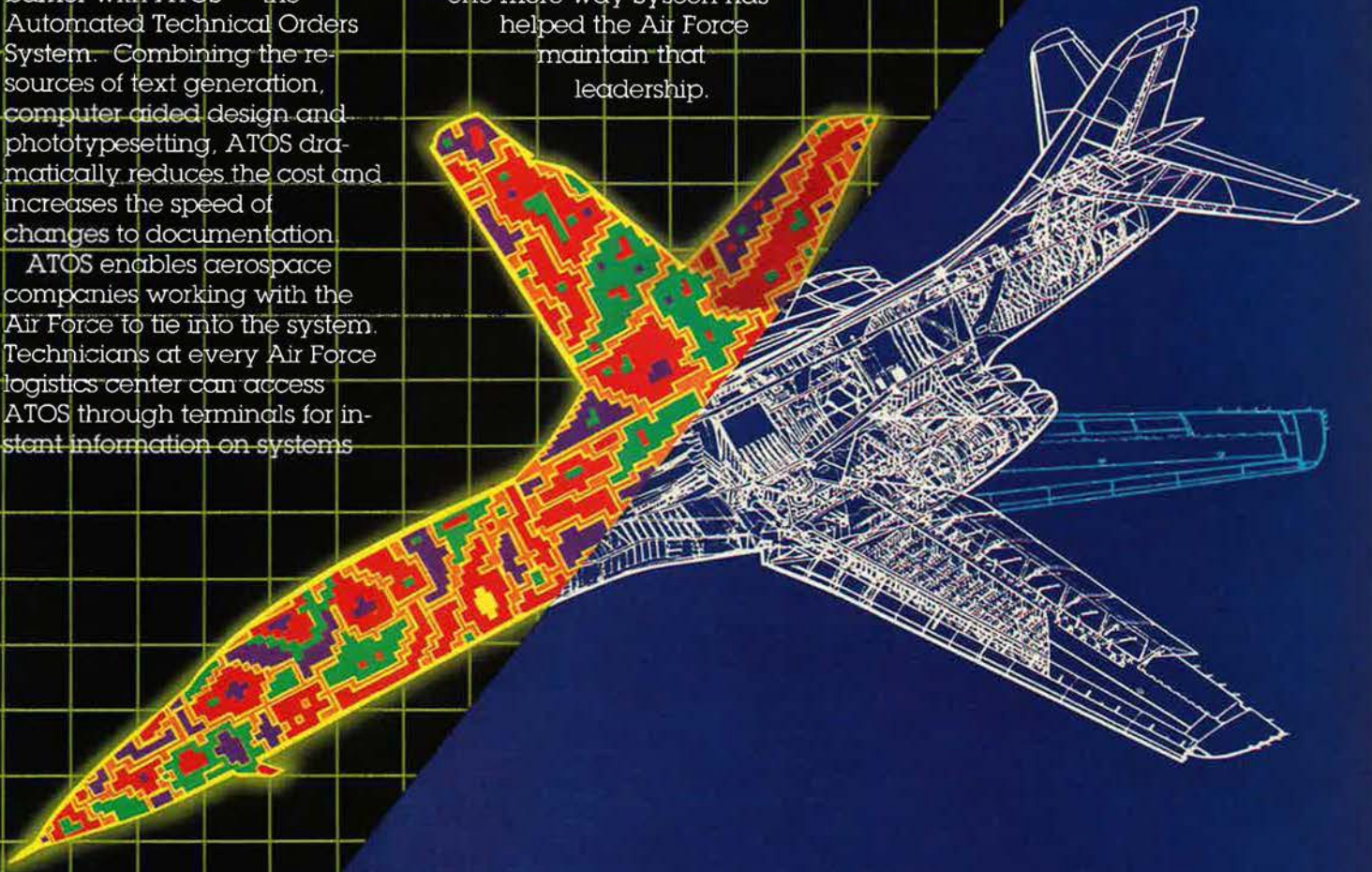
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Mach 25 (18,000 mph). It will be used to support hypersonic propulsion development for the National Aerospace Plane.

Boeing rolled out the first E-3D for Great Britain on July 11 at its Seattle, Wash., plant. The E-3D Airborne Warning and Control System (AWACS) aircraft (to be called Sentry Mk. 1 by the Royal Air Force) feature radar enhancements, wingtip-mounted passive electronic support measures pods, Have Quick frequency-hopping radios (which are to be refit-

ted to US E-3s), and a refueling pod mounted over the cockpit in addition to its receptacle for boom-type refueling. The aircraft will be delivered to RAF Waddington next September for testing and will enter service in early 1991. The RAF's seventh and last aircraft will be delivered in January 1992. Boeing also said that contracts amounting to forty percent (\$624 million) of the 130 percent offset agreement made to Britain in return for the E-3s have already been let, either for AWACS or commercial work.

Senior Staff Changes

PROMOTION: To be General: Hansford T. Johnson.

RETIREMENTS: M/G Henry D. Canterbury; M/G John J. Doran, Jr.; M/G Jack K. Farris; M/G Jerry D. Holmes; B/G Lawrence E. Huggins; L/G Buford D. Lary; M/G Paul H. Martin; M/G Samuel H. Swart, Jr.; L/G Claudius E. Watts III.

CHANGES: B/G James S. Allen, from Cmdr., 833d AD, TAC, Holloman AFB, N. M., to ACS/Ops., Hq. AFCEAT, NATO, Brunssum, the Netherlands, replacing retired B/G Lawrence E. Huggins . . . B/G John R. Allen, Jr., from Vice Cmdr., Sacramento ALC, AFLC, McClellan AFB, Calif., to Vice Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., replacing B/G Denis L. Walsh . . . B/G (M/G selectee) James G. Andrus, from Dir., NORAD Planning Staff, Hq. NORAD, Peterson AFB, Colo., to Cmdr., 25th AD, TAC, McChord AFB, Wash., replacing M/G John M. Davey . . . B/G Edward N. Brya, from Dep. Commanding Gen., Joint Spec. Ops. Cmd., USSOCOM, Ft. Bragg, N. C., to Dir., Ops., J-3, Hq. USSOCOM, MacDill AFB, Fla., replacing retiring M/G Frank J. Kelly, Jr. . . . B/G Lewis E. Curtis III, from DCS/P&P, Hq. AFLC, Wright-Patterson AFB, Ohio, to Cmdr., Acq. Log. Div., Hq. AFLC, Wright-Patterson AFB, Ohio, replacing M/G Joseph K. Spiers . . . M/G John M. Davey, from Cmdr., 25th AD, TAC, McChord AFB, Wash., to C/S, Hq. AIRSOUTH, Naples, Italy, replacing retired M/G Samuel H. Swart, Jr.

B/G John W. Douglass, from Dir., Planning and Integration, Ass't Sec'y of the Air Force for Acq., OSAF, Washington, D. C., to Dep. US Mil. Rep., NATO Mil. Committee, Int'l Mil. Activity, Brussels, Belgium . . . Col. (B/G selectee) Robert W. Drewes, from Vice Cmdr., Contract Mgmt. Div., AFSC, Kirtland AFB, N. M., to DCS/Contracting, Hq. AFSC, Andrews AFB, Md., replacing B/G Kenneth V. Meyer . . . B/G Benard W. Gann, from Cmdr., 43d Bomb Wg., SAC, Andersen AFB, Guam, to Dir., Strategy, Prgms., and Pol., J-5, USSOUTHCOM, Quarry Heights, Panama, replacing B/G James J. LeCleir . . . Col. (B/G selectee) Otto K. Habedank, from Chief, Ops. and Plans Div., Hq. ANG Bureau, Washington, D. C., to Cmdr., AFLC Int'l Log. Ctr., and Ass't for Int'l Log., Hq. AFLC, Wright-Patterson AFB, Ohio, replacing B/G Ronald C. Spivey . . . Col. (B/G selectee) Travis E. Harrell, from Cmdr., 80th Flying Training Wg., ATC, Sheppard AFB, Tex., to Cmdr., 833d AD, TAC, Holloman AFB, N. M., replacing B/G James S. Allen . . . M/G Harald G. Hermes, from C/S, Hq. TAC, Langley AFB, Va., to C/S, 4th ATAF, NATO, Heidelberg, Germany, replacing M/G Thomas R. Olsen.

L/G Bradley C. Hosmer, from Pres., NDU, Washington, D. C., to IG of the Air Force, OSAF, Washington, D. C., replacing retired L/G Buford D. Lary . . . L/G (Gen. selectee) Hansford T. Johnson, from Dir., Joint Staff, JCS, Washington, D. C., to CINC, Hq. USTRANSCOM, and CINC, Hq. MAC, Scott AFB, Ill., replacing retiring Gen. Duane H. Cassidy . . . B/G James J. LeCleir, from Dir., Strategy, Prgms., and Pol., J-5, USSOUTHCOM, Quarry Heights, Panama, to Ass't DCS/Ops., Hq. MAC, Scott AFB, Ill., replacing B/G Robert V. Woods . . . B/G Kenneth V. Meyer, from DCS/Contracting, Hq. AFSC, Andrews AFB, Md., to C/S, Hq. AFSC, Andrews AFB, Md., replacing retiring M/G Thomas C. Brandt . . . M/G Thomas R. Olsen, from C/S, 4th ATAF, NATO, Heidelberg, Germany, to Vice Cmdr., 9th AF, TAC, Shaw AFB, S. C., replacing retired M/G Henry D. Canterbury . . . B/G Robert W. Poel, from Dir., Medical Plans and Resources, AFOMS, Bolling AFB, D. C., to Cmdr., Malcolm Grow USAF Medical Ctr., MAC, Andrews AFB, Md., replacing B/G Stephen R. Shapiro.

B/G Jon A. Reynolds, from Mil. Ass't to the Sec'y of the Air Force, OSAF, Washington, D. C., to Ass't Dep. Dir. for Attachés, DIA, Arlington, Va. . . . B/G Stephen R. Shapiro, from Cmdr., Malcolm Grow USAF Medical Ctr., MAC, Andrews AFB, Md., to Cmd. Surgeon, Hq. AFLC, Wright-Patterson AFB, Ohio, replacing retiring B/G Willard L. Meader . . . M/G Joseph K. Spiers, from Cmdr., Acq. Log. Div., Hq. AFLC, Wright-Patterson AFB, Ohio, to Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., replacing retiring M/G William P. Bowden . . . B/G Ronald C. Spivey, from Cmdr., AFLC Int'l Log. Ctr., and Ass't for Int'l Log., Hq. AFLC, Wright-Patterson AFB, Ohio, to DCS/P&P, Hq. AFLC, Wright-Patterson AFB, Ohio, replacing B/G Lewis E. Curtis III . . . Col. (B/G selectee) Paul E. Stein, from DCS/Pers., Hq. TAC, Langley AFB, Va., to C/S, Hq. TAC, Langley AFB, Va., replacing M/G Harald G. Hermes . . . B/G Denis L. Walsh, from Vice Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., to Cmdr., Def. Industrial Sup. Ctr., DLA, Philadelphia, Pa. . . . B/G Robert V. Woods, from Ass't DCS/Ops., Hq. MAC, Scott AFB, Ill., to Vice Cmdr., Sacramento ALC, AFLC, McClellan AFB, Calif., replacing B/G John R. Allen, Jr.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENT: Boyd T. Thurgood.

SES CHANGE: John E. Lang, to Ass't DCS/Comptroller, Hq. AFLC, Wright-Patterson AFB, Ohio, replacing Robert W. Thornett. ■

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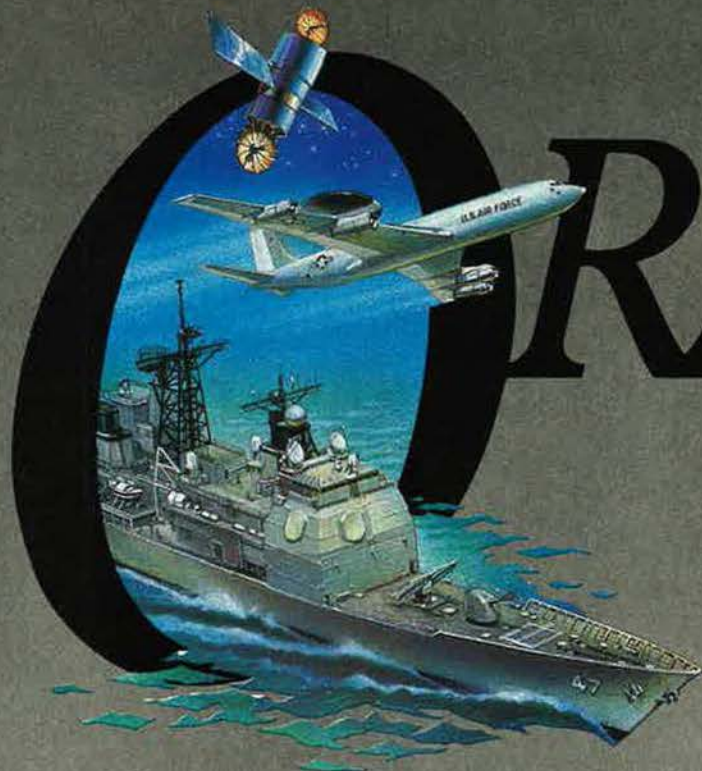
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★ **MILESTONES**—On June 10, **Capt. Jacquelyn S. Parker** became the first woman to graduate from the **Air Force Test Pilot School** at Edwards AFB, Calif. She was one of twenty-five pilots, flight engineers, and navigators to be graduated from the eleven-month school this year. A former T-38 and C-141 flight instructor, Captain Parker will be a test pilot for the 4950th Test Wing at Wright-Patterson AFB, Ohio.

Alaskan Command, a subordinate unified command of US Pacific Command, was activated on July 7 in ceremonies at Elmendorf AFB in Anchorage. Lt. Gen. Thomas G. McInerney, Commander of Alaskan Air Command, will also head Alaskan Command. The new command will be responsible for the unified defense of Alaska and its territorial waters, including the Aleutian Islands. It is made up of AAC, Army forces assigned to the 6th Infantry Division (Light), and a Navy component composed primarily of forces assigned during peacetime to the 17th Coast Guard District. The new organization provides a unity of command that has been absent from the state since 1971.

Strategic Air Command's oldest active bomber was retired on July 10. The B-52G (serial number 58-0232) entered service in 1959. The BUFF, nicknamed "Eldership" by crews at its last assignment, the 320th Bomb Wing at Mather AFB, Calif., was flown to SAC headquarters at Offutt AFB, Neb., where it will become part of the SAC Museum. The crew for the last flight was headed by the 320th BMW's commander, Col. Dave Johnson. Over the course of its career, the aircraft was stationed at ten bases, including Loring AFB, Me.; Ramey AFB, P. R.; Ellsworth AFB, S. D.; and Castle AFB, Calif. It was assigned to Andersen AFB, Guam, during part of the Vietnam War. In 1987, a crew flying this B-52G made the news when they hit a bald eagle on a low-level training sortie.

The Thunderbirds, the Air Force's Air Demonstration Team, flew their **500th show in the General Dynamics F-16A** on July 23. The milestone show occurred in Chicago, Ill. The Thunderbirds switched to the F-16 from the Northrop T-38A in 1983.

The **free world's largest anechoic chamber** went on line at the Air Force Flight Test Center at Edwards AFB, Calif., on July 25. The \$52 million building is a 325-foot by 400-foot by 108-foot structure with a 250-foot by 264-foot by seventy-foot indoor chamber lined



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with thousands of radar-absorbing cones. The chamber also features a 200-foot by seventy-foot door and an eighty-foot-diameter turntable that can support 250,000 pounds. The chamber will allow the Air Force to bridge the gap between laboratory checks of components and testing the entire system during flight tests. The chamber can hold any US military aircraft except the Air Force's C-5 Galaxy transport.

The **first McDonnell Douglas F-15** ever to be powered with a **General Electric engine** made its first flight

on July 12. The F110-GE-129-powered F-15E flew at the McDonnell Aircraft plant in St. Louis, Mo. After six flights there, the aircraft will be flown to Edwards AFB, Calif., for further testing. The -129 engine entered service with the Air Force in 1986.

When **Lt. Gen. Hansford T. Johnson** pins on his fourth star and assumes command of US Transportation Command and Military Airlift Command on October 1, he will become the first Air Force Academy graduate to attain the rank of full



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general. General Johnson was one of the 207 cadets who graduated in the Academy's first class in 1959. He replaces Gen. Duane H. Cassidy, who is retiring.

★ **NEWS NOTES**—The first Bell-Boeing V-22 Osprey entered the second stage of its flight-test program in July. The tilt-rotor Osprey reached speeds of 100 knots, and the crew tilted the nacelles to sixty-nine degrees from the horizontal once the aircraft resumed flying. At the conclusion of the first stage of testing, the V-22's dynamic systems were thoroughly inspected (as planned), test instrumentation was calibrated, and the aircraft was put on the test stand for a series of runs in the airplane mode. The first full conversion from helicopter mode to airplane mode and flights of up to 250 knots were expected to be made by the end of the summer. The second V-22 was expected to fly for the first time in August.

Aircrew members who wear glasses can now wear contact lenses while flying. Under a plan announced by the Air Force Surgeon General's office, contacts can be worn provided the wearer's glasses are available in flight, and aircrew members must maintain 20/20 vision or better with the contacts and with glasses immediately after removing the lenses. Contact-lens wear enhances peripheral vision, reduces reflections, and eliminates fogging, and contacts are more stable during aggressive maneuvering of aircraft. Cockpit air does tend to dry contacts out, though, which can lead to corneal infection, an ailment that could lead to grounding.

In mid-June, the Air Force announced the schedule for shutting down the five bases targeted in December 1988 for closure by the Commission on Base Realignment and Closure. Expected closing dates are January 1991 for Pease AFB, N. H.; December 1992 for George AFB, Calif.; July 1993 for both Mather AFB, Calif., and Chanute AFB, Ill.; and April 1994 for Norton AFB, Calif. The cost of closing the bases has been estimated at \$975 million, and the annual savings from the closings are estimated to be \$381.2 million.

The 162d Tactical Fighter Group, the replacement training unit for Air National Guard A-7 and F-16 pilots, will begin training Royal Netherlands Air Force F-16 pilots as early as next April. Plans are not complete, but the 162d TFG, based at Tucson Inter-

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national Airport, Ariz., will train thirty Dutch pilots annually.

The Army and Air Force Exchange Service (AAFES) was ranked by *Forbes* Magazine as the ninth-largest American retailer in 1988. With sales of \$6.2 billion, AAFES ranked behind Sears, K-Mart, Wal-Mart, J. C. Penney, Dayton Hudson, May Department Stores, F. W. Woolworth, and Melville, and ahead of R. H. Macy.

On June 4, paratroopers from the

US Army's 82d Airborne Division, based at Fort Bragg, N. C., along with jumpers from the 3d Battalion, 325th Infantry Regiment, from Vincenza, Italy, recreated the jump made by the first Allied troops on D-Day. A total of 450 paratroopers jumped from eight C-130s to a spot outside of the town of Ste. Mère-Eglise, where, in 1944, 1,500 paratroopers jumped in the hours prior to the amphibious landings at Normandy. Bob Murphy, who

was one of the first to jump on June 6, 1944, was the first of twenty-five other veterans who recreated the jump by parachuting from a de Havilland Twin Otter.

An injustice was remedied on July 8, as the Army restored William F. "Buffalo Bill" Cody's Medal of Honor. The award was presented to Mr. Cody, famous for his western show, in 1872 for leading a cavalry charge against the Sioux. The honor was stripped from Mr. Cody in February 1917 (a month after he died) by Congress, which declared that only military men could win the nation's highest award for valor. Mr. Cody, an Army scout, was considered a civilian. Although his name was stricken from the Medal of Honor Roll, Mr. Cody's medal was never recalled and is in the Buffalo Bill Historical Center in Cody, Wyo.

★ **DIED**—Reserve Rear Adm. **S. David Griggs**, a space shuttle astronaut, of injuries received in the crash of a World War II AT-6 aircraft at an air show in Earle, Ark., on June 17. He was forty-nine. A Naval aviator, Admiral Griggs flew two combat tours in Vietnam and served briefly as a test pilot. He joined the astronaut corps in 1979 and flew on Mission 51-D in April 1985 as a mission specialist. He was scheduled to pilot STS-33, a classified Department of Defense shuttle mission, this November.

(As a result of Admiral Griggs' death, Air Force Col. John E. Blaha, whose first shuttle mission was STS-29 this past March, will now be the pilot for STS-33. Air Force Maj. Sidney M. Gutierrez will now replace Colonel Blaha on STS-40, scheduled for August 1990. It will be Major

Gutierrez's first flight aboard the shuttle.)

Retired Air Force **Col. William T. Whisner**, one of the first two-war aces, of complications from a yellow jacket sting, in a hospital in Alexandria, La., on July 21. He was sixty-five. Flying with the 487th Fighter Squadron in Europe during World War II, he was credited with 15.5 aerial victories. During the Korean War, he flew with the 334th and 25th Fighter Squadrons and was credited with shooting down 5.5 MiG-15 aircraft. He also served in Vietnam.

Thomas A. Pope, believed to be the last surviving World War I Medal of Honor winner, of congestive heart failure on June 14 in Maywood, Ill. He was ninety-four. He was decorated for rushing a machine-gun nest in France in 1918. ■

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**AFA presents five special awards to
the top air crews and missile
crews of the year.**

The Finest Crews in the Force

BY C. V. GLINES

THERE is no more important measure of an air force than the caliber of its people who stand ready to fly and fight. It follows, then, that the aircrews and missile crews who do it best are special indeed.

At its National Convention this month, AFA will present five awards named for five general officers who made their marks in Air Force history. The awards go to the year's top crews from the US Air Force: the Curtis E. LeMay Award to the top strategic aircrew; the Thomas S. Power Award to the best strategic combat missile crew; the William H. Tunner Award to the best aircrew in Military Airlift Command; the Jerome F. O'Malley Award to the best reconnaissance crew; and the Claire Lee Chennault Award to the outstanding aerial warfare tactician.

The O'Malley Award

The award goes to Maj. John J. Smith, a U-2/TR-1 flight commander assigned to the 99th Strategic Reconnaissance Squadron of the 9th Strategic Reconnaissance Wing at Beale AFB, Calif.

The O'Malley Award winner, in full pressure suit, prepares for a flight. Maj. John J. Smith is a U-2/TR-1 flight commander assigned to the 99th Strategic Reconnaissance Squadron, 9th Strategic Reconnaissance Wing, Beale AFB, Calif. In 1988, he saved the day in at least two aircraft emergencies and performed twenty sensitive reconnaissance missions.



Smith is being honored for his "superior airmanship, exceptional aircraft systems knowledge, and outstanding judgment." In 1988, he flew twenty operational sorties over "extremely sensitive geopolitical areas supporting national reconnaissance objectives."

Smith's airmanship and decision-making abilities were clearly demonstrated on one mission while deployed overseas. Near the completion of a lengthy flight high above an overcast while the autopilot was engaged, the aircraft pitched up suddenly and the engine flamed out. Smith went through the restart procedure and was finally successful in getting a light just prior to entering a solid overcast. Gen. John T. Chain, CINCSAC, noted in forwarding the nomination that Smith "with minimum navigational aids was able to locate the takeoff base and accomplish flameout-landing procedures in rapidly deteriorating weather conditions, thus saving a valuable strategic reconnaissance asset."

Smith, forty-one, was involved in another emergency episode during the year, this time as a ground supervisor of a training sortie. When a pilot trainee was descending from high altitude, the aircraft landing gear extension system failed. Smith, in continuous communication with the pilot, analyzed the gear emergency procedures to correct the malfunction, but nothing worked. Undaunted, Smith then briefed the pilot on the procedures to be followed for an intentional, tail-gear-only landing. The result: The pilot made a "picture-perfect landing with minimal damage to the aircraft," according to the award recommendation from SAC.

An AFROTC graduate of Central Washington University in 1970, Smith earned a degree in business administration. He was assigned to Air Training Command as an instructor in the T-37 program and to Military Airlift Command as a C-130 aircraft commander before being assigned to SAC in 1986.

The LeMay Award

The outstanding strategic aircrew award, in the name of General Curtis E. LeMay, goes to Crew S-01 of the 441st Bombardment Squadron, 320th Bombardment Wing, Fifteenth Air Force, stationed at Math-



The outstanding strategic aircrew of 1989 is Crew S-01 of the 441st Bomb Squadron, 320th Bomb Wing, Fifteenth Air Force, Mather AFB, Calif. Winners of the Gen. Curtis E. LeMay Award are (from left, standing) Capt. James M. Tinnesz, 1st Lt. Allan K. "Ken" Click, Maj. David E. Snodgrass, Maj. Cameron K. "Keith" Green, 1st Lt. James O. Preaskorn, 1st Lt. Richard T. Gindhart, and (front) TSgt. Noah L. "Skip" Elliott, Jr.

er AFB, Calif. The B-52 crew consists of Maj. Cameron K. Green, aircraft commander; 1st Lts. James O. Preaskorn and Allan K. Click, pilots; Maj. David E. Snodgrass, radar navigator; 1st Lt. Richard T. Gindhart, navigator; Capt. James M. Tinnesz, electronic warfare officer; and TSgt. Noah L. Elliott, Jr., defensive aerial gunner.

Crew S-01 started 1988 by winning the Best Synchronous and Electro-optical Visual System (EVS) Bomb Award at the Fifteenth Air Force shootout. In the ensuing months, the crew was picked to lead many higher headquarters missions, including a six-ship, live bombing exercise. During a Conventional Operational Readiness Inspection, it achieved the best damage expectancy score and an "outstanding" rating on testing. It was selected as the Fifteenth Air Force Bomber Crew of the Year.

Because of its demonstrated expertise, this crew was selected to develop a new EVS-aided bombing procedure, which won the Fifteenth Air Force Shootout Award by bettering the closest competitor's bombing average by forty-four feet. More important, Crew S-01 introduced an effective means of delivering a weapon under severely degraded equipment conditions. The

crew also demonstrated the first use of night-vision goggles during an EVS depressed-angle bomb run.

Major Green, using a standard Air Force computer, developed the Automatic Standardization/Evaluation Data Base Model Program, which has reduced the processing of forms and administrative support requirements. He also co-wrote a contingency guide, which has been flight-tested "with great success and borrowed by other wings," according to the nomination statement.

Lieutenant Preaskorn is active in the Big Brothers/Big Sisters program. Lieutenant Click, an Awards and Decorations Officer, has never had a submission rejected for correction. Major Snodgrass directs the Mather honor guard. Lieutenant Gindhart was selected to flight-test a training route and, by so doing, opened up a new live bombing range to other SAC units. He has been selected for pilot training.

Captain Tinnesz, an expert in mobility planning, helped rewrite the squadron mobility plan. Technical Sergeant Elliott was chief flight evaluator of the ASG-33 Fire Control System. His observations "gave the program managers the data they needed to make an objective and sound decision."

The Power Award

The winners of the Thomas S. Power Strategic Missile Crew Award are Capt. Dennis R. Benson and 1st Lt. Julia A. Gibbons, who make up Crew S-170 of the 351st Strategic Missile Wing at Whiteman AFB, Mo.

Benson, an Air Force Academy graduate, majored in mathematical sciences and received a master's degree in business administration from the University of Missouri. He has been selected to attend the current session of the Air Force Institute of Technology to study for a master of science degree in operations research. The twenty-seven-year-old missileer from Danbury, Conn., became the only dual-qualified missile combat crew commander and wing command post emergency action controller in 1987. In June 1988, he became the senior flight commander of the 510th Strategic Missile Squadron.

Off duty, Captain Benson served as an Air Force Academy Liaison Officer, visited local high schools and junior colleges, conducted interviews with prospective Academy cadets, and counseled students on Air Force career opportunities. He also assisted in the construction and repair of facilities at a local youth summer camp.

Lieutenant Gibbons, born at Kunsan AB, Korea, in 1963, is an AFROTC graduate of Birmingham-Southern College, Ala., where she earned a bachelor of science degree in biology. She received national at-



Crew S-170 of the 351st Strategic Missile Wing, Whiteman AFB, Mo., consists of Capt. Dennis R. Benson and 1st Lt. Julia A. Gibbons, whose SAC achievements, Minuteman missile-handling skills, and flight commander training experience have earned them this year's Thomas S. Power Strategic Missile Crew Award.

tention in 1986, when she was selected to be the deputy missile combat crew commander of the first male-female Minuteman crew in SAC's history.

Gibbons has shown expertise in her handling of significant safety-related events and intricate squadron weapon anomalies. She earned the "highly qualified" rating on her upgrade check to missile combat crew commander in 1988. While preparing for the 1989 missile competition, she compiled a personal study guide detailing many aspects of missile crew procedures. This

guide will be used for future missile competition training.

Lieutenant Gibbons's off-duty activities include service as a leader for a local Cub Scout den and as a volunteer for Project Literacy, an organization dedicated to eliminating illiteracy in the US. She also helped paint and repair a children's summer camp facility.

Benson and Gibbons not only scored highest in a SAC IG inspection, but also made the DCO Honor Roll for excellence in emergency war order and Minuteman code-handler testing and outstanding per-



Maj. Michael L. Straight, chief of F-15 academics at the USAF Fighter Weapons School, Nellis AFB, Nev., is this year's winner of the Claire Lee Chennault Award. In addition to upgrading the school's fighter weapons courses, he has drawn on his flying expertise to identify F-15 combat techniques critical to pilot training.

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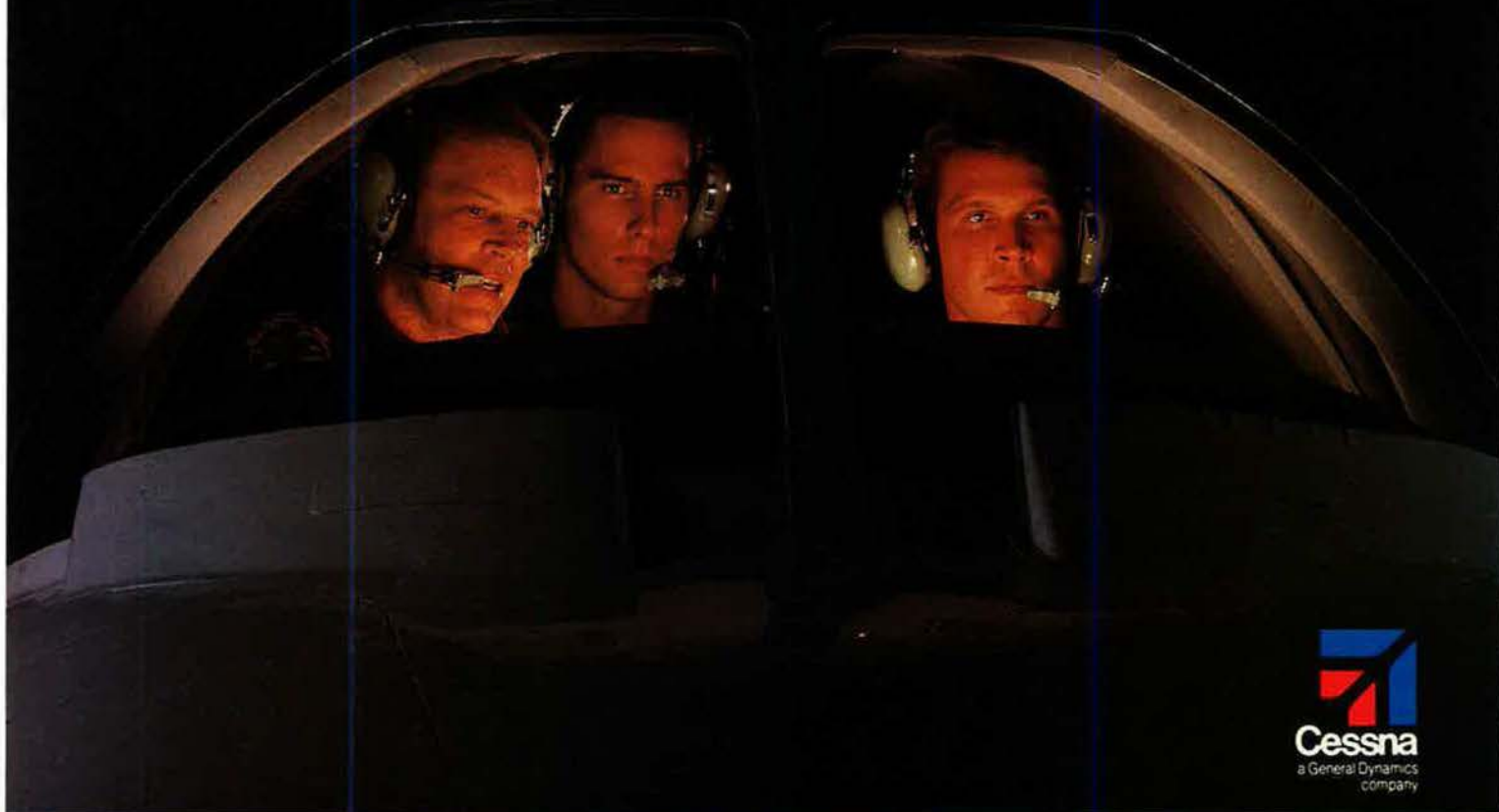
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formances in standardized evaluation. They were noted for "their unparalleled ability to handle complex critical situations," which "puts them in the forefront of SAC's warriors during this Year of the SAC Alert Force."

The duo also co-wrote their squadron's Flight Commander/Flight Commander Deputy Guide, a comprehensive package that serves as a foundation for training flight commander crews.

The Chennault Award

"A self-starting, hard-charging Fighter Weapons School Instructor Pilot, [who] is at the forefront of tactics development and instruction," states the nomination of Maj. Michael L. Straight, chief of F-15 academics at the USAF Fighter Weapons School at Nellis AFB, Nev., for the Lt. Gen. Claire Lee Chennault Award.

Major Straight's title may imply that he is a ground school instructor who does little flying. After all, his main duty is as primary academic instructor for six generic USAF fighter weapons courses. He has updated the F-15 system syllabus and enhanced the course with updates on the latest Soviet aircraft and missile systems. He has written four articles that are now considered classics in the field of fighter tactics. He has become an expert in the field of infrared missile design and employment. As his nomination states: "His efforts not only enhanced F-15 and F-16 offensive employment with the AIM-9M, but increased the combat employment of this missile system from the A-10, F-4, and the F-111 aircraft as well."

But Straight is far from being ground-bound. His flying expertise has identified such critical areas as the optimum acceleration, turn performance, and maneuvering techniques for the F-15 in combat configurations. In addition, he was responsible for the complete restructuring and improvement of the basic fighter-maneuvering phase of flight instruction. Following a series of F-15 low-altitude incidents, Straight identified areas in the school syllabus that could be improved. TAC headquarters subsequently incorporated his suggestions into its initial qualification manuals and continuation training.



The William H. Tunner Award goes to the crew of SPAR 71, a UH-1N helicopter of the 58th Military Airlift Squadron, 608th Military Airlift Group, Ramstein AB, Germany. From left: Capt. Theodore E. Hartenstein, A1C Jeffrey T. Franco, SSgt. Gregory B. West, and 1st Lt. Daniel P. Hickey.

The Tunner Award

On August 28, 1988, during an air show at Ramstein AB, West Germany, three members of Italy's air demonstration team collided in mid-air. One aircraft crashed into the crowd of 300,000 spectators, causing many deaths and injuries. SPAR 71, a UH-1N helicopter assigned to the 58th Military Airlift Squadron of the 608th Military Airlift Group, standing by for VIP security support, quickly became airborne. It was crewed that day by Capt. Theodore E. Hartenstein, pilot; 1st Lt. Daniel P. Hickey, copilot; SSgt. Gregory B. West, flight engineer; and A1C Jeffrey T. Franco, flight engineer.

Hartenstein reached the tragic scene within four minutes, flying through smoking debris. Hartenstein hovered over the burning aircraft and used the helicopter's downwash to suppress the flames. He landed the aircraft, and the crew began to evacuate the worst casualties. Sergeant West and Airman Franco fought their way into the fire to get their first patient, an Italian captain, the team's official photographer, who suffered burns and a broken leg.

Hartenstein made two flights to

Landstuhl Army Regional Medical Center before other medically equipped helicopters arrived to assist. DUSTOFF 64, the Army medical helicopter assigned to the show, never got airborne because its crew members were also casualties of the crash.

With DUSTOFF 64 lost, SPAR 71 and its counterpart, SPAR 78, became the primary rescue helicopters. SPAR 78 did not get airborne immediately, because TSgt. Clinton Douty had run to DUSTOFF 64 to help someone escape the burning helicopter and to fight the fire. When the fire trucks arrived, he ran to his chopper; SPAR 78 landed beside SPAR 71 just as it lifted off for its first run to Landstuhl.

Within the first ninety minutes of the crash, SPAR 71 made seven sorties and 78 three; the two helicopter teams were credited with saving a total of fifteen lives. Before the operation was complete, two more 58th MAS helicopters rushed to the scene to support the medical teams. According to the narrative accompanying the MAC selection board's nomination: "Without the immediate response of the 58th MAS personnel on the scene, more lives would have been lost." ■

C. V. Glines is a regular contributor to AIR FORCE Magazine. See also his articles "Guard and Reserve All-Stars" and "Flying Blind" in this issue.

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THE SENSIBLE SOLUTION

Of all the airmen in the Air Force, only twelve a year are so honored.

The Outstanding Airmen of 1989

BY SUSAN KATZ-KEATING

THE most sought-after ticket at the AFA National Convention is always the one that admits the bearer to the elegant ballroom on Monday night. That's when the Air Force's twelve Outstanding Airmen of the Year are presented.

As the following profiles of the Outstanding Airmen of 1989 show, it takes real achievement to be selected. These twelve have been chosen from an enlisted force of 466,000 eligible contenders. In the thirty-three years that the Air Force Association has conducted this program, only 507 individuals have earned the distinction.

• **SrA. Michael L. Acker**, Mass Spectrometry Technician, Applied Physics Laboratory, McClellan Central Laboratory, Technical Operations Division, McClellan AFB, Calif. Airmen Acker completed his on-the-job training in less time than any other previously assigned technician, allowing his section to alleviate a two-month backlog one month ahead of schedule. He went on to



become the top technician in his mass spectrometry section, exceeding average technician output by sixty percent. When his section was assigned to move to a new laboratory, Airman Acker saved the Air Force \$150,000 in moving costs. He was instrumental in dismantling, moving, and reassembling more than \$2,000,000 worth of delicate equipment. He is also credited with placing the reassembled spectrometry equipment back in service three weeks ahead of schedule. The data output is now accurate to a degree not previously attained. Airman Acker is now primary trainer on the mass spectrometers.

**SrA. Michael
L. Acker**



Airman Acker is currently pursuing a bachelor's degree in physics and has maintained a grade-point average of 4.0. He won top honors from McClellan's NCO Preparatory Course and in 1988 was recognized as the Technical Operations Division Airman of the Year and the McClellan AFB Airman of the Year. He is active in the Sacramento community's Amiga Computer Club and the Planetary Society.

• **MSgt. Mary F. Baker**, Superintendent of Law Enforcement, 513th Security Police Squadron, RAF Mildenhall, United Kingdom. When British Ministry of Defence police became available for work at RAF Mildenhall, Sergeant Baker researched and wrote a set of operational instructions that would integrate the British and US law-enforcement personnel. She was so thorough in her work that her procedures were accepted by British and US officials without alterations. She reworked a failing self-inspection program into one that wing inspectors called "error-free, best on base, and a model for other units to fol-

**MSgt. Mary
F. Baker**



low." Chosen over more senior personnel as the law-enforcement superintendent, Sergeant Baker developed fifteen new operating instructions and eighteen special security instructions. In addition, she automated programs for self-inspection, quality control, and individual evaluation and created a computerized test certification process that gives a realistic assessment of test validity.

Sergeant Baker earned a remarkable thirty-nine semester hours in one year and is working toward a degree in business management. She takes a leading role in community and Air Force projects. She was named Outstanding NCO of the Quarter by both her wing and her squadron; was chosen Law Enforcement NCO of the Year by 513th ACCW, Third Air Force, and USAFE; and was selected Outstanding NCO of the Year by her squadron, 513th ACCW, and Third Air Force.

**SSgt. David
E. G. Butler**



• **SSgt. David E. G. Butler**, Administrative Specialist assigned as Staff Administrative Technician, Hq. Human Systems Division, Brooks AFB, Tex. Sergeant Butler was promoted to staff sergeant after



only three years of service. As manager of command suspenses, Sergeant Butler developed a computerized suspense tracking system, from which he provides HSD's Chief of Staff weekly reports of suspenses. His development of a streamlined OES/APR tracking system has resulted in zero late reports. He redesigned HSD Individual Mobilization Augmentee program training schedules and was selected to prepare the commander's daily read file.

Sergeant Butler is currently completing a degree in electrical engineering. Nevertheless, he still finds time to donate an average of seven hours per month as a volunteer for Family Services and to assist in preschool classes at his church. He helped form a new Cub Scout troop at his church and is an assistant scoutmaster. Sergeant Butler was honored as Airman of the Quarter by both Hq. HSD and Brooks AFB. He received the John Levitow Award as a graduate of the NCO Preparatory Course. He was named the Brooks AFB Enlisted Administrator (Administration Management) of the Year. He was also named Airman of the Year by the Human Systems Division and by Air Force Systems Command.



**Sgt.
Stephen M.
Kravitsky**

• **Sgt. Stephen M. Kravitsky**, Minuteman Team Chief, Electro-Mechanical Team Section, Missile Electrical Branch, 321st Organizational Missile Maintenance Squadron, 321st Strategic Missile Wing, Grand Forks AFB, N. D. At twenty-one years of age, Sergeant Kravitsky is the youngest of this year's twelve Outstanding Airmen, but he clearly knows his way around a missile. Thanks to his efforts in security system maintenance, the 321st

Strategic Missile Wing can claim the highest security-system reliability rate in SAC. He was able to complete more than 350 work orders in support of emergency war orders and AFLC contractor support maintenance, while sustaining an unprecedented maintenance data collection accuracy rate of 97.8 percent. He saved more than 1,000 man-hours by clearing security malfunctions that had tied up twenty-one missile security sentry teams.

Sergeant Kravitsky performed an emergency entry into one missile site in a way that avoided the use of a destructive entry procedure—saving USAF \$75,000. He was selected to be the Lead Electro-Mechanical Team Chief for Glory Trip-129, an operational test launch, at Vandenberg AFB in California.

Sergeant Kravitsky earned the John L. Levitow Award while attending the NCO Preparatory Course. He was named the 321st Strategic Missile Wing's Airman of the Month and SAC ICBM Maintenance Airman of the Month. He is active in the Knights of Columbus and plays on his squadron's basketball and volleyball teams.

• **TSgt. Ronald A. LaRosa**, Comptroller, 4th Weather Wing, Peterson AFB, Colo. Sergeant LaRosa's knack for numbers has paid off handsomely for the Air Force. He is in charge of a \$3.5 million annual budget for twenty-three units scattered around the globe. After taking a close look at how the budget was operating, Sergeant LaRosa revamped the civilian pay procedures, establishing a system whereby civilian pay would be managed at individual subordinate units. This innovation resulted in a savings of 600 man-hours per year previously spent tracking down and correcting errors. He instituted a new process for reviewing commercial contracts, resulting in a saving of \$145,000. In addition, he helped save the service \$55,000 in salvaged equipment when he provided detailed advice to the 4WW's Office Automation Board.

Sergeant LaRosa holds a master's degree with specialties in management and computer resource management. He is a lay minister and youth coordinator at the Peterson chapel and an assistant den leader for the Cub Scouts. He was active in

**TSgt.
Ronald A.
LaRosa**



the Special Olympics and coached the Wing's basketball team. He is currently participating in a bowl-athon for muscular dystrophy. His one-man shop was honored as the 1988 Best Budget Office in MAC, Category III. He received the Wing Commander's Award as a MAC IG outstanding performer and was named the Peterson AFB Complex NCO of the Year for 1988. He is the Primary Tax Representative and Savings Bond Drive OPR for his wing and serves as the wing's alternate OJT monitor.

• **MSgt. William H. Nodine**, NCOIC, T-38 Flightline Support Section, 12th Field Maintenance Squadron, 12th Flying Training Wing, Randolph AFB, Tex. Under his stewardship, his jet engine test cell completed 1,149 performance and functional test runs while maintaining a reject rate of 2.9 percent, well below the ATC standard of 4.8. His technique for training engine technicians greatly increased their ability to troubleshoot without removing engines, which helped Randolph achieve the highest fiscal year mission-capable rate in the history of ATC. The rate for T-37s soared to 90.7 percent and the T-38 rate to



**MSgt.
William H.
Nodine**



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85.9. Randolph also had the lowest deferred maintenance rates in ATC history: 0.23 for T-37s and 0.65 for T-38s.

While maintaining his normal work load, Sergeant Nodine provided sixty engine tests per month, plus technical assistance, to the ATC Queen Bee maintenance contractor. By so doing, he was able to save the Air Force \$600,000 per year in contractor support fees. He broke another record through his efforts to procure new equipment that would allow J69 test stands to accommodate J85 engines, thus achieving the highest J85 spare engine in-commission rate in the history of ATC.

Sergeant Nodine is pursuing his second associate in arts degree, plus a bachelor's degree, and is enrolled in the Senior NCO Academy. He was Senior NCO of the Year for Randolph AFB and for his squadron and was Squadron Senior NCO of the Quarter. He was honored by the city of San Antonio for outstanding service to the community.



**MSgt.
Michelle D.
Oakes**

● **MSgt. Michelle D. Oakes**, Detachment Chief of the AFCC Detachment, Transmitter Facility, OLA, 1957th Communications Group, Bellows AFS, Hawaii. Sergeant Oakes earned her grade under the Stripes for Exceptional Performers program. Thanks to her efforts, the purchase and installation of two unnecessary omni antennas were canceled, saving the Air Force more than \$213,000 in one year alone. She consolidated on-hand heavyweight log periodic antennas into a matrix system, thereby ensuring a reliable backup to the Mystic Star Presidential support mission. Sergeant Oakes helped her division earn an excellent rating during an operational readiness inspection.

Sergeant Oakes is enrolled in the Senior NCO Academy correspondence course and has maintained a perfect grade-point average of 4.0 in college courses. She supervised a major self-help project at her site's dormitories that included repainting the entire facility and installing a new security fence surrounding more than 560 acres. She coordinated the filming of scenes at Bellows for the television series "Magnum, P. I." She is the Senior NCO of the Year for AFCC, Pacific Communications Division, and 1957th Communications Group. She is president of the Hickam AFB Falcon Youth Booster Group, a "T-Ball Mom," and a volunteer for Special Olympics.



**TSgt.
Vincent E.
Paoletta**

● **TSgt. Vincent E. Paoletta**, Material Facilities Supervisor, 347th Supply Squadron, 347th Tactical Fighter Wing, Moody AFB, Ga. In 1983, while taking his three-level examination, he achieved the highest score to date for the 436th MAW. He is credited for leading his section and branch to a rating of "Outstanding—Best Seen to Date" during the recent TAC Unit Effectiveness Inspection. His high standards for supply operations have resulted in a remarkable accuracy rate of 98.46 percent and a refusal rate of zero at base supply. He oversees most of the branch's key projects.

Sergeant Paoletta designed and constructed forty bin rows to house more than 12,000 F-16 spares. This effort was a large contribution to his wing's achieving the smoothest F-16 conversion to date. After only five years in the Air Force, he was promoted under the Stripes for Exceptional Performers program.

Sergeant Paoletta is pursuing a bachelor's degree in engineering and has a grade-point average of

3.63. He was a multiaward winner upon graduation from the NCO Leadership School and is now enrolled in the Senior NCO Academy correspondence course. He is a volunteer counselor for troubled teens and teaches Sunday school at his church. He was Outstanding Senior Supply Technician of the Year for both Ninth Air Force and TAC. He also earned recognition as NCO of the Month and NCO of the Quarter for Supply and was the 347th TFW's Outstanding NCO of the Quarter.



**TSgt. Alva
Patterson**

● **TSgt. Alva Patterson**, Supply Systems Analyst, Hq. Air Force Logistics Command, Deputy Chief of Staff/Distribution, Directorate of Supply. Her Base Automated Service Store project for Air Logistics Centers conserved more than 300 manpower positions service-wide, allowing for increased productivity at the store level. The average customer was spared an estimated sixty-two seconds of shopping time per line item purchased. The project also benefited USAF, saving \$4.5 million per year.

Sergeant Patterson's extensive knowledge of the supply computer system causes her to be called away on temporary duty to various AFLC units. She came to the rescue at Robins AFB after that base's supply computer had been down for more than a week. The existing backlog was a virtual nightmare, but she was able to bring the system back on line in less than seventy-two hours, recovering more than 1,000 line-item issues and back orders.

Sergeant Patterson is pursuing a degree in data processing. She is active in her local Parent-Teacher Association and is a Red Cross volunteer. She was chosen the AFLC NCO of the Year and graduated from the AFLC NCO Academy

with two major honors: the Commandant's Award and the NCO Association Communicative Skills Award.

● **Sgt. Timothy R. Rademacher**, Communications Maintenance Technician, 6911th Electronic Security Squadron, Hahn AB, West Germany. Sergeant Rademacher keeps a sharp eye out for the good of the Air Force. One example of this is his discovery of usable electronics equipment that was gathering dust in a government salvage yard. After securing permission, Sergeant Rademacher purchased, repaired, and installed the equipment, thereby saving the service more than \$50,000. His keen awareness also contributed toward national security when he discovered what he thought to be classified information contained in the annual Air Force Inventory Survey. He was subsequently able to protect the material that was indeed classified.



**Sgt.
Timothy R.
Rademacher**

Sergeant Rademacher was in charge of converting his unit's "B" hut from tube-theory to solid-state equipment. The conversion was completed without disrupting service, increasing circuit reliability by twelve percent. He also led an upgrade of power wiring and signal cabling equipment, which channeled three operational units into one.

Sergeant Rademacher is working toward degrees in electronic engineering and computer science. He is well versed in communications and cryptographic machinery and was able to develop a training program to qualify Teletype technicians on cryptographic equipment. He twice won Airman of the Quarter for logistics and earned that honor for both the 6911th ESS and the 691st ESW. He was named the ESC Communications-Electronics

Maintenance Technician of the Year.

● **TSgt. Raymond N. Walker, Jr.**, NCOIC of Electronic Warfare Systems, 6200th Tactical Fighter Training Squadron, Clark AB, the Philippines. Sergeant Walker is credited with greatly improving both the Cope Thunder electronic combat training scenario and its corresponding data-reporting procedures. His analysis of the radar-warning receiver and IFF procedures used in Cope Thunder exercises enabled both Hq. PACAF and the IG team to implement command-wide directives on acceptable testing procedures. In addition, he



**TSgt.
Raymond N.
Walker, Jr.**

was instrumental in the creation of a manpower planning guide, used by Cope Thunder participants to project and maintain manpower requirements. Units returning home from Cope Thunder will also benefit by his efforts through his updated version of the redeployment procedures handbook. He has updated and reviewed many other logistics products, including the Advance Party and Special Assignment Airlift Mission Processing checklists.

Sergeant Walker has nearly completed his college degree and is enrolled in the NCO Academy correspondence course. In addition to his other duties, he manages the squadron Land Mobile Radio Net, which has assets of more than \$75,000. He is an active member of the squadron Morale Club's Fund Committee and is a financial counseling advisor for the Family Support Center. He earned honors as NCO of the Quarter and as NCO 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, "Blue Two," appeared in the April '89 issue.

**MSgt.
Stephen C.
Woodard**



● **MSgt. Stephen C. Woodard**, NCOIC and Chief of the Electronic Warfare Section, 124th Consolidated Aircraft Maintenance Squadron, Idaho Air National Guard. Sergeant Woodard is one of those rare individuals who have directly affected a weapon system. The arming of all RF-4C aircraft, which have been unarmed for twenty-five years, has been made possible through his efforts. He single-handedly designed aircraft wiring, fire-control panels, and cockpit switches, which he then adapted for use with AIM-9 missiles on existing LAU-7 missile rails. He tested his design on a jet in Boise and later supervised a live-firing run at Eglin AFB. His modification was so successful that it was adopted for use by the entire RF-4C fleet.

Sergeant Woodard then turned his attention to modifying the aircraft's chaff and flare dispensing system. The resulting modification, which used the RF-4C's internal ejector racks, was adopted for use throughout the fleet. It is little wonder that his fifteen-man shop has a waiting list of personnel wishing to join.

Sergeant Woodard is pursuing a degree in business administration. He completed the USAF Senior NCO Academy correspondence course. He is a prize-winning country-and-western dancer and is part of a group that took second place in a national competition at Reno. He received the Air Force Commendation Medal for his work on the chaff dispenser and was named NCO of the Quarter and NCO of the Year. ■



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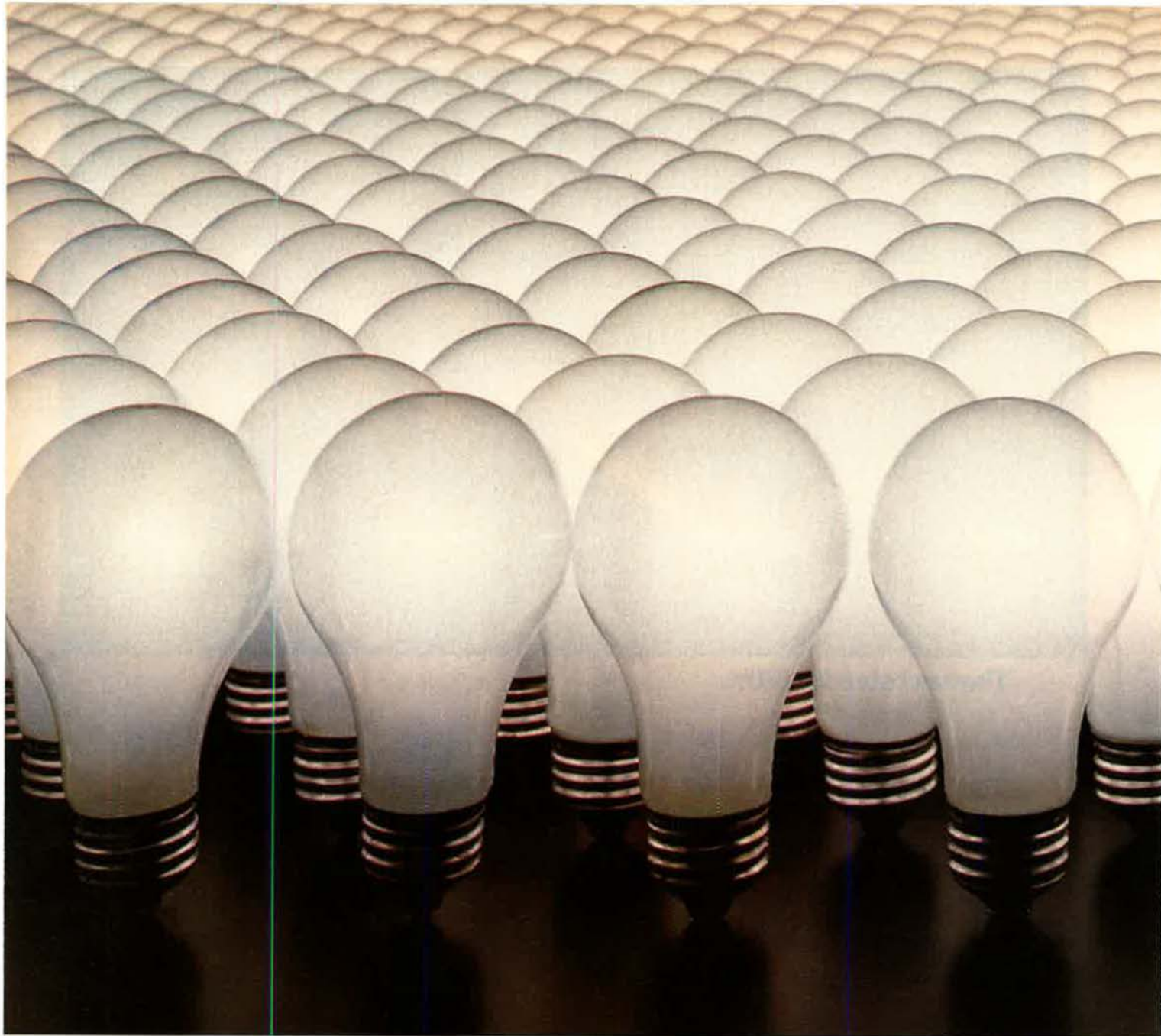
Operating cost savings also would compound at an even faster rate because of the increased fuel efficiency of its new Rolls-Royce Tay engines; the design improvements and reduced maintenance requirements of its many new aircraft systems; and the significant commonalities it has with the C-20 Gulfstream in maintenance procedures, spares supply and support programs.

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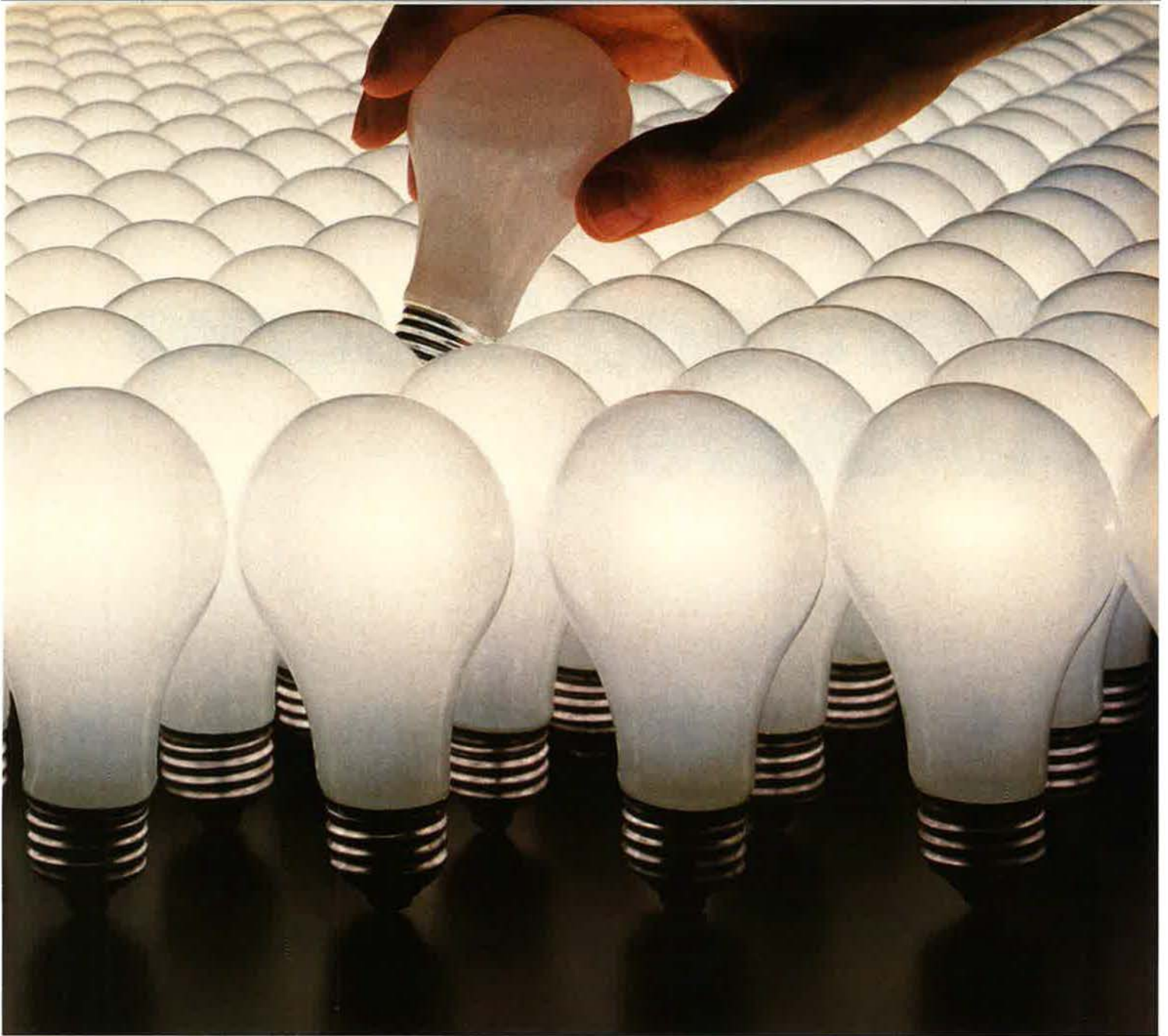
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Guard and Reserve All-Stars

FOUR awards to honor outstanding Air Force Reservists and Air Guardsmen will be presented this month at AFA's National Convention. They are the President's Award to honor the top AFRES crew, the Air Force Reserve Outstanding Unit Award, the ANG Outstanding Unit Award, and the Earl T. Ricks Award for outstanding airmanship in the Air National Guard.

The President's Award

All Air Force flight crew members who fly in pressurized aircraft are required to go through altitude chamber training periodically. There's a good reason for this requirement. A sudden decompression at high altitude can be fatal to everyone on board. Quick crew reaction is essential.

Such an occurrence may be rare, but it happened to Maj. Van E. Short, aircraft commander of a C-141B on a mission from Charleston AFB, S. C., to Ascension Island in the South Atlantic last October. Major Short and his Reservist crew are members of the 707th Military Airlift Squadron (Associate) based at Charleston. The flight crew



The quick action of this C-141B flight crew saved the aircraft and its passengers. The President's Award winners, from left, back row, are: Maj. Richard E. Gurrieri, CMSgt. Richard R. Fuller, 2d Lt. Paul V. Rancatore, SSgt. William L. Morris. Front row: MSgt. Richard D. Williams, aircraft commander Maj. Van E. Short, TSgt. Anthony R. Reyes, and TSgt. Benson S. Futrell. Not shown is SSgt. Rex L. Litchfield.

that day consisted of Maj. Richard E. Gurrieri, flight examiner pilot; 2d Lt. Paul V. Rancatore, copilot; CMSgt. Richard R. Fuller, flight engineer flight examiner; MSgt. Richard D. Williams, instructor flight examiner; TSgt. Benson S. Futrell, flight engineer; TSgt. Anthony R. Reyes, flight engineer; SSgt. Rex L. Litchfield, loadmaster; and SSgt.

William L. Morris, loadmaster. Also on board were fourteen passengers.

While cruising at 37,000 feet at night over the Atlantic between Antigua and Ascension, the aircraft encountered severe clear-air turbulence. After a violent downward jolt, the No. 1 engine compressor stalled. The aircraft yawed to the

left, and the No. 4 engine also stalled. A few seconds later, the No. 2 emergency hatch blew out, filling the cargo compartment with fog, debris, and horrendous noise. The escape ladder was sucked out, damaging the fuselage and vertical stabilizer as it flew by.

The report of the ensuing few minutes shows the value of previous training for just such emergencies.

“Chief Fuller, who was sitting next to the flight engineer panel, felt that the aircraft was coming apart, even though the cockpit entrance door was closed, somewhat muffling the overall effects of the blow-out. Sergeant Williams, who had been asleep in the crew loft just forward of the blown hatch, was dazed but managed to climb down to the cockpit before becoming incoherent and passing out. The crew quickly found out that during a rapid decompression, their time of useful consciousness without pressurized oxygen was only about seven seconds.

“The pilots donned their masks, pulled the engines to idle, and began a descending right turn. The pilot and flight engineer completed the rapid-decompression checklist, while the copilot attempted to contact [control centers] to declare an emergency in uncontrolled airspace. There was no response.

“Chief Fuller was pinned down by Sergeant Williams, but managed to reach another mask and used force to hold it to Williams’s face until he recovered. At the same time, Sergeant Reyes, the student flight engineer, administered oxygen to a passenger in the jump seat who had become unconscious.”

Meanwhile, Sergeant Morris, one of the loadmasters, had passed out on the cargo floor, and the passengers seated in the cargo compartment were having life-threatening problems. Some couldn’t reach their oxygen masks; some couldn’t get a good facial fit and were losing vital pressure.

Sergeant Williams began filling portable oxygen bottles with which Chief Fuller and Sergeant Litchfield tended passengers. Some were panicking; three were slumped in their seats; two more had passed out on the cargo deck, one of them in convulsions. Major Short left the flight deck with Major Gurrieri at

The Earl T. Ricks Award goes to this C-130 crew for moving life-saving medical support equipment from Kansas City to San Antonio during Hurricane Gilbert. From left, standing: Maj. Ronald A. Hale, Jr., Lt. Col. Larry L. Landtroop, and Capt. Michael B. Green. Kneeling: SSgt. Charles R. Swearingin and SMSgt. Jerry A. Beasley. Not shown is SMSgt. James N. Shirey.



the controls and helped Sergeant Morris recover. He then assisted the fourteen passengers until all were sitting up and giving the “thumbs up” sign.

When the aircraft leveled off at 10,000 feet, the copilot radioed Ascension Island and notified controllers that the aircraft was returning to Antigua, where Major Gurrieri made the landing. As the report states matter-of-factly, “As a result of the crew’s quick actions, no casualties or injuries resulted.”

The Ricks Award

Hurricane Gilbert, a massive storm that came ashore near Corpus Christi, Tex., last fall, catapulted Maj. Ronald A. Hale, a C-130 pilot, and his reserve crew into the limelight. Beginning at 9:30 a.m. on September 17, 1988, thirteen tornados blasted into the San Antonio area. One barreled through the South Texas Medical Center, damaging its air-cooling equipment and endangering its power supply. The Medical Center, Audie Murphy VA Hospital, and the University of Texas Health Science Center all rely on these cooling and power systems.

San Antonio Mayor Henry Cisneros declared a state of emergency for the city, and the Texas Air National Guard responded.

When calls went out for volunteers, Major Hale and crew immediately reacted. Replacement electrical units were waiting for pickup in Kansas City. The weather at the destination was marginal, and there would be severe thunderstorms en route. Hale took off and arrived at the Kansas City Naval Air Station after dark. Two more Hercules transports were to follow.

The report of the mission explains what Hale and his crew saw when they landed:

“They were met by three eighteen-wheel flatbed trucks with more than twenty tons of cooling-tower parts and generators. The truck drivers were the only people present. It was explained that unless all the equipment went, the system would not operate. This type of equipment had never been flown in a C-130 before, and it was in no configuration for transport on an aircraft.

“Evaluating the need and [drawing on] years of airlift experience. Major Hale’s crew began planning

The 459th Military Airlift Wing, Andrews AFB, Md., has been chosen AFA's 1989 Outstanding Reserve Unit. The wing's activities included medical support, security, disaster relief, research, and civil engineering. Here, SSgt. David J. Richards of the 459th Security Police Flight prepares to check out a new ATV.



just how they were going to fit [what looked like] five C-130 loads into three Hercules. Working for more than six hours, they handloaded what they could manually lift. What they could not lift, they [moved with] wooden planks smeared with grease. Using the aircraft's winch and the crew's manpower, they were able to delicately slide the outsized parts into place and secure them for flight. Added to the night's task was working in the dark on an almost deserted part of the airfield with occasional rain bursts and minimal equipment."

It was not certain that the C-130s would be able to get safely airborne and make the trip around the thunderstorms to San Antonio. With no precedent for this type of operation or for this type of load, Major Hale had to rely on his own experience and the experience of his crew. He had to calculate as best he could the fuel requirements, the total weight, the aircraft's center of gravity, and the airfield's ability to withstand the taxi weight. Hale did not consider stopping the operation, knowing that San Antonio was relying on this cargo.

Covered with grease and extremely tired, the crew made the three-and-a-half-hour flight to Kelly AFB and landed fifteen hours after their having first heard of the need for their services and twenty-four hours after the first tornado ripped through San Antonio. It took the Kelly aerial port squadron, with all its sophisticated equipment, two and a half hours to offload the aircraft. By the evening of the second day, the generators were installed and two of the four air-cooling units were in operation. Everything was in full operation on the third day. The dedication of Major Hale and the other volunteers made it unnecessary to evacuate patients from any of the medical facilities.

The members of Major Hale's crew were awarded the Air Force Achievement Medal from the State of Texas for their efforts. Those who will receive the Ricks Award in addition to Major Hale, aircraft commander, are: Lt. Col. Larry L. Landtroop, pilot/mission commander; Capt. Michael B. Green, navigator; SSgt. Charles R. Swearingin, flight engineer; SMSgt. Jerry A. Beasley, the loadmaster; and

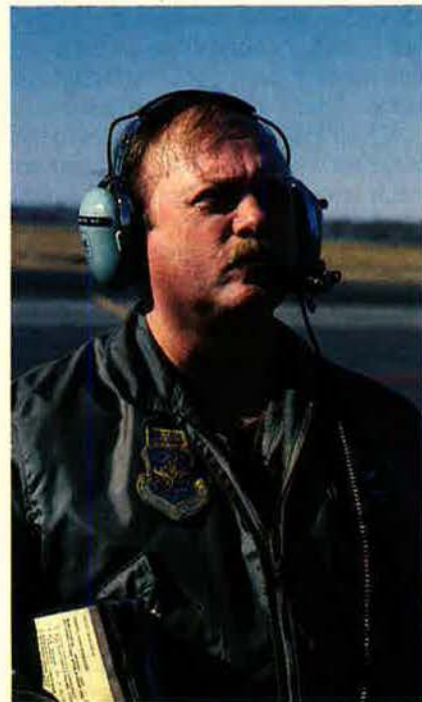
SMSgt. James N. Shirey, loadmaster.

Outstanding Reserve Unit

The award for the top reserve wing has been won by the 459th Military Airlift Wing (AFRES), Andrews AFB, Md., with special mention given to its associated 910th Tactical Airlift Group, Youngstown, Ohio, and 913th Tactical Airlift Group, Willow Grove, Pa.

The wing's activities included providing 35,000 hours of medical service support to the Malcolm Grow USAF Medical Center at Andrews AFB; to members of the 22d Medical Services Squadron deployed for training at Wilford Hall Medical Center, San Antonio, Tex.; to the Wiesbaden USAF Medical Center, West Germany; and to the hospital at Keesler AFB, Miss. The 459th MAW also sent medical staffers to Reforger and Wintex exercises in Europe. The unit's medics treated more than 1,000 aeromedical patients on medevac missions throughout the continental US, Europe, and the Caribbean.

The 1989 inauguration of President Bush involved almost the en-



Maintenance of the C-141B StarLifter on the Andrews flight line is integral to the 459th MAW's operational capability. The wing sustains one of the best safety records in AFRES history. Here, MSgt. Franklin P. Laning, a C-141B flight engineer, checks out the aircraft before departure.

—USAF photo by MSgt. Ken Hammond

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FlightSafety International is the preeminent pilot training company in the world. With over 35 years of flight training experience, FSI trains 32,000 pilots a year, including USAF C-5 pilots in the C-5 ATS, which has become a model for USAF training system acquisitions.

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Each member individually — a pioneer of advanced aerospace technology. Together — an All-American team of unrivaled technical resources and talent.

For further information call Dave Brant, Director of Government Aircraft Programs, Learjet Corp., 316-946-2511.



United in the interests of a productive, problem-free Tanker Transport Training System

tire 459th Weapons Security Flight. Aerial port squadrons of the 459th deployed to Panama, Portugal, Spain, and Italy during the year. Members of the wing also supported the Armenian earthquake-relief efforts, flying more missions there than any other USAF unit. A research expedition in Argentina was also supported by 459th personnel. An elite cadre of logistics experts from the 1st Transportation Liaison Flight were sent to the United Kingdom and Germany.

The 459th Civil Engineers deployed personnel during the year to Honduras for humanitarian projects. Unit crews and aircraft also went to Honduras, and a 756th MAS crew was the first US aircraft into the country after a short-notice Presidential order in April 1988.

The 152d Tactical Reconnaissance Group is this year's Air National Guard Outstanding Unit. The 152d, which flies RF-4C Phantoms out of Reno-Cannon International Airport, Nev., has won several reconnaissance meet trophies and TAC intelligence awards. The unit deploys firefighters, communications specialists, base-service specialists, and medical personnel around the country.



Other personnel were sent to France for USAFE exercises and supported initial relief efforts to Yellowstone National Park during the devastating 1988 fires.

The 76th Mobile Aerial Port Squadron of the 910th Tactical Airlift Group led the wing in exercise participation with twelve deployments during the year, including movements to Germany, Portugal, Alaska, and Korea. They also supported exercises in the continental US at Dover, Pope, Charleston, and Little Rock AFBs, as well as at Fort A. P. Hill, Va. Medical, civil engineering, firefighting, and support personnel from the 910th's squadrons were deployed to Florida,

Louisiana, California, Wisconsin, California, South America, and Bitburg, Germany, on various support missions. Last March, the unit's personnel participated in Volant Oak exercises in Panama.

Outstanding Guard Unit

Reno, Nev., is well-known for its gambling. This year, it will also be well-known in Air Force circles. Nevada's 152d Tactical Reconnaissance Group based there has won the Air National Guard Outstanding Unit Award.

The unit's ability to perform its mission was proven when it won the top Air National Guard trophy, won the Top Photo Interpretation Team trophy, and placed second to the overall winner of the 1988 worldwide Reconnaissance Air Meet

competition. Competition sorties were flown day and night against sixteen teams representing the USAF, ANG, USN, USMC, West Germany, and Australia.

The 152d successfully completed an ORI with forty-eight percent of the ratings assigned either "Excellent" or "Outstanding." Photo processing, photo interpretation, and intelligence functions were rated the best in the Twelfth Air Force. The unit intelligence officer received an award as the best reserve forces intelligence officer in the Twelfth Air Force. His unit was judged the best reserve forces intelligence unit in Tactical Air Command.

In June 1988, four aircraft and forty-six Guardsmen deployed to Elmendorf AFB, Alaska. Using tanker support from the Utah ANG, the 152d contingent flew a number of four-hour missions to photograph Army installations on the north coast of Alaska and several strategic radar sites.

In September 1988, the unit provided maintenance support for the USAF Thunderbirds, displayed the unit's aircraft, and assisted USAF recruiters at their tent during the 1988 National Championship Air Races.

Deployments during 1988 included sending firefighters to Hickam AFB, Hawaii; Prime RIBS participants to Dobbins AFB, Ga., and K. I. Sawyer AFB, Mich.; Communications Flight members to George

AFB, Calif.; and medical clinic personnel to Nellis AFB, Nev. The Communications Flight conducted a transfer of mainframe computer support from March AFB to Mather AFB, Calif., and converted the aircraft maintenance database from one system to another, all with minimal disruption to unit record-keeping activities.

The 152d is known locally for its many community projects. During 1988, the unit was involved in more than sixty projects and charitable events, including the Ronald McDonald House Fun Run and the Northern Nevada Children's Home Christmas Party.

—C. V. Glines



BEECHJET FOR TTTS—THE FOR TOMORROW'S

The Air Force Tanker Transport Training System (TTTS) using the Beechjet will be able to accomplish its mission of training undergraduate pilots well into the 21st century.

The rugged, reliable Beechjet is the ideal choice for TTTS, because it offers the most advanced, proven technology and highest training transfer of any light jet. Certified in the 1980's, the Beechjet fits the mission like it was designed for it. Other competing airframe certifications are based on outdated designs started over twenty-five years ago.

Flying the T-tail Beechjet, student pilots will experience the advantages of a swept-wing aircraft with an advanced airfoil that is efficient at both high and low speeds. Handling is straight-forward, safe, predictable, and very similar in feel to the tankers and transports graduates will transition to in their operational assignments.

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environment ideal for effective training throughout all mission profiles.

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with half a century of building superior military trainer aircraft.

When the Air Force selects the Beechjet as its TTTS aircraft, the Air Training Command students will be getting the newest, most rugged and durable quality airframe offered in its class. And that will give them the feel of things to come.

Beechcraft
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**These five Security Policemen are
AFA's Team of the Year for 1989.**

Supercops

BY COLLEEN A. NASH, ASSOCIATE EDITOR

PHOTOS BY PAUL KENNEDY

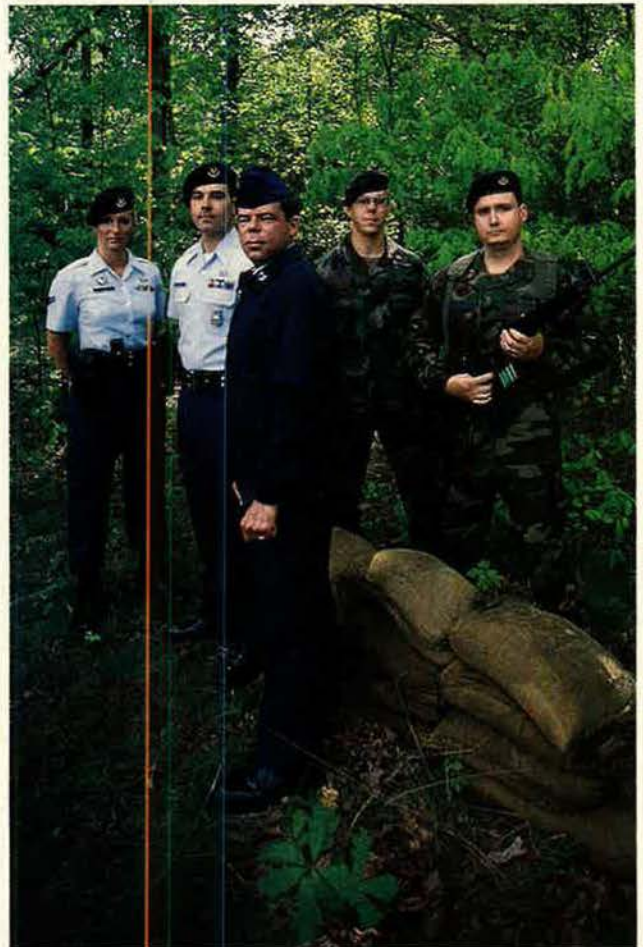
EVERYBODY calls them "the cops." They even refer to themselves that way. But as a redesignation of the career field—from "air police" to "security police"—recognized years ago, the job goes far beyond directing traffic and keeping the peace on base.

Air Force Security Policemen (SPs) are the base's first line of defense against terrorists and saboteurs, its guardians of nuclear weapons, and much more. In a salute to security police professionals everywhere, AFA this year is honoring five of their finest as the 1989 Team of the Year.

The career field incorporates two main specialties, security and law enforcement. Security specialists provide defense for such resources as aircraft, missiles, nuclear weapons, and elements of the command and control system. They are trained and equipped to defend an air base against commando raids and attack by enemy ground forces.

Law-enforcement functions include maintaining law and order, patrolling the base, working with guard dogs, regulating entry to the base, enforcing traffic laws, ad-

The 1989 Team of the Year, five of the Air Force Security Police's finest, assembles at the Security Police training grounds at Andrews AFB, Md. From left: A1C Linda K. Dean, TSgt. Russell S. Rickert, TSgt. James R. Bingham, SSgt. Randall E. McCormick, and TSgt. Ronald G. Kessinger.



ministering confinement and corrections, improving crime prevention, and performing various other police services. Law-enforcement specialists are also trained in air base ground defense tactics.

Approximately 38,000 enlisted personnel serve in Security Police assignments. Here are five of them:

• **TSgt. James R. Bingham** of Hq. Air Force Space Command (AFSPACECOM), Peterson AFB, Colo., is a security supervisor. By putting the right resources in the right places at the right time, he ensured that manpower cuts had a minimum effect on AFSPACECOM security. He created a database that helps manage officer and senior NCO assignments for the command's SPs and developed a computer spreadsheet program to track unit strengths and manpower trends early.

Sergeant Bingham also takes the initiative to work on additional projects. As the project officer for a short-notice System Acquisition Management Inspection of security sensor systems, he quickly gathered and organized the necessary

Sergeant Bingham is a security supervisor at Hq. Air Force Space Command, Peterson AFB, Colo. Thanks to his information management skills, AFSPACECOM can manage and track assignments and resources more effectively, absorbing manpower cuts with a minimal effect on security.



information. The inspectors were impressed.

Sergeant Bingham was the 1987 USAF Security Police NCO of the Year in the security specialty. He earned his bachelor's degree from Southwest Texas State University and two associate degrees from the

Community College of the Air Force.

• **A1C Linda K. Dean** of the 142d Security Police Flight (ANG), Portland International Airport, Ore., is a law-enforcement specialist and base-entry controller. She is a Top Gun award recipient and a fully qualified ambulance paramedic. During a simulated terrorist threat scenario for the 1987 TAC Operational Readiness Inspection, her vigilance at the main gate stopped several intruders.

When forest fires blazed through southern Oregon last fall, firefighters relied on Airman Dean's level-headedness. She expertly controlled the flood of vehicle and firefighter traffic and helped maintain security for personnel and equipment.

Airman Dean was also on a ten-person security team that supplied round-the-clock protection for more than 4,000 delegates and visitors at the 1988 National Guard Association conference.

In civilian life, Airman Dean is a police officer with the Washington County Sheriff's Department. She is pursuing an associate degree in criminal justice from Portland Community College.

• **TSgt. Ronald G. Kessinger** of the 142d Security Police Flight (ANG), Portland International Airport, Ore., is a security controller. As the assistant Air Base Ground Defense (ABGD) coordinator, Sergeant Kessinger aided in training a



Airman Dean is a law-enforcement specialist and a base-entry controller for the 142d Security Police Flight (ANG), Portland International Airport, Ore. She is also a fully qualified ambulance paramedic and a police officer with the Washington County Sheriff's Department.



Sergeant McCormick (left), a security specialist with the 842d Security Police Group (SAC), Grand Forks AFB, N. D., and Sergeant Kessinger, a security controller with the 142d Security Police Flight (ANG), Portland International Airport, Ore., go over security procedures at Andrews AFB.

thirteen-person deployment team for ABGD at McChord AFB, Wash. He helped to develop a top-notch compass course, commanded the aggressor force during a three-day practice exercise, and shared in the responsibility for deploying the group.

Sergeant Kessinger volunteered to serve as the weight-control and physical-fitness monitor for the unit. He was selected as the 1987 Reserve Component Outstanding Security Police Airman in the security specialty. He maintains a 3.4 grade-point average at Oregon State University, and he will graduate with a bachelor's degree in business administration this December.

● **SSgt. Randall E. McCormick** of the 842d Security Police Group (SAC), Grand Forks AFB, N. D., is a security specialist who serves as a missile security systems trainer and ABGD instructor. During his first days at Grand Forks, he earned a position on the 1988 Missile Combat Competition Team. He later became fire-team leader for the 1988 SAC Peacekeeper Challenge Team. In this annual competition, Sergeant McCormick performed exceptionally well in the obstacle course and combat rifle events. He was the trainer of the 842d Security Police Group contingent for the 1989 Missile Combat Competition.

A certified emergency medical technician, Sergeant McCormick serves as the leader for the Base Emergency Services Team. This

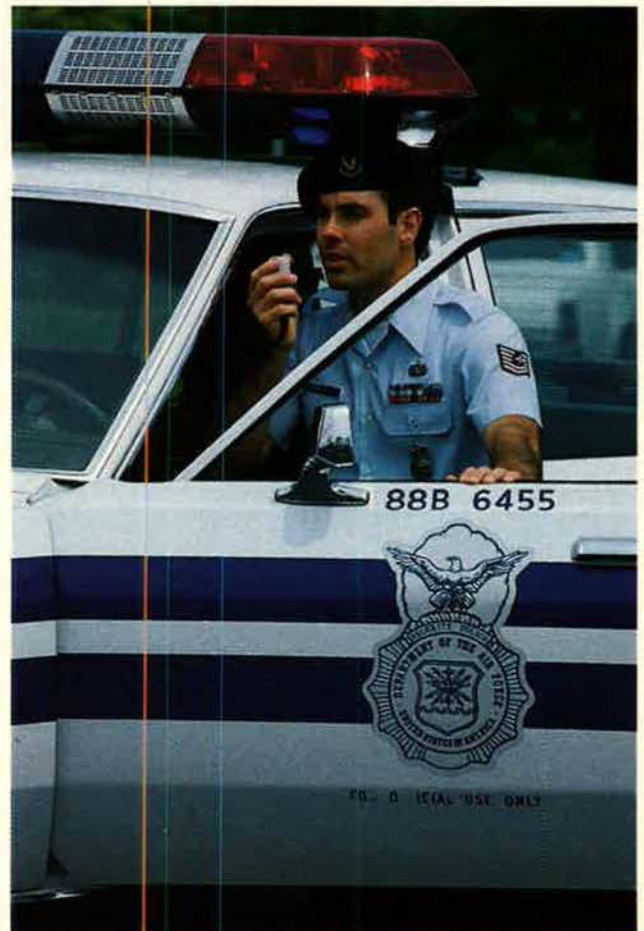
Tae Kwon Do blue belt and certified parachutist is the recipient of the 1987 Air Force Outstanding Security Police First Term Airman Security Specialist Award. He is working toward an associate degree in criminal justice from the Community College of the Air Force.

Sergeant Rickert, a law-enforcement flight chief for the 4th Security Police Squadron (TAC), Seymour Johnson AFB, N. C., is credited with forty-three percent of the IDs in crime cases resolved at Seymour Johnson in 1988. During that year, the base cut its crime rate by ten percent.

● **TSgt. Russell S. Rickert** of the 4th Security Police Squadron (TAC), Seymour Johnson AFB, N. C., is a law-enforcement flight chief with a long list of academic and professional honors. He is a three-time recipient of the TAC Certificate of Distinguished Scholastic Achievement. He was a 1985 Distinguished Honor Graduate from the Army's Military Police Investigative Course and the 1986 John Levitow Honor Graduate from NCO Leadership School. He was selected as the 1987 USAF Outstanding NCO of the Year. He participated in several Peacekeeper Challenge competitions and received awards for his tactics, combat rifle work, and crime-scene investigation.

In 1988, Seymour Johnson AFB slashed its crime rate by ten percent. Sergeant Rickert was credited with forty-three percent of the identifications in the cases resolved.

A certified student pilot, Sergeant Rickert is active with the Civil Air Patrol. He received an associate degree in criminal justice from the Community College of the Air Force. ■



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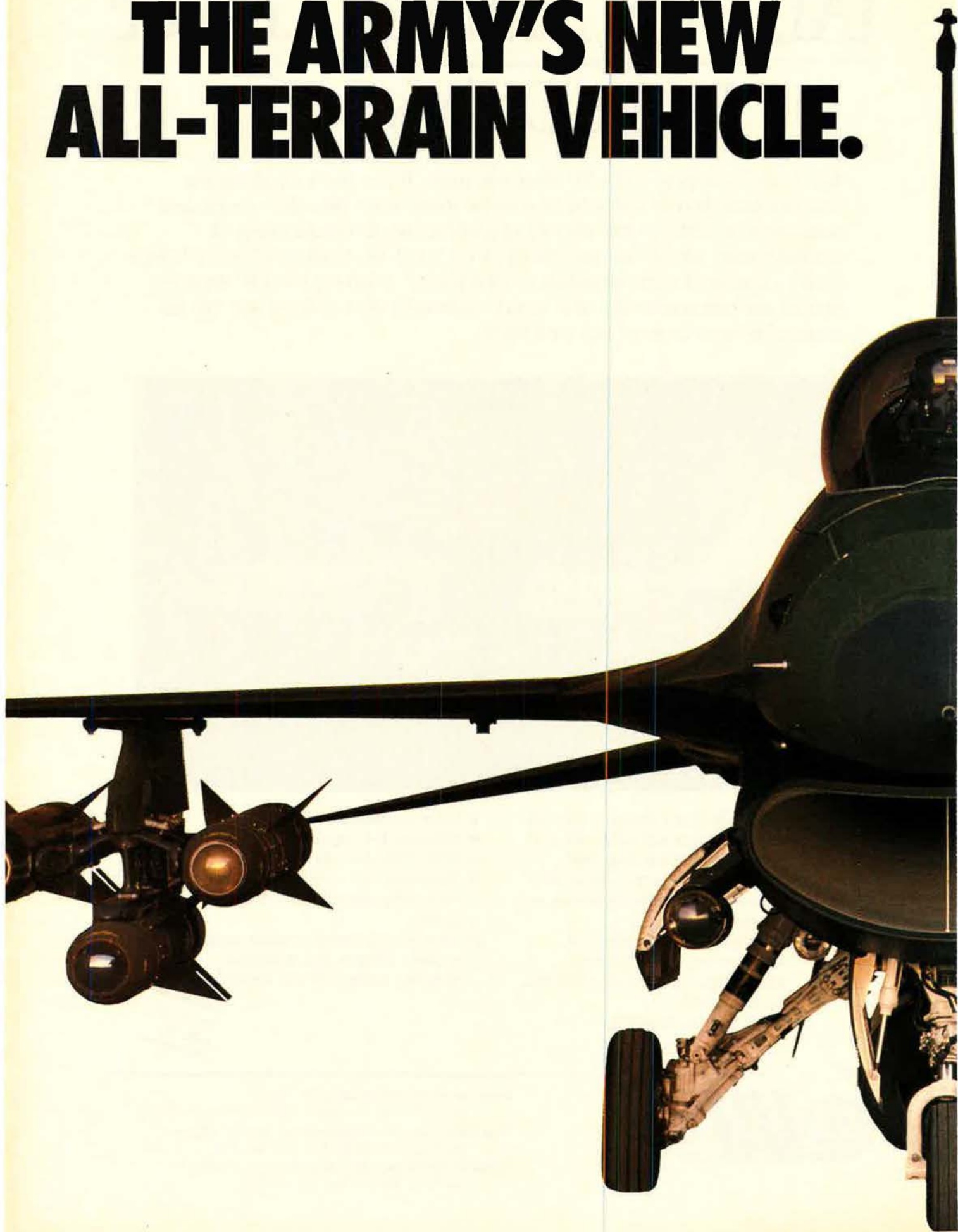
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Colorado Springs, Colo.

Computer Systems Div.

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Strategic Communications Div.

Brig. Gen. Stancil L. Dilda, Jr.
Offutt AFB, Neb.

Tactical Communications Div.

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Langley AFB, Va.

Air Training Communications Div.

Col. Jan P. Huggins
Randolph AFB, Tex.

Logistics Communications Div.

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Hq. Wright-Patterson AFB, Ohio



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Ogden Air Logistics Ctr.

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Hill AFB, Utah

Oklahoma City Air Logistics Ctr.

Maj. Gen. Joseph K. Spiers (Sept. 30)
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Sacramento Air Logistics Ctr.

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McClellan AFB, Calif.

San Antonio Air Logistics Ctr.

Maj. Gen. Richard D. Smith
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Warner Robins Air Logistics Ctr.

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Logistics Operations Ctr.

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Wright-Patterson AFB, Ohio

Logistics Management Systems Ctr.

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International Logistics Ctr.

Col. (Brig. Gen. selected)
Otto K. Habedank (Sept. 30)
Wright-Patterson AFB, Ohio

Air Force Acquisition Logistics Div.

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Wright-Patterson AFB, Ohio

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Newark AFB, Ohio

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Commander

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Peterson AFB, Colo.

2d Space Wing

Col. Jimmy R. Morrell
Falcon AFB, Colo.

3d Space Support Wing

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Peterson AFB, Colo.

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Lackland AFB, Tex.

Chanute Technical Training Ctr.
Brig. Gen. (Maj. Gen. selectee)
Peter D. Robinson
Chanute AFB, Ill.

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

Goodfellow Technical Training Ctr.
Col. Charles R. Edwards
Goodfellow AFB, Tex.

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

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Air Force Electronic Warfare Ctr.
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Military Airlift Command

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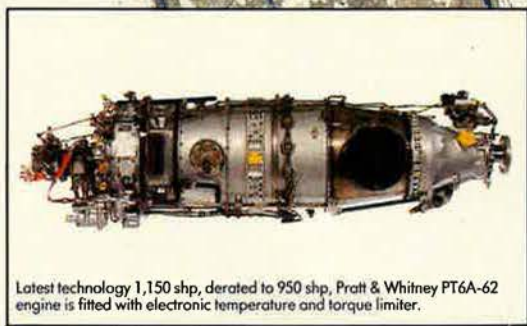
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A flock of warbirds from the Air Force's past.

A Gallery of Classics

BY JEFFREY P. RHODES, AERONAUTICS EDITOR

Bombers

DH-4

Only US-built aircraft to see action in World War I. Based on de Havilland design, but modified for Liberty engine. Used for day bombing, observation, and artillery spotting. Built by three companies during the war. Contracts for thousands of airplanes canceled after the Armistice. In AAS/AAC service until late 1920s. Modified a number of times and used for multiple purposes after World War I. (Data for DH-4B.)

Contractor/Number built: Dayton-Wright primarily/3,106.
Specifications: Powerplant—1 Liberty 12A in-line of 421 hp; Dimensions—wingspan 42 ft 5 in, length 30 ft 2 in, height 9 ft 8 in; Weight—gross 3,740 lb; Armament—2 .30-cal. nose-mounted Marlin machine guns, 2 .30-cal. Lewis machine guns on a Scarff ring in rear cockpit, and 220 lb of bombs; Accommodation—2, in separate, tandem cockpits; Cost—\$11,250.

Performance: Max. speed—128 mph; Range—400 miles; Service ceiling—14,000 ft.

B-3A, B-4A, B-5A, B-6A Panther

This series of bombers comprised the first dedicated bombing aircraft purchased in quantity by AAS/AAC. Basically, the only differences between these types were engine changes. Type first flew in 1923. Production continued until 1932. The last biplane bombers, B-6s were assigned to units in Hawaii, Panama Canal Zone, and the Philippines. In use until the mid-1930s. (Data for B-6A.)

Contractor/Number built: Keystone Aircraft/39.
Specifications: Powerplant—2 Wright R-1820-1 Cyclone radials of 575 hp each; Dimensions—wingspan 74 ft 9 in, length 48 ft 10 in, height 17 ft 2 in; Weight—gross 13,374 lb; Armament—3 .30-cal. Browning machine guns and 2,500 lb of bombs; Accommodation—crew of 5.

Performance: Max. speed—121 mph; Range—825 miles; Service ceiling—14,100 ft.

B-10

First all-metal monoplane bomber to be produced in quantity. Featured retractable landing gear, internal bomb



DH-4



B-3



B-10s

stowage, and a rotating gun turret. Ordered into production in 1933. Faster than many fighters. In 1934, H. H. Arnold led a flight of B-10s from Washington, D. C., to Fairbanks, Alaska, and back. Production ended in 1936. B-12 and B-14 were B-10s powered by different engines. Used by several foreign countries. (Data for B-10B.)

Contractor/Number built: Glenn L. Martin Co./103.
Specifications: Powerplant—2 Wright R-1820-33 Cyclone radials of 775 hp each; Dimensions—wingspan 70 ft 6 in, length 44 ft 9 in, height—15 ft 5 in; Weight—gross 14,600 lb; Armament—3 .30-cal. Browning machine guns and 2,260 lb of bombs; Accommodation—crew of 4; Cost—\$55,000.

Performance: Max. speed—213 mph; Range—1,240 miles; Service ceiling—24,200 ft.

B-17 Flying Fortress

One of three major types of US heavy bombers in World War II. First four-engine bomber put into production for AAC. Early models assigned to Hawaii flew into the Pearl Harbor attack. Used in every theater of operations during the war, but came to symbolize Eighth Air Force in England. Had one of the largest production runs in history (more than 12,700). Given a number of other missions, including that of a bomb (they were radio-controlled and filled with TNT), search and rescue, maritime surveillance, and transport. (Data for B-17G.)

Contractor/Number built: Boeing Airplane/8,680.
Specifications: Powerplant—4 supercharged Wright R-1820-97 Cyclone radials of 1,200 hp each; Dimensions—wingspan 103 ft 9 in, length 74 ft 4 in, height 19 ft 1 in; Weight—gross 65,500 lb; Armament—13 .50-cal. Browning machine guns and a normal load of 6,000 lb of bombs; Accommodation—crew of 10; Cost—\$276,000.

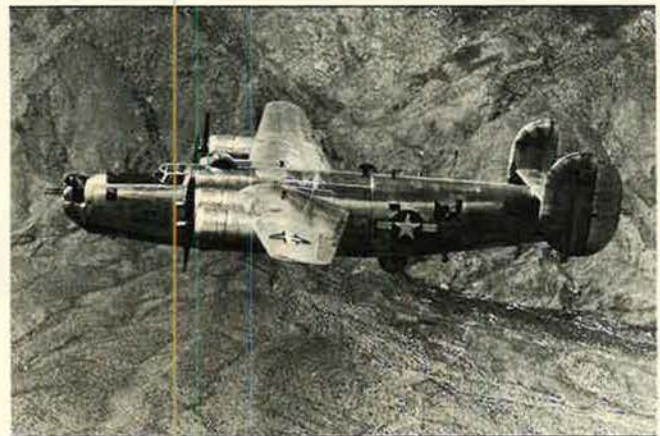
Performance: Max. speed—287 mph; Range—2,000 miles; Service ceiling—35,600 ft.

B-24 Liberator

Second of major USAAF World War II heavy bomber types. Had greater range and could carry a larger bomb load than B-17, but B-24 never had the notoriety of the



B-17F



B-24J

Fortress. Used in every theater of the war in various missions. Gained greatest fame on 8/1/43 when 177 Liberators bombed the oil refineries at Ploesti, Romania, from low-level. Also used by USN, RAF, and others. Largest production run in American military history (18,031 aircraft for USAAF and more than 1,800 for USN/RAF). Aircraft had complicated systems and was somewhat hard to handle. (Data for B-24J.)

Contractor/Number built: Consolidated-Vultee/6,687.
Specifications: Powerplant—4 Pratt & Whitney R-1830-65 Twin Wasp radials of 1,200 hp each; Dimensions—wingspan 110 ft 0 in, length 67 ft 2 in, height 18 ft 0 in; Weight—gross 65,000 lb; Armament—10 .50-cal. Browning machine guns and 8,000 lb of bombs; Accommodation—crew of 12; Cost—\$336,000.

Performance: Max. speed—290 mph; Range—3,200 miles; Service ceiling—28,000 ft.

B-25 Mitchell

Another ubiquitous bomber that did a variety of things very well. First flew in 1940. Most famous use of B-25s was raid on Tokyo led by Lt. Col. Jimmy Doolittle on 4/18/42 after taking off from the deck of the USS *Hornet*. Used in every theater of the war. Many sent to the Soviet Union under Lend-Lease. Later versions included a 75-mm cannon in the nose for strafing ships. Used until early 1960s, mainly for training pilots to fly multiengine aircraft. (Data for B-25J.)

Contractor/Number built: North American Aviation/4,318.

Specifications: Powerplant—2 Wright R-2600-29 Cyclone radials of 1,700 hp each; Dimensions—wingspan 67 ft 7 in, length 52 ft 11 in, height 16 ft 4 in; Weight—gross 35,000 lb; Armament—13 .50-cal. Browning machine guns and 4,000 lb of bombs; Accommodation—crew of 6; Cost—\$96,000.

Performance: Max. speed—272 mph; Range—1,500 miles; Service ceiling—24,200 ft.

B-26 Marauder

Medium bomber ordered off the drawing board in 1940. Had very high wing loading, and a number of training accidents resulted. Disparaged as "The Widow Maker" until improvements were made. Despite shaky start, acquitted itself well in combat. Used primarily in ETO and Mediterranean, though used to great effect in antishipping role in the Pacific. Most had been retired by 1948. (Data for B-26B.)

Contractor/Number built: Glenn L. Martin Co./1,883.

Specifications: Powerplant—2 Wright R-2600-9 Cyclone radials of 2,000 hp each; Dimensions—wingspan 65 ft 0 in, length 58 ft 3 in, height 19 ft 10 in; Weight—gross 34,000 lb; Armament—12 .50-cal. Browning machine guns and 4,000 lb of bombs; Accommodation—crew of 7; Cost—\$227,000.

Performance: Max. speed—317 mph; Range—1,150 miles; Service ceiling—23,000 ft.

B-29/B-50 Superfortress

State of the art in heavy bomber design in World War II. Introduced such innovations as pressurization and remotely controlled gun turrets. Its great range made it ideal for Pacific operations. Inflicted heavy damage on Japan from bases in the Marianas. Dropped the two atomic bombs on Japan that effectively ended World War II. The first Strategic Air Command bombers. Saw action in Korea. B-50 was postwar development that featured redesigned fin and higher-performance engines. Found greater utility as the KB-50 tanker. Last KB-50s retired in mid-1960s. (Data for B-29.)

Contractor/Number built: Boeing Airplane/2,791.

Specifications: Powerplant—4 supercharged Wright R-3350-23 Cyclone radials of 2,200 hp each; Dimensions—wingspan 141 ft 3 in, length 99 ft 0 in, height 29 ft 7 in; Weight—gross 124,000 lb; Armament—10 .50-cal. Browning machine guns and 1 20-mm cannon (or 11 .50-cal. machine guns) and 20,000 lb of bombs; Accommodation—crew of 12; Cost—\$639,000.

Performance: Max. speed—358 mph; Range—3,250 miles; Service ceiling—31,850 ft.

B-36 Peacemaker

Designed in 1941 to bomb targets in Europe from North America when it seemed that Britain might fall to the Germans. Did not fly until 1946. Politically controversial, the B-36 was partly responsible for the "Revolt of the Admirals." Served as US airborne nuclear deterrent through the 1950s. XF-85 and YRF-84F parasite fighters were designed to provide fighter escort from bomb bay and wing, respectively, when needed (the idea didn't prove practical). Retired in 1959. (Data for B-36H.)

Contractor/Number built: Convair/81.

Specifications: Powerplant—6 Pratt & Whitney R-4350-53 Wasp Major radials of 3,800 hp each and 4 General Electric J47-GE-19 turbojets of 5,200 lb thrust each; Dimensions—wingspan 230 ft 0 in, length 162 ft 1 in, height 46 ft 8 in; Weight—gross 358,000 lb; Armament—16 M24A1 20-mm cannon and 85,000 lb of nuclear or conventional bombs; Accommodation—crew of 15; Cost—\$3,701,000.

Performance: Max. speed—435 mph; Range—6,800 miles; Service ceiling—39,000 ft.



B-25



B-26



B-45



B-47



B-29 tanker (top) refueling B-50



B-36

B-45A/C Tornado

First jet bomber put into quantity production. First flew 3/17/47. Found more utility in reconnaissance role than as a bomber. RB-45s flew some combat missions in Korea. Also used as a drone director, for towing targets, as engine testbeds, for pilot training, and later for electronic intelligence-gathering. In 1952, two RB-45Cs made first nonstop transpacific flight by multiengine jet bombers. (Data for B-45C.)

Contractor/Number built: North American Aviation/10 (although most of the 97 A models were later brought up to C model standard).

Specifications: Powerplant—4 General Electric J47-GE-13 or J47-GE-15 turbojets of 5,200 lb thrust each; Dimensions—wingspan 96 ft 0 in, length 75 ft 4 in, height 25 ft 2 in; Weight—gross 112,952 lb; Armament—2 .50-cal. machine guns and 22,000 lb of bombs; Accommodation—crew of 4; Cost—\$1,081,000.

Performance: Max. speed—579 mph; Range—1,910 miles; Service ceiling—43,250 ft.

B-47 Stratojet

First jet bomber to utilize swept-wing design after data obtained from the Germans following World War II. XB-47 first flew 12/17/47. First production airplane to use bicycle landing gear arrangement. First jet bomber ordered in large quantities. Used effectively in photoreconnaissance and electronic intelligence missions. Last Air Force EB-47s retired in mid-1960s, last USN test aircraft in 1976. (Data for B-47E.)

Contractor/Number built: Boeing Airplane/1,591.

Specifications: Powerplant—6 General Electric J47-GE-25 turbojets of 6,000 lb thrust each; Dimensions—wingspan 116 ft 0 in, length 109 ft 10 in, height 27 ft 11 in; Weight—gross 206,700 lb; Armament—2 M24A1 20-mm

cannon and 22,000 lb of bombs; Accommodation—crew of 3 in tandem; Cost—\$1,888,000.

Performance: Max. speed—606 mph; Range—3,600 miles; Service ceiling—40,500 ft.

B-58A Hustler

USAF's first supersonic bomber. First production aircraft to hit Mach 2. Delta-wing design. First flew in 1954. Large, disposable, weapons/fuel pod slung under fuselage. Pioneered use of honeycomb materials for heat-dissipation and strength. Exceptionally high operating costs. Set numerous speed records and won last Bendix Trophy race. Retired in 1970.

Contractor/Number built: Convair/116.

Specifications: Powerplant—4 General Electric J79-5B or -5C turbojets of 15,500 lb of thrust each; Dimensions—wingspan 56 ft 10 in, length 96 ft 9 in, height 31 ft 5 in; Weight—gross 160,000 lb; Armament—1 General Electric T171E Vulcan 20-mm multibarrel cannon and 4 Mk. 43 nuclear bombs externally, plus other nuclear weapons in pod; Accommodation—crew of 3, in separate, tandem cockpits; Cost—\$12,442,000.

Performance: Max. speed—1,385 mph; Range—4,800 miles; Service ceiling—60,000 ft.

XB-70A Valkyrie

Conceived as a high-altitude, triple-sonic bomber. Contract let in 1957. Because of budget problems, only two were built, solely for research. First flew 9/21/64. Hit Mach 3 on 10/14/65. Used phenomenon of compression lift. Aircraft actually "rode" on its own shock wave. On 4/8/66, test pilot Joe Walker was killed when his chase F-104 hit second XB-70's tail. XB-70 copilot Carl Cross also died, and the aircraft was completely destroyed. Remaining aircraft was retired to the Air Force Museum in 1969.

Contractor/Number built: North American Aviation/2.

Specifications: Powerplant—6 General Electric YJ93-GE-3 turbojets of 30,000 lb thrust each with afterburner; Dimensions—wingspan 105 ft 0 in, length 185 ft 10 in, height 30 ft 9 in; Weight—gross 534,700 lb; Armament—none; Accommodation—crew of 2, side by side; Cost—total development \$1.5 billion.

Performance: Max. speed—2,000+ mph; Range—4,000 miles; Service ceiling—70,000+ ft.

Fighters

Nieuport 28C.1

World War I fighter the American Expeditionary Force used in quantity. Type's first flight 6/14/17. AEF obtained 297 straight from factory. On 4/14/18, while flying Nieuports, Lt. Alan Winslow and Douglas Campbell shot down two German fighters. Winslow was first pilot in the American sector to down an airplane. Campbell was first American-trained pilot to score a victory. French airplane also used by Greece and in Switzerland.

Contractor/Number procured: Soc. Anonyme des Etablissements Nieuport/297.

Specifications: Powerplant—1 Gnôme-Rhône Monosouape 9N rotary of 160 hp; Dimensions—wingspan 26 ft 3 in, length 20 ft 4 in, height 7 ft 9 1/2 in; Weight—gross 1,625 lb; Armament—2 .303-cal. Vickers machine guns; Accommodation—pilot only.

Performance: Max. speed—122 mph; Range—248 miles; Service ceiling—20,000 ft.

S. P. A. D. (Spad) XIII

Another French fighter obtained in quantity by the AEF. Type used by both Capt. Eddie Rickenbacker (top American ace in the war with 24.33 victories) and 2d Lt. Frank Luke (15.83 victories) for majority of their victories. First flew



B-58



XB-70



Nieuport 28C.1



S.P.A.D. (Spad) XIII



P-6

4/4/17. Rugged aircraft with impressive rate of climb. Used by several countries after the war. Famed Lafayette Escadrille used Spad VII, an earlier model.

Contractor/Number procured: Société Pour Aviation et ses Dérivés/893.

Specifications: Powerplant—1 Hispano-Suiza 8-Be rotary of 220 hp; Dimensions—wingspan 26 ft 6 in, length 20 ft 4 1/4 in, height 7 ft 8 1/2 in; Weight—gross 1,862 lb; Armament—2 fixed 7.62-mm Vickers machine guns; Accommodation—pilot only.

Performance: Max. speed—139 mph; Range—200 miles; Service ceiling—21,800 ft.

P-6 Hawk

Classic fabric-covered biplane of the late 1920s and early 1930s. Aircraft design was a reworked version of the P-2 for the 1927 National Air Races. XP-6 and XP-6A took second and first, respectively. Few procured because of the Great Depression. Last P-6E was converted to XP-23 (metal fuselage and higher-performance engine) and was the last biplane fighter procured by AAC. (Data for P-6E.)

Contractor/Number built: Curtiss-Wright/46.

Specifications: Powerplant—1 Curtiss V-1570-23 in-line of 700 hp; Dimensions—wingspan 31 ft 6 in, length 23 ft 2 in, height 8 ft 10 in; Weight—gross 3,392 lb; Armament—1 .30-cal. and 1 .50-cal. machine guns; Accommodation—pilot only; Cost—\$12,360.

Performance: Max. speed—198 mph; Range—480 miles; Service ceiling—24,700 ft.

P-26 "Peashooter"

First monoplane and all-metal fighter procured by AAC. Development started at company expense with design help from the Army in 1932. Became front-line equipment for pursuit squadrons in US, Hawaii, and the Panama Canal Zone. Still in service on 12/7/41, but only for training and courier duties. Engaged Japanese, and allegedly shot down a bomber in attacks on the Philippines. Last Boeing fighter until present-day ATF (YF-26A).

(Data for P-26A.)

Contractor/Number built: Boeing Airplane/111.

Specifications: Powerplant—1 Pratt & Whitney R-1340-27 Wasp radial of 600 hp; Dimensions—wingspan 27 ft 11 1/2 in, length 23 ft 10 in, height 10 ft 5 in; Weight—gross 3,012 lb; Armament—2 .30-cal. or 1 .30-cal. and 1 .50-cal. machine guns, plus up to 200 lb of bombs; Accommodation—pilot only.

Performance: Max. speed—234 mph; Range—635 miles; Service ceiling—27,400 ft.

P-38 Lightning

Versatile fighter originally designed for high-speed, high-altitude interception. Designed in 1937, but development was troubled. Twin engines and tricycle landing gear were a departure from contemporary fighter design. Entered service in 1942. Type was first AAF fighter to shoot down a German plane. Used by Maj. Richard Bong (40 victories) and Thomas McGuire (38), the top two American aces of all time. Modified for use in several other missions. (Data for P-38L.)

Contractor/Number built: Lockheed Aircraft/3,923.

Specifications: Powerplant—2 Allison V-1710-111 or -113 in-lines of 1,600 hp each; Dimensions—wingspan 52 ft 0 in, length 37 ft 10 in, height 9 ft 10 in; Weight—gross 21,600 lb; Armament—4 .50-cal. Browning machine guns and 1 20-mm cannon, plus up to 4,000 lb of bombs or 10 rockets; Accommodation—pilot only (some later variants carried a second crew member); Cost—\$115,000.

Performance: Max. speed—414 mph; Range—1,100 miles; Service ceiling—44,000 ft.

P-39 Airacobra

Dedicated ground-attack fighter, although designed to delete the supercharger on operational aircraft limited its effectiveness. First flew in 1939. Had unique automobile-



P-26



P-38

type doors, tricycle landing gear, and center fuselage engine mount. Used mainly in Southwest Pacific and Mediterranean theaters. Almost half of total production run went to the Soviet Union, where its tank-killing capability was used to great advantage. (Data for P-39Q.)

Contractor/Number built: Bell Aircraft/4,905.

Specifications: Powerplant—1 Allison V-1710-85 in-line of 1,200 hp; Dimensions—wingspan 34 ft 0 in, length 30 ft 2 in, height 12 ft 5 in; Weight—gross 8,200 lb; Armament—1 T9 37-mm cannon firing through the propeller hub and 4 .50-cal. Browning machine guns, plus 400 lb of bombs; Accommodation—pilot only; Cost—\$46,000.

Performance: Max. speed—385 mph; Range—700 miles; Service ceiling—35,000 ft.

P-40 Warhawk

Rugged fighter based on P-36 but with more powerful in-line engine. Its ready availability (first flight made in 1938) was main reason for ordering it into production as the P-38 and P-39 were being developed. P-40s from dispersed fields engaged the Japanese at Pearl Harbor in 1941. Aircraft was made famous by the American Volunteer Group (Flying Tigers) in China. Served throughout World War II in many theaters. (Data for P-40E.)

Contractor/Number built: Curtiss-Wright/2,320.

Specifications: Powerplant—1 Allison V-1710-39 in-line of 1,150 hp; Dimensions—wingspan 37 ft 4 in, length 31 ft 9 in, height 12 ft 4 in; Weight—gross 9,200 lb; Armament—6 .50-cal. Browning machine guns, plus 700 lb of bombs; Accommodation—pilot only; Cost—\$45,000.

Performance: Max. speed—354 mph; Range—650 miles; Service ceiling—29,000 ft.

P-47 Thunderbolt

Largest single-engine fighter in US use during World War II. Exceptionally big, rugged airplane used primarily for ground attack in a number of theaters. Pilots nicknamed it "Jug." First flew in 1941 and was still in ANG service in 1955. Had a combat-loss rate of about 0.7 percent, a testimony to its ruggedness. Grand total of 15,660 aircraft made it the most produced fighter in the war. Used by a number of foreign air arms after World War II. (Data for P-47D.)

Contractor/Number built: Republic Aviation/12,603.

Specifications: Powerplant—1 Pratt & Whitney R-2800-21 Twin Wasp radial of 2,000 hp; Dimensions—wingspan 40 ft 9 in, length 36 ft 1 in, height 14 ft 2 in; Weight—gross 19,400 lb; Armament—8 .50-cal. Browning machine guns, plus 2,500 lb of bombs or 10 5-in. rockets; Accommodation—pilot only; Cost—\$94,000.

Performance: Max. speed—428 mph; Range—1,000 miles; Service ceiling—42,000 ft.

P-51 Mustang

One of the classic fighters of all time. Originally designed for the British, but USAAF evaluated it and liked it. Had limited high-altitude performance at first, but addition of Packard-built Rolls-Royce Merlin engine allowed aircraft to live up to its potential. First US plane flew in 1942. P-51 pilots destroyed 4,950 aircraft in the air and a further 4,131 on the ground, the most by any US fighter type. Primary role was air superiority and long-range escort. Saw front-line duty in Korea. Cavalier remanufactured a number of aircraft for counterinsurgency missions in 1967. Early USAAF ground attack version was designated A-36, and photo-reconnaissance versions were designated F-6. Used by at least 55 other countries. (Data for P-51D.)

Contractor/Number built: North American Aviation/7,956.

Specifications: Powerplant—1 Packard V-1650-7 in-line of 1,590 hp; Dimensions—wingspan 37 ft 0 in, length 32 ft 3 in, height 13 ft 8 in; Weight—gross 11,600 lb; Armament—6 .50-cal. Browning machine guns, plus 2,000 lb of bombs or 10 5-in. rockets; Accommodation—pilot only; Cost—\$54,000.

Performance: Max. speed—437 mph; Range—1,300 miles; Service ceiling—41,900 ft.

P-61 Black Widow

First US aircraft designed specifically as a night fighter. Carried the SCR-720 airborne intercept radar in nose. A large aircraft but remarkably maneuverable. First flew in 1942 and used in Europe, but found greater use in the Pacific. Replaced the P-70. Type recorded its first night "kill" on 7/6/44. The F-15 Reporter was photoreconnaissance version of the P-61. P-61s were phased out in 1952. The last F-15s retired in 1955. (Data for P-61B.)

Contractor/Number built: Northrop Aircraft/450.

Specifications: Powerplant—2 Pratt & Whitney R-2800-65 Twin Wasps of 2,000 hp each; Dimensions—wingspan 66 ft 0 in, length 49 ft 7 in, height 14 ft 8 in; Weight—gross 38,000 lb; Armament—4 20-mm M2 cannon in belly and 4 .50-cal. machine guns in remote controlled upper turret, plus 6,400 lb of bombs; Accommodation—crew of 3 in 2 separated, tandem cockpits; Cost—\$170,000.

Performance: Max. speed—366 mph; Range—2,800 miles; Service ceiling—33,100 ft.

P-80 (F-80) Shooting Star/T-33/F-94 Starfire

First jet fighter procured in quantity. Went from drawing board to finished product in 180 days. Flew on 1/8/44. First



P-39



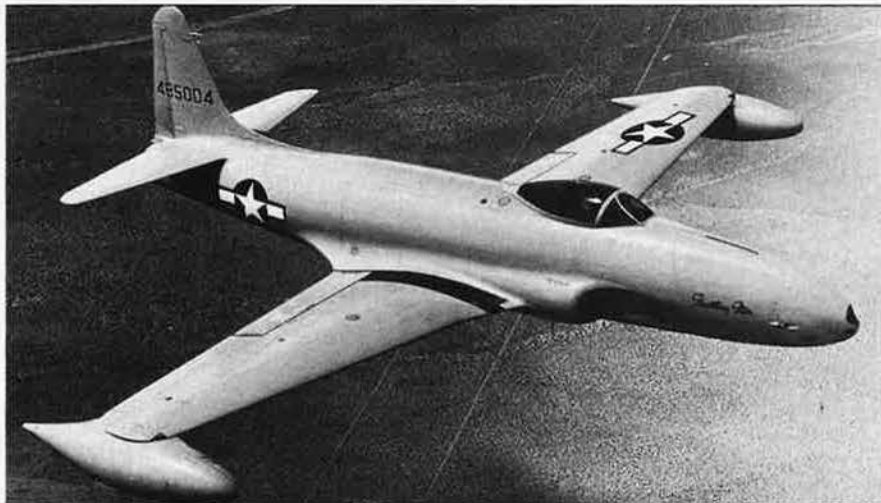
P-40E



P-47B



P-51



P-80 (F-80)

USAAF aircraft to exceed 500 mph. Two were flown in Europe late in World War II, but saw no combat. Saw extensive combat in Korea, mostly for ground attack. Lt. Russell Brown recorded first all-jet air-to-air victory on 11/8/50 when he shot down a MiG-15. F-80s retired from ANG and AFRES units in 1958. T-33 was two-seat version used as a trainer for many years and then for special-duty missions. Last "T-bird" (as T-33 was known) was retired in 1988. Both F-80 and T-33 were used by a number of other countries. F-94 was two-seat, all-weather interceptor developed from F-80 and was first US production jet to have an afterburner. Last F-94C was phased out in 1959. (Data for F-80C.)

Contractor/Number built: Lockheed Aircraft/798.

Specifications: Powerplant—1 Allison J33-A-35 turbojet of 5,400 lb thrust; Dimensions—wingspan 39 ft 11 in, length 34 ft 6 in, height 11 ft 4 in; Weight—gross 16,856 lb; Armament—6 .50-cal. machine guns, plus 2,000 lb of bombs or 10 5-in. rockets; Accommodation—pilot only; Cost—\$93,456.

Performance: Max. speed—580 mph; Range—1,380 miles; Service ceiling—42,750 ft.

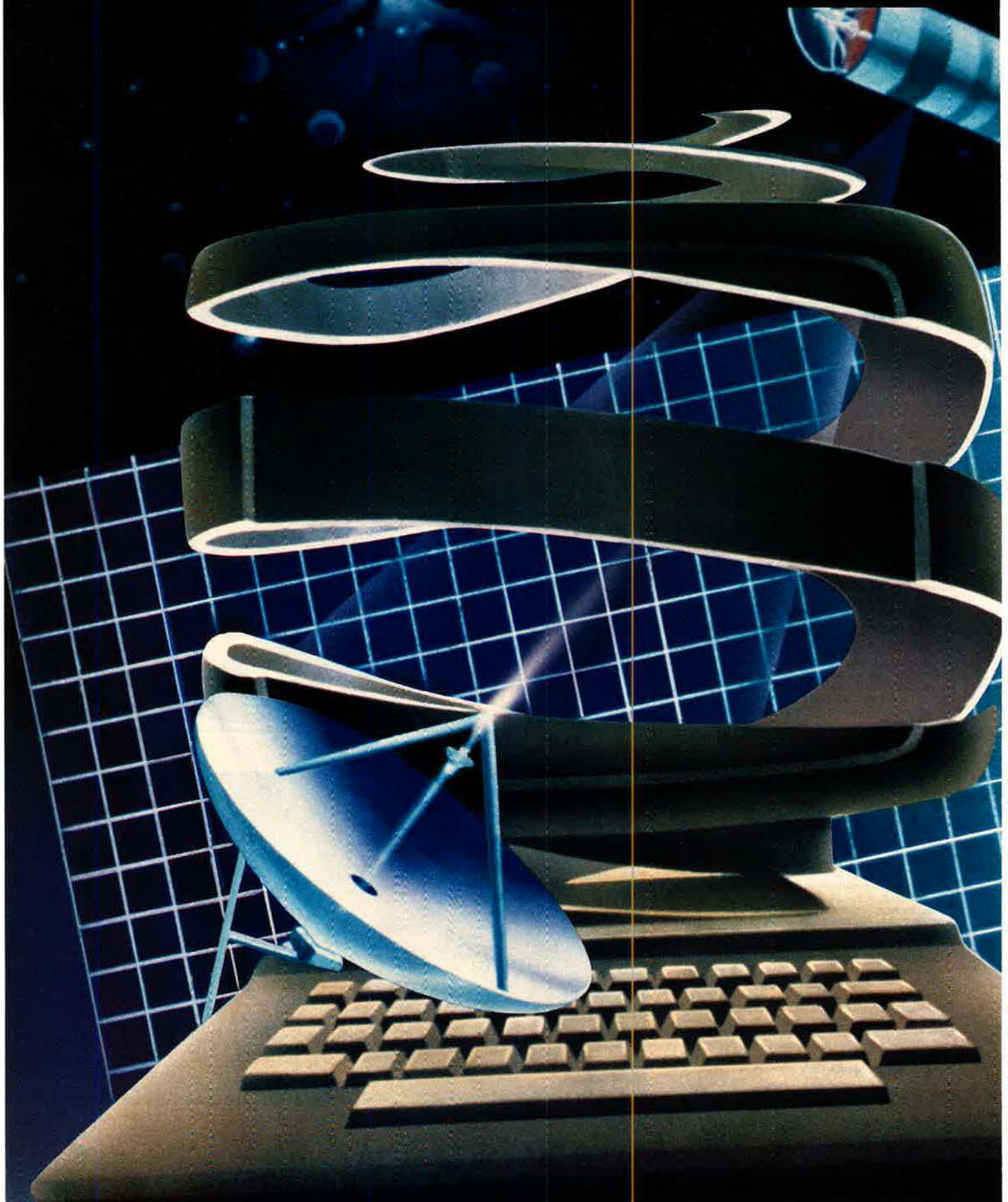
F-82 Twin Mustang

Designed for long-range, overwater escort missions late in World War II, but didn't see combat until Korea. Resembled two "married" P-51 fuselages, but was actually a



P-61

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redesign. The last US propeller-driven fighter procured in quantity. Served as replacement for P-61 in the night-intercept role. On 6/27/50, Lt. William Hudson became first USAF (as a separate service) pilot to record a victory when he shot down a Yakovlev fighter. That was also the first US victory of the Korean War. (Data for F-82E.)

Contractor/Number built: North American Aviation/100.

Specifications: Powerplant—2 Allison V-1710-143 in-lines with 1,600 hp each; Dimensions—wingspan 51 ft 3 in, length 39 ft 1 in, height 13 ft 10 in; Weight—gross 24,864 lb; Armament—6 .50-cal. machine guns, plus 4,000 lb of bombs or 24 5-in rockets; Accommodation—crew of 2 in separate side-by-side cockpits; Cost—\$228,000.

Performance: Max. speed—465 mph; Range—2,500 miles; Service ceiling—40,000 ft.

F-84 Thunderjet and F/RF-84F Thunderstreak

First post-World War II USAF fighter and eventually the last USAF straightwing subsonic fighter. First tactical fighter capable of carrying nuclear weapons. Used extensively for ground attack missions in Korea. First flew 2/28/46 and used until the late 1950s. F model had a swept-wing design, while reconnaissance version had redesigned intakes and cameras in nose. F models were recalled to active duty during the Berlin Crisis. One variant (YRF-84F) was modified for use as a parasite fighter for the B-36. F-84s flown by many other countries. (Data for F-84F.)

Contractor/Number built: Republic Aviation/2,711.

Specifications: Powerplant—1 Wright J65-3 turbojet of



F-82



F-84



7,220 lb thrust; Dimensions—wingspan 33 ft 7 in, length 43 ft 5 in, height 14 ft 5 in; Weight—gross 28,000 lb; Armament—6 .50-cal. Browning machine guns, plus 6,000 lb of bombs or 24 5-in rockets; Accommodation—pilot only; Cost—\$769,000.

Performance: Max. speed—658 mph; Range—1,650 miles; Service ceiling—46,000 ft.

F-86 Sabre

First USAF fighter designed from the outset to feature swept wings. First flew in 1947. Classic air-to-air fighter in the Korean War. Sabre pilots shot down 792 MiGs at a loss of only 76 F-86s, a victory ratio of 10:1. Most prolific variant was the F-86D ("Sabre Dog") all-weather interceptor. H model was designed as a fighter-bomber. D model was first USAF airplane to have all-rocket armament and was first interceptor to carry only one man. F-86s used by a number of countries well into the 1960s. (Data for F-86D.)

Contractor/Number built: North American Aviation/2,504.

Specifications: Powerplant—1 General Electric J47-GE-33 turbojet of 5,200 lb thrust; Dimensions—wingspan 37 ft 1 in, length 40 ft 4 in, height 15 ft 0 in; Weight—gross 18,483 lb; Armament—24 2.75-in Mighty Mouse folding-fin rockets in a retractable pack; Accommodation—pilot only; Cost—\$343,839.

Performance: Max. speed—625 mph; Range—850 miles; Service ceiling—54,600 ft.

F-89 Scorpion

All-weather interceptor designed originally to replace the P-61. Didn't fly until 1948. Made use of decelerons (split ailerons that could be used as airbrakes) to close in behind foe before firing wingtip-mounted rockets. On 7/19/57, a Scorpion crew launched an AIR-2 Genie, marking the first time a nuclear-tipped air-to-air rocket had been used in a live test. Last ANG aircraft retired in 1969. (Data for F-89J.)

Contractor/Number built: Northrop Aircraft/350 (aircraft were converted D models).

Specifications: Powerplant—2 Allison J35-47 turbojets of 7,500 lb thrust each; Dimensions—wingspan 59 ft 8 in, length 53 ft 10 in, height 17 ft 7 in; Weight—gross 42,590 lb; Armament—2 AIR-2 Genie nuclear-tipped rockets and four AIM-4 Falcon air-to-air missiles; Accommodation—crew of 2 in tandem; Cost—\$1,009,000.

F-86



F-89



F-100



F-105D

Performance: Max. speed—595 mph; Range—1,000 miles; Service ceiling—36,000 ft.

F-100 Super Sabre

World's first production fighter to exceed the speed of sound in level flight. First of the "Century Series" of fighters. Used extensively in a ground-attack role in Vietnam. First flew in 1953. Initial problems led to the grounding of all F-100s, but an increase in area of the vertical tail corrected the problem. Two-seat F-100F was first "Wild Weasel" radar-suppression aircraft. F-100s were used by a handful of other countries, notably Turkey. Phased out of the ANG in the late 1970s. Used as remote-controlled targets until the late 1980s. (Data for F-100D.)

Contractor/Number built: North American Aviation/1,274.

Specifications: Powerplant—1 Pratt & Whitney J57-P-21A turbojet of 16,950 lb thrust with afterburner; Dimensions—wingspan 38 ft 9 in, length 47 ft 0 in, height 15 ft 0 in; Weight—gross 34,832 lb; Armament—4 M39E 20-mm cannon, plus up to 7,500 lb of bombs or missiles; Accommodation—pilot only; Cost—\$704,000.

Performance: Max. speed—864 mph; Range—1,500 miles; Service ceiling—44,900 ft.

F-104 Starfighter

Sleek aircraft that served only briefly with USAF, but formed the backbone of a number of NATO and other foreign countries' air arms through most of the 1960s and into the 1970s, with almost 1,700 built. Originally conceived as a high-performance tactical day fighter. First aircraft to hold simultaneous world records for speed, altitude, and time-to-climb. First flew in 1954. Used by NASA for chase and test purposes through the mid-1980s. (Data for F-104C.)

Contractor/Number built: Lockheed Aircraft/77.

Specifications: Powerplant—1 General Electric J79-GE-7 turbojet of 15,800 lb thrust with afterburner; Dimensions—wingspan 21 ft 11 in, length 54 ft 9 in, height 13 ft 6 in; Weight—gross 23,590 lb; Armament—1 General Electric M61 Vulcan 20-mm cannon, plus 2 AIM-9 Sidewinder air-to-air missiles on wingtips and two underwing stations for either 2 additional Sidewinders or conventional or nuclear bombs; Accommodation—pilot only; Cost—\$1,471,000.

Performance: Max. speed—1,450 mph; Range—1,000+ miles; Service ceiling—58,000 ft.



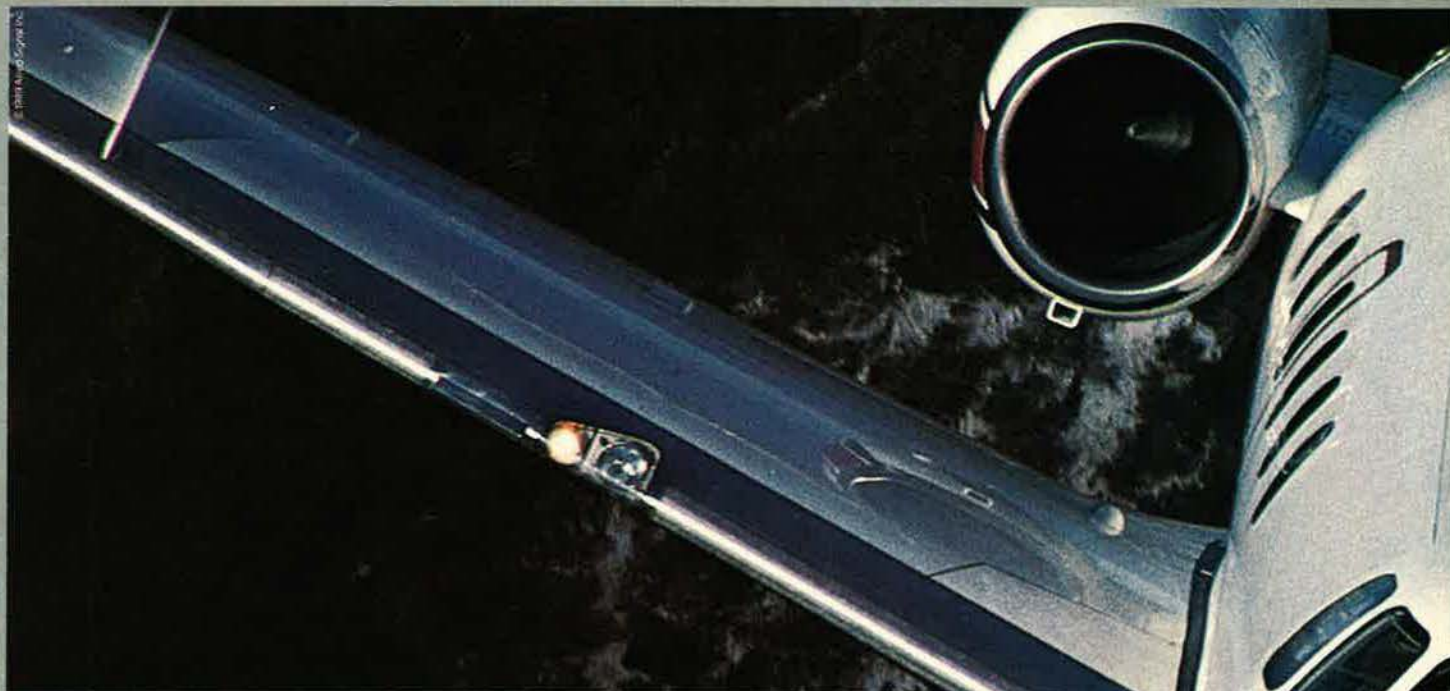
F-104

F-105 Thunderchief

Big, brutish fighter that was the heaviest US single-engine, single-seat fighter ever. Nicknamed "Lead Sled" or, more popularly, "Thud." Could carry a larger bomb load than a World War II B-17. Achieved supersonic speed on its first flight. First flew in 1956. Designed as a follow-on to the F-84. Achieved fame in Vietnam, where it was used primarily for ground attack, although Thud crews were credited with downing twenty-five MiGs. Two-seat F-105Gs used for "Wild Weasel" radar-suppression missions in Vietnam. In use with ANG units until the early 1980s. (Data for F-105D.)

Contractor/Number built: Republic Aviation/610.

Specifications: Powerplant—1 Pratt & Whitney J75-P-19W turbojet of 26,500 lb thrust; Dimensions—wingspan 34 ft 11 in, length 67 ft 0 in, height 19 ft 8 in; Weight—gross 52,546 lb; Armament—1 General Electric M61 Vulcan 20-mm cannon and up to 14,000 lb of bombs internally and



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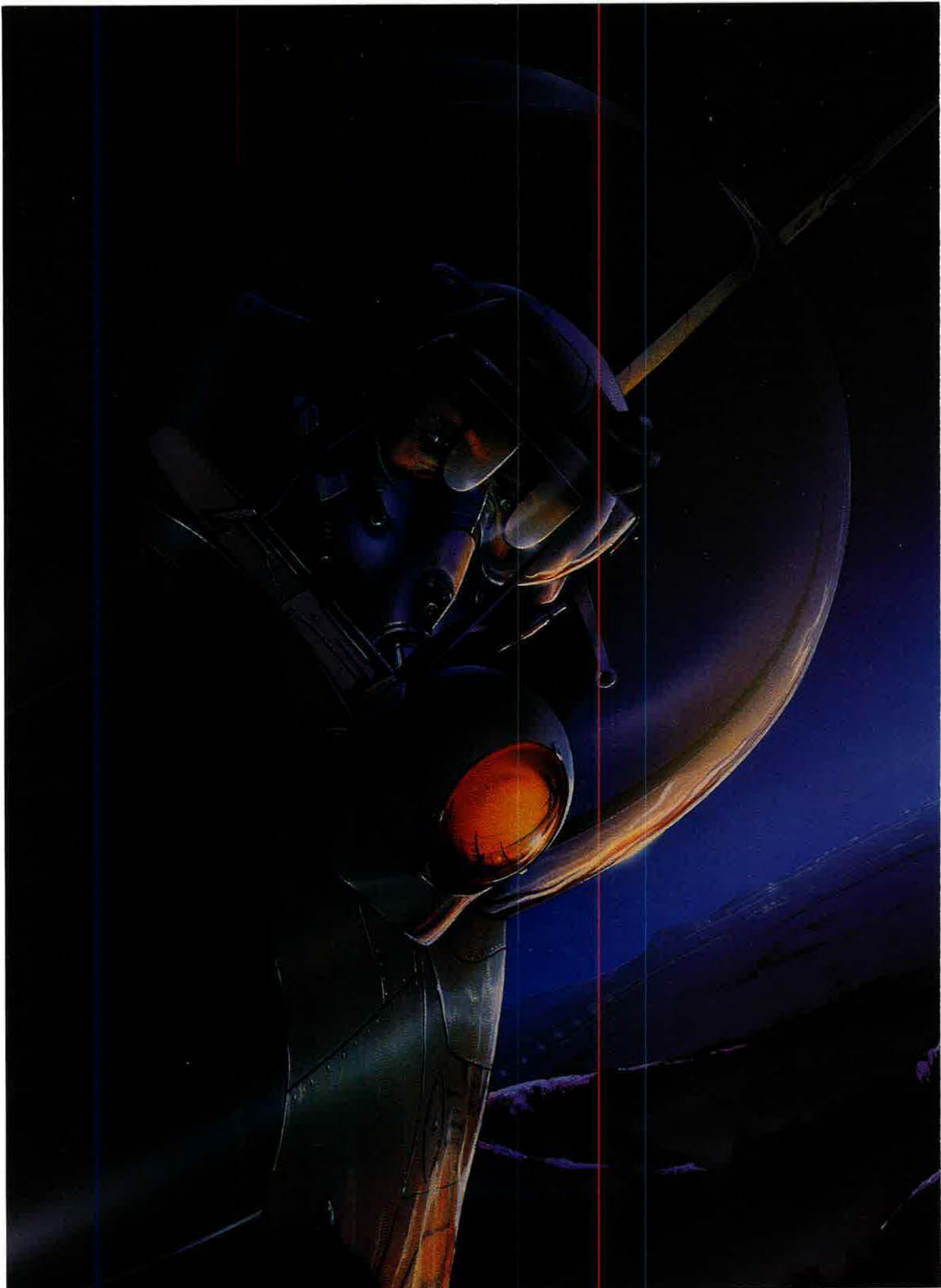
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externally; Accommodation—pilot only; Cost—\$2,237,000 (F-105G).

Performance: Max. speed—1,390 mph; Range—1,840 miles; Service ceiling—36,000 ft.

F-106A/B Delta Dart

The last dedicated air defense interceptor in USAF use. In use from 1959 to 1968. A follow-on to the F-102, the "Six" was actually a major redesign of the Delta Dagger. Was continually improved, with such features as a 20-mm cannon and provisions for midair refueling. Operated in conjunction with the ground-based SAGE (semi-automatic ground environment) air defense system. Remaining F-106s have been converted to full-scale drones. B model was the two-seat trainer. (Data for F-106A.)

Contractor/Number built: Convair Division of General Dynamics/277.

Specifications: Powerplant—1 Pratt & Whitney J75-P-17 turbojet of 24,500 lb thrust with afterburner; Dimensions—wingspan 38 ft 3 1/2 in, length 70 ft 8 3/4 in, height 20 ft 3 1/2 in; Weight—gross 38,250 lb; Armament—1 General Electric M61A-1 20-mm Vulcan cannon, plus 4 AIM-4 Falcon missiles and 2 AIR-2 Genie nuclear rockets; Accommodation—pilot only; Cost—\$3,310,000.

Performance: Max. speed—1,525 mph; Range—1,500 miles; Service ceiling—57,000 ft.

Attack, Observation, and Amphibious

A-12A Shrike

Top of the evolutionary line of the early attack planes. Big improvement over A-8 and A-10 designs. Some A-12s were delivered to China as Model 60s. First delivered to AAC in 1934. Last operational examples in use at Pearl Harbor on 12/7/41, but not used in combat.

Contractor/Number built: Curtiss Wright/46.

Specifications: Powerplant—1 Wright R-1820-21 Cyclone radial of 690 hp; Dimensions—wingspan 44 ft 0 in, length 32 ft 3 in, height 9 ft 0 in; Weight—gross 5,756 lb; Armament—5 .30-cal. machine guns and ten 30 lb or four 122 lb bombs; Accommodation—2, in separated, tandem cockpits; Cost—\$19,483 (less GFE).

Performance: Max. speed—176 mph.; Range—521 miles; Service ceiling—15,150 ft.

A-20 Havoc

Ubiquitous attack aircraft that saw action in every theater of World War II. Flown by AAC/AAF, USN, France, Britain, the Netherlands, Soviet Union, and even Japan (captured aircraft). Crews from the 15th Bomb Squadron (along with RAF crews) made first US daylight raid on Europe on 7/4/42. Modified aircraft became F-3A night photoreconnaissance aircraft and P-70A night fighter. More than 7,000 aircraft built. (Data for A-20G.)

Contractor/Number built: Douglas Aircraft/2,850.

Specifications: Powerplant—2 Wright R-2600-23 radials of 1,600 hp each; Dimensions—wingspan 61 ft 4 in, length 47 ft 11 7/8 in, height 17 ft 7 in; Weight—gross 24,127 lb; Armament—9 .50-cal. machine guns and 4,000 lb of bombs (2,000 lb internally and externally); Accommodation—2, in separated, tandem cockpits; Cost—\$74,000.

Performance: Max. speed—316 mph; Range—945 miles; Service ceiling—23,700 ft.

A-26 Intruder

One of only a handful of aircraft types to see service in World War II, Korea, and Vietnam. Entered combat 11/19/44. Used by fourteen nations after the war. Redesignated B-26 in 1948. In addition to usual roles, it performed night harassment in Korea. On-Mark rebuilt and modified forty aircraft (B-26K) for counterinsurgency missions. Last aircraft (VB-26B) retired in 1972. More than 3,000 aircraft produced. (Data for A-26C.)

Contractor/Number built: Douglas Aircraft/1,091.

Specifications: Powerplant—2 Pratt & Whitney R-2800-79 radials of 2,000 hp each; Dimensions—wingspan 70 ft 0 in, length 51 ft 3 in, height 18 ft 6 in; Weight—gross 37,740 lb; Armament—up to 6 .50-cal. machine guns and 6,000 lb of bombs (2,000 lb internally, 4,000 lb externally); Accommodation—3, in 2 separated, tandem cockpits; Cost—\$192,000.

Performance: Max. speed—355 mph; Range—1,400 miles; Service ceiling—22,100 ft.

A-1E/H Skyraider

Another attack plane that refused to die. First flew in 1945 as a Navy dive bomber. Used extensively in Korea. Played important role in Vietnam for counterinsurgency and special operations. Could carry much ordnance, had long endurance, and could absorb punishment. Acquired nicknames "Spad" and "Sandy" (A-1H only). Maj. Bernard Fisher won the Medal of Honor while flying an A-1E in 1966 in Vietnam. (Data for A-1E.)

Contractor/Number built: Douglas Aircraft/3,180 (total production).



F-106



A-20



A-26



A-1H



Caquot Type R Balloon



1909 Wright Flyer

Specifications: Powerplant—1 Wright R-3350-26WA radial of 2,700 hp; Dimensions—wingspan 50 ft 0 1/4 in, length 40 ft 0 in, height 15 ft 9 5/8 in; Weight—gross 24,872 lb; Armament—4 20-mm cannon and 8,000 lb of bombs, rockets, dispensers (once even a kitchen sink for a posed publicity photo), etc., on 15 pylons; Accommodation—usually pilot only; Cost—\$414,000.

Performance: Max. speed—345 mph; Range—1,500 miles; Service ceiling—32,000 ft.

1909 Flyer

First observation airplane. In fact, first military airplane. Accepted by the Signal Corps on 8/2/09 at Fort Myer, Va. Used to teach Lts. Frank P. Lahm and Frederick E. Humphreys to fly. Used in 1910 by Lt. Benjamin D. Foulois to teach himself to fly. Aircraft was determined unfit to fly by March 1911 and was retired. Now in National Air and Space Museum.

Contractor/Number built: Wilbur and Orville Wright/1.

Specifications: Powerplant—1 Wright 4-cylinder of 30.6 hp; Dimensions—wingspan 36 ft 6 in, length 28 ft 11 in, height 7 ft. 10 1/2 in; Weight—gross 740 lb; Armament—none; Accommodation—2, side by side; Cost—\$25,000 (plus \$5,000 bonus for exceeding 40 mph in trials).

Performance: Max. speed—42 mph; Endurance—approximately 1 hour.

Caquot Type R Balloon

Used for observation during World War I. American observers directed artillery fire at 315 targets, recorded 11,856 airplane sightings, and reported enemy activities. Balloons were generally tethered two miles behind the front and heavily protected by anti-aircraft guns. Named for its French designer, Lt. Albert Caquot. British reprisal design and briefly used it in World War II.

Contractor/Number built: Goodyear Tire & Rubber/approximately 1,000.

Specifications: Powerplant—none; Dimensions—length 92 ft 0 in, diameter 32 ft 0 in, gas capacity 3,220 cubic feet; Armament—none; Accommodation—2, in wicker basket suspended underneath.

Performance: Operating altitude—up to 5,000 ft.

O-52A Owl

Last of the early O-designated observation planes. Was first of the smaller observation aircraft. First flew February 1941. Only a handful went overseas. Most used for courier duties and short-range antisubmarine patrol over the Gulf of Mexico and Atlantic and Pacific Oceans.

Contractor/Number built: Curtiss-Wright/203.

Specifications: Powerplant—1 Pratt & Whitney R-1340-51 Wasp radial of 600 hp; Dimensions—wingspan 40 ft 9 1/2 in, length 26 ft 4 3/4 in, height 9 ft 11 1/2 in; Weight—gross 5,364 lb; Armament—2 .30-cal. machine guns; Accommodation—2, in tandem; Cost—\$50,826.

Performance: Max. speed—220 mph; Range—700 miles; Service ceiling—23,200 ft.



O-52A



L-4



O-1

L-4 Grasshopper

First large-buy, liaison-type aircraft that replaced the dedicated observation aircraft. L-4 was military version of J-3 Cub. First used in 1941. Used for artillery spotting, pilot training, glider-pilot instruction, courier service, and front-line liaison. Supposedly the type of aircraft used to bring down (with crew's sidearms) the last German aircraft in ETO in 1945.

Contractor/Number built: Piper Aircraft/almost 6,000 in 10 versions.

Specifications: Powerplant—1 Continental O-170 4-cylinder of 65 hp; Dimensions—wingspan 35 ft 3 in, length 22 ft 5 in, height 6 ft 8 in; Weight—gross 1,200 lb; Armament—none; Accommodation—2, in tandem; Cost—\$2,600.

Performance: Max. speed—85 mph; Range—190 miles; Service ceiling—9,300 ft.

O-1 Bird Dog

First of second-generation of observation aircraft. Originally designated L-19 when delivered to the Army starting in 1950. Gained fame with USAF as a forward air controller in Vietnam. Would launch markers to designate targets for fighter pilots. Air Force primarily used three versions (O, F, and G). Phased out of inventory in early 1970s. (Data for O-1G.)

Contractor/Number built: Cessna Aircraft/3,431 (total production).

Specifications: Powerplant—1 Continental O-470-11 6-cylinder of 213 hp; Dimensions—wingspan 36 ft 0 in, length 25 ft 10 in, height 9 ft 2 in; Weight—gross 2,430 lb; Armament—none (except for smoke rockets); Accommodation—up to 2, in tandem; Cost—\$11,000.

Performance: Max. speed—150 mph; Range—530 miles; Service ceiling—20,300 ft.

OA-1

First amphibious aircraft purchased by the Army Air Service in quantity. Primarily used in Hawaii, the Philippines, and areas with numerous lakes and rivers. First example delivered in 1924. Five OA-1As and crews made a goodwill tour of twenty-five Latin American countries from 12/21/26 to 5/2/27, with Capt. Ira Eaker and Lt. Muir Fairchild as one of the crews. (Data for OA-1A.)

Contractor/Number built: Loening Aeronautical Engineering/45 (total production).

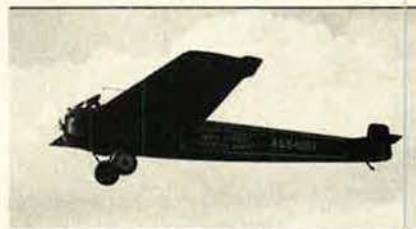
Specifications: Powerplant—1 inverted Liberty V-1650 in-line of 425 hp; Dimensions—wingspan 45 ft 0 in, length



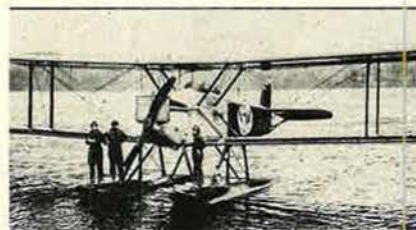
OA-1



HU-16B



T-2



Douglas World Cruiser



R3C-2

34 ft 7 in, height 12 ft 1 in; Weight—gross 5,010 lb; Armament—3 .30-cal. machine guns; Accommodation—2, in separated, tandem cockpits; Cost—\$21,000.

Performance: Max. speed—122 mph; Range—750 miles; Service ceiling—13,500 ft.

HU-16A/B Albatross

Amphibious aircraft that did yeoman service for nearly thirty years. First flew 10/24/47. Gained fame in Korea, where crews rescued nearly 1,000 United Nations personnel from coastal waters and rivers. Ably performed the same mission in Vietnam until replaced by the Jolly Green Giant helicopter. Also used by USN, USCG, and USMC. Originally designated SA-16 by USAF. Likely the last USAF amphibious aircraft. (Data for HU-16B.)

Contractor/Number built: Grumman Aircraft/464 (total production).

Specifications: Powerplant—2 Wright R-1820-76A or B radials of 1,425 hp each; Dimensions—wingspan 96 ft 8 in, length 62 ft 10 in, height 25 ft 10 in; Weight—gross 37,500 lb; Armament—none; Accommodation—crew of 6, plus up to 20 passengers or 12 litters; Cost—\$510,000.

Performance: Max. speed—250 mph; Range—1,650 miles; Service ceiling—22,000 ft.

Special Duty and Gliders

T-2

First airplane type to fly across the US nonstop. AAS Lts. Oakley G. Kelly and John A. Macready took off from Roosevelt Field, N. Y., on 5/2/23 and landed 26 hours, 50 minutes later at Rockwell Field in San Diego, Calif. Lieutenant Kelly took off and Lieutenant Macready landed the plane. Two earlier, west-east attempts to cross the continent had failed. Aircraft now in National Air and Space Museum.

Contractor/Number built: Fokker Aircraft/9.

Specifications: Powerplant—1 Liberty 12-A in-line of 420 hp; Dimensions—wingspan 79 ft 8 in, length 49 ft 1 in, height 12 ft 7 in; Weight—gross 10,750 lb; Armament—none; Accommodation—2, in connected cockpits (one open, the other enclosed).

Performance: Max. speed—95 mph; Endurance—aircraft set a record of 36 hours and 5 minutes over a 2,518-mile measured course shortly after its transcontinental flight.

Douglas World Cruiser

First aircraft type to fly around the world. Four AAS crews left Seattle, Wash., on 4/6/24, and two of the original aircraft (named *Chicago* and *New Orleans*) returned on 9/28/24. *Seattle* crashed in Alaska, and *Boston* was forced down and sank in the North Atlantic. Both remaining aircraft are now in museums. Design based on DT-2 torpedo bomber.

Contractor/Number built: Douglas Aircraft/4.

Specifications: Powerplant—1 Liberty 12-A in-line of 420 hp; Dimensions—wingspan 50 ft 0 in, length 35 ft 6 in (38 ft 11 in with pontoons), height 13 ft 7 in (15 ft 1 in with pontoons); Weight—gross 7,380 lb (8,180 lb with pontoons); Armament—none; Accommodation—2, in separate, tandem cockpits; Cost—\$192,684 for the four aircraft, plus fifteen spare engines, fourteen sets of replacement pontoons, and 200 percent airframe replacement parts.

Performance: Max. speed—103 mph (100 mph with pontoons); Range—2,200 miles (1,650 miles with pontoons); Service ceiling—10,000 ft (7,000 ft with pontoons).

R3C-1/2

Joint AAS/Navy racing plane designed and built for the 1925 racing season. Lt. Cyrus Bettis won Pulitzer race with a speed of 248.9 mph in R3C-1 (the landplane version). Several weeks later, Lt. Jimmy Doolittle easily won the Schneider Cup race with speed of 232.57 mph in R3C-2 seaplane. Next day, Doolittle set world seaplane record of 245.713 mph. Aircraft is now in National Air and Space Museum. (Data for R3C-2.)

Contractor/Number built: Curtiss Aeroplane & Motor/3.

Specifications: Powerplant—1 Curtiss V-1400 in-line of 610 hp; Dimensions—wingspan 22 ft 0 in, length 19 ft 8 1/2 in, height 9 ft 10 1/2 in; Weight—gross 2,720 lb; Armament—none; Accommodation—pilot only; Cost—\$25,000.

Performance: Max. speed—245.713 mph; Range—290 miles at full throttle.



CG-4A

—Air Force Museum photo

—NASM photo

—Air Force Museum photo

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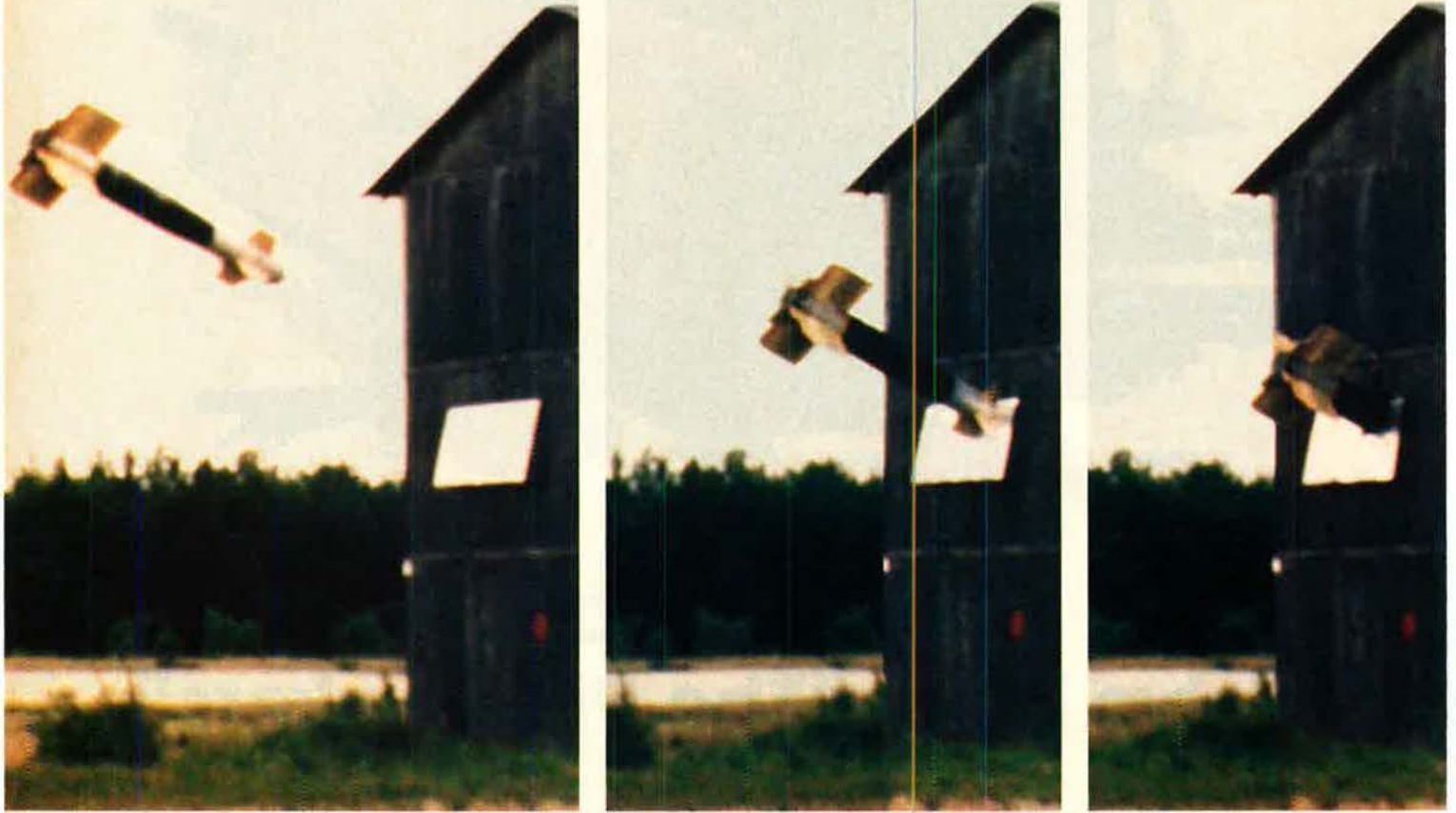
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Actual flight test photo AGM-130, Eglin AFB, Fla.



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AGM-130/GBU-15

CG-4A

Most widely used US troop/cargo glider in World War II. Development work started in 1942. First saw action in invasion of Sicily in 1943. Extensively used in Normandy invasion of 1944. Also used in operations in the CBI. Like all gliders, considered expendable. Towed by a C-46 or C-47. Constructed of fabric-covered wood and metal. Cargo loaded through upward-hinged nose.

Contractor/Number built: Waco-designed, but built by fifteen manufacturers/more than 12,000.

Specifications: Powerplant—none; Dimensions—wingspan 83 ft 8 in, length 48 ft 4 in, height 12 ft 7 in; Weight—gross 7,500 lb; Armament—none; Accommodation—crew of 2, side by side, and 13 troops or up to 500 lb of cargo; Cost—\$24,000.

Performance: Max. tow speed—150 mph.

Experimental

X-1

First aircraft to exceed the speed of sound (761 mph at sea level) in level flight. Originally designated XS-1. Capt. Chuck Yeager flew the airplane to Mach 1.06 on that flight (10/14/47). Rocket engine was started after aircraft was dropped from a B-29. First powered flight 12/9/46. Eight USAF, seven NACA, and three company pilots made 157 flights. Later versions reached Mach 2.44. (Data for X-1.)

Contractor/Number built: Bell Aircraft/3.

Specifications: Powerplant—1 Reaction Motors XLR11-RM-3 rocket of 6,000 lb thrust; Dimensions—wingspan 28 ft 0 in, length 30 ft 11 in, height 10 ft 10 in; Weight—gross 12,250 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—957 mph (Mach 1.45); Range—5 minutes powered duration; Max. altitude—71,902 ft.

X-2

Designed to explore speeds and altitudes far beyond those achieved by the X-1 and its variants. Also designed to investigate aerodynamic heating at high Mach numbers. Program achieved main goals (a speed of Mach 3 and an altitude of nearly 126,000 ft), but was trouble-plagued. Both aircraft were destroyed (one exploded on a ferry mission and the other crashed). First powered flight 11/11/55. Only twenty flights made.

Contractor/Number built: Bell Aircraft/2.

Specifications: Powerplant—1 Curtiss-Wright XLR25-CW-3 two-chambered rocket of 15,000 lb thrust; Dimensions—wingspan 32 ft 3 in, length 37 ft 10 in, height 13 ft 6 in; Weight—gross 24,910 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—2,094 mph (Mach 3.196); Range—10 minutes 55 seconds powered duration; Max. altitude—125,907 ft.

X-3 Stiletto

Designed for sustained high-speed work of up to thirty minutes duration. Took off and landed conventionally. Lackluster engine performance severely limited performance. First flight on 10/20/52 was followed by only twenty-five other USAF/NACA sorties. Much knowledge gained from titanium construction. Many X-3 features appeared on such other aircraft as the F-104.

Contractor/Number built: Douglas Aircraft/1.

Specifications: Powerplant—2 Westinghouse J34-WE-17 turbojets with 3,370 lb thrust each (4,850 lb with afterburner); Dimensions—wingspan 22 ft 8 1/4 in, length 66 ft 9 in, height 12 ft 6 3/4 in; Weight—gross 22,400 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—706 mph; Range—500 miles; Max. altitude—38,000 ft.

X-5

Designed to test the viability of variable-geometry wings. Based on World War II Messerschmitt P.1101. First flew 6/20/51. Made full wing sweep from 20 to 60 degrees on ninth flight. Had vicious tendency to spin. One pilot and aircraft lost when aircraft failed to recover from a spin at 60 degree sweep. Achieved all USAF and NACA program objectives. Total of 149 flights made.

Contractor/Number built: Bell Aircraft/2.

Specifications: Powerplant—1 Allison J35-A-17A non-afterburning turbojet with 4,900 lb thrust; Dimensions—wingspan 32 ft 9 in (wings extended), 22 ft 8 in (wings swept), length 33 ft 4 in, height 12 ft 0 in; Weight—gross 9,875 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—690 mph; Range—500 miles; Max. altitude—50,700 ft.

X-13 Vertijet

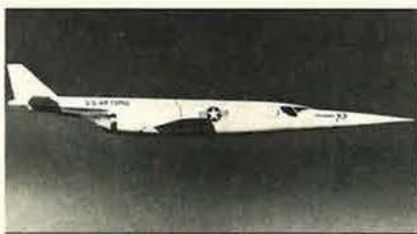
Designed to test the feasibility of a pure jet vertical takeoff and landing (VTOL) aircraft. Made first conventional flight on 12/10/55. Made first full-cycle flight (vertical takeoff from a tail-sitting mode, transition to horizontal flight, vertical landing on launch trailer by nose hook and arresting wire) on 4/11/57. Plans for an intended production fighter were scrapped. Data still used today from this highly successful test program.



X-1



X-2



X-3



X-5

Contractor/Number built: Ryan Aeronautical/2.

Specifications: Powerplant—1 Rolls-Royce Avon RA.28-49 nonafterburning turbojet of 10,000 lb thrust; Dimensions—wingspan 21 ft 0 in, length 24 ft 0 in, height 15 ft 0 in; Weight—gross 7,313 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—483 mph; Range—184 miles; Max. altitude—30,000 ft.

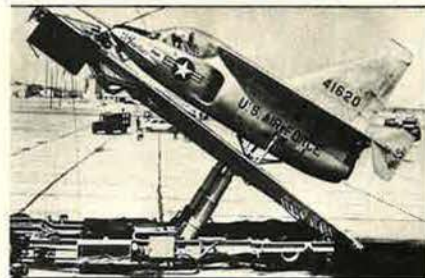
X-15/X-15A-2

One of the most significant aircraft in history. Designed to provide data on materials and human factors during high-speed, high-altitude flight. Eight USAF and NASA pilots made thirteen flights into the lower edges of space and earned astronaut wings. First aircraft to reach Mach 4, 5, and 6. Still holds absolute altitude record for air-launched aircraft (314,750 ft). First powered flight 9/17/59. Made 199 total flights, last on 10/24/68. (Data for X-15.)

Contractor/Number built: North American Aviation/3.

Specifications: Powerplant—1 Reaction Motors XLR99-RM-2 throttleable rocket of 50,000 lb thrust; Dimensions—wingspan 22 ft 5 in, length 50 ft 9 in, height 13 ft 0 in; Weight—gross 38,276 lb; Armament—none; Accommodation—pilot only.

Performance: Max. speed—4,520 mph (unofficial world speed record); Range—approximately 250 miles; Max. altitude—354,200 ft (unofficial world altitude record).



X-13



X-15



X-24B

X-24A/B

Tested the "lifting-body" configuration. Proved flight characteristics of vehicles within the atmosphere from high-altitude supersonic speeds to actual landing. First powered flight (X-24A) 3/19/70. The A model made twenty-eight flights. X-24B was radical redesign of original aircraft. First powered flight of B model 11/15/73. Thirty-six flights made after upgrade. (Data for X-24B.)

Contractor/Number built: Martin Marietta/1.
Specifications: Powerplant—1 Thiokol XLR11-RM-13 rocket of 8,000 lb thrust; Dimensions—wingspan 19 ft 2 in, length 37 ft 6 in, height 10 ft 4 in; Weight—gross 13,800 lb; Armament—none; Accommodation—pilot only.
Performance: Max. speed—1,163 mph; Range—approximately five-minute powered duration; Max. altitude—74,130 ft.

Transports

C-46 Commando

Gained fame flying "the Hump" (the Himalayas) in the CBI during World War II. Could carry more than the C-47 (see below) and had better high-altitude performance, but required much maintenance and had a relatively high loss rate. Used in Korea and later for special operations in Vietnam. Could tow two CG-4A gliders. Still in commercial use, mainly in South America. (Data for C-46D.)

Contractor/Number built: Curtiss-Wright/1,410.
Specifications: Powerplant—2 Pratt & Whitney R-2800-51 Twin Wasps of 2,000 hp each; Dimensions—wingspan 108 ft 0 in, length 76 ft 4 in, height 21 ft 9 in; Weight—gross 51,000 lb; Armament—none; Accommodation—crew of 4, plus 50 passengers or 33 litters or 12,000 lb of cargo; Cost—\$233,000.
Performance: Max. speed—245 mph; Range—1,200 miles; Service ceiling—27,600 ft.

C-47 Skytrain

One of the most important aircraft of all time. This military version of the DC-3, was used for almost everything—carrying cargo, troop transport, glider towing (one version of the C-47 was a glider), seaplane, flareship, ground attack (AC-47), electronic surveillance, and psychological-warfare operations, to name several uses. First ordered in September 1940. Served through three wars (and played a critical role in the Berlin Airlift). Last C-47 in active USAF service was retired in June 1975. Was (and still is) used by many other air arms. One of the longest production runs in history—10,047 aircraft. (Data for C-47A.)

Contractor/Number built: Douglas Aircraft/6,218.
Specifications: Powerplant—2 Pratt & Whitney



C-46



C-47



C-54



C-69



C-124

R-1830-92 Twin Wasp radials of 1,200 hp each; Dimensions—wingspan 95 ft 6 in, length 63 ft 9 in, height 17 ft 0 in; Weight—gross 31,000 lb; Armament—(AC-47 only) 3 fixed, side-firing 7.62-mm Miniguns; Accommodation—crew of 3, plus 28 troops or 14 litters or 6,000 lb of cargo; Cost—\$138,000.

Performance: Max. speed—230 mph; Range—3,800 miles; Service ceiling—24,000 ft.

C-54 Skymaster

Heavy-lift, long-range transport. Saw service in World War II, Berlin Airlift, and Korea. Military version of DC-4. First flew 2/14/42. A C-54 nicknamed "Sacred Cow" was used to take President Franklin D. Roosevelt to Yalta in 1945. Used to transport occupation troops into Japan. Made a record run of 31 hours and 25 minutes between Tokyo and Washington, D. C., with films of the Japanese surrender. (Data for C-54D.)

Contractor/Number built: Douglas Aircraft/380.
Specifications: Powerplant—4 Pratt & Whitney R-2000-11 Twin Wasps of 1,350 hp each; Dimensions—wingspan 117 ft 6 in, length 93 ft 10 in, height 27 ft 6 in; Weight—gross 73,000 lb; Armament—none; Accommodation—crew of 4, 50 troops or 32,500 lb of cargo; Cost—\$534,945.
Performance: Max. speed—275 mph; Range—3,500 miles; Service ceiling—30,000 ft.

C-69/C-121 Constellation

A pre-World War II Model 49 commercial Constellation. Only 20 aircraft were delivered. Last plane Orville Wright flew. C-121 was a variant of postwar Models 749 and 1049. Early C-121s mainly used for executive transport (including President Dwight Eisenhower). Later models modified for electronic surveillance and airborne early warning. C-69 first flew in 1943. Last EC-121 retired in mid-1970s. (Data for EC-121D.)

Contractor/Number built: Lockheed Aircraft/72.
Specifications: Powerplant—4 Wright R-3350-91 turbo-compound radials of 3,400 hp each; Dimensions—wingspan 123 ft 5 in, length 116 ft 2 in, height 27 ft 0 in; Weight—143,600 lb; Armament—none; Accommodation—crew of 3 to 5, plus multiple radar operators and 12,000 lb of radar gear; Cost—\$2,031,000.
Performance: Max. speed—290 mph; Range—4,000 miles; Service ceiling—18,000 ft.

**C-74 Globemaster I/
C-124A/C Globemaster II**

Conceived as first true transoceanic transport. Did not fly until 1945. Only 14 delivered. However, wings and tail surfaces added to a new fuselage became the C-124. C-124 first flew in 1949. Served in Korea and Vietnam. Had clamshell loading doors in nose. Only transport until C-133 that could carry most Army equipment. Nicknamed "Old Shaky." (Data for C-124C.)

Contractor/Number built: Douglas Aircraft/243.
Specifications: Powerplant—4 Pratt & Whitney R-4360-63A radials of 3,800 hp each; Dimensions—wingspan 174 ft 1 1/2 in, length 130 ft 5 in, height 48 ft 3 1/2 in; Weight—gross 194,500 lb; Armament—none; Accommodation—crew of 5, plus 200 troops or 123 litters or 74,000 lb of cargo; Cost—\$1,646,000.
Performance: Max. speed—304 mph; Range—6,820 miles; Service ceiling—21,800 ft.

C/KC-97 Stratofreighter

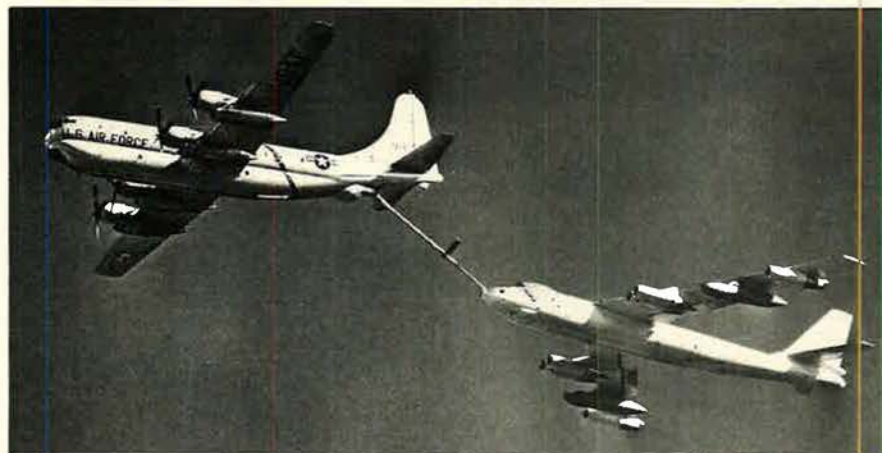
Cargo/transport version of B-29 made (in essence) by putting one fuselage on top of another. KC-97 first flew in 1950. Introduced boom concept to USAF air refueling. Eventually became USAF's largest-ever tanker fleet—816 aircraft. Gradually gave way to KC-135 after 1956. ANG KC-97s had two jet engines added so the aircraft could keep up with modern jets. Last Air Guard KC-97 retired in late 1970s. (Data for KC-97L.)

Contractor/Number built: Boeing Airplane/82.
Specifications: Powerplant—4 Pratt & Whitney R-4360-59B radials of 3,800 hp each and 2 General Electric J47-GE-25A turbojets of 5,970 lb thrust each; Dimensions—wingspan 141 ft 3 in, length 117 ft 5 in (with boom retracted), height 38 ft 4 in; Weight—gross 175,000 lb; Armament—none; Accommodation—crew of 5; Cost—\$1,205,000.
Performance: Max. speed—375 mph; Range—4,300 miles; Service ceiling—35,000 ft.

C-118A/B Liftmaster

Military version of DC-6. First flew in 1949. The 29th commercial example built became President Harry Truman's executive transport (VC-118) and was used until 1952. Gained fame during Operation Safe Haven, during which more than 14,000 Hungarian refugees were airlifted to the US during 1956-57. Also used by USN, which transferred 64 aircraft to USAF. Popular today for aerial firefighting. (Data for C-118A.)

Contractor/Number built: Douglas Aircraft/101.
Specifications: Powerplant—4 Pratt & Whitney R-2800-52W radials of 2,500 hp each; Dimensions—wingspan 117 ft 6 in, length 105 ft 7 in, height 29 ft 1 in; Weight—



KC-97 refueling B-47

Q

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MOTOROLA

The story of the "Cherokee Rose."

On November 19, 1988, KC-135R crews from Altus, Grand Forks, McConnell and Robins Air Force Bases all gathered at Robins to make some aviation history.

The previous evening, anticipating success, the aircraft commander's wife painted the final touches of a proud emblem—the state flower of Georgia—on the nose of the chosen aircraft.

Going for broke.

By 0400 Hours the next day, the "Cherokee Rose" was ready to go. The target: 16 time-to-climb records in four different weight categories.

The first was for an aircraft a little over 300,000 pounds in the 100-150,000 kg category. With the extra power of its four F108 (CFM56) engines, the aircraft was off the ground in 7,000 feet. Ten minutes and 14.80 seconds later, the Cherokee Rose and the crew from McConnell had nailed the new time-to-climb record for 12,000 meters. Along the way, they also broke records at two other altitudes.

Next came the crew from Grand Forks, competing in the 80-100,000 kg category. The result: four time-to-climb records.

Next, the crew from Altus in the 60-80,000 kg category. Again four new records.

Finally the crew from Robins in the 45-60,000 kg class. Here, the aircraft virtually jumped off the ground at 2,000 feet. And again the Cherokee Rose came through, this time with five time-to-climb records.

Credit where credit is due.

The story behind the story is the outstanding performance of the F108 engine. But the names that will properly go into the history books are the Cherokee Rose and the flight and support crews who made it happen.

What a tribute to the enhanced mission capabilities of the re-engined tanker fleet and the entire United States Air Force!

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CHEROKEE ROSE ART BY RUTH BLISSON.

gross 107,000 lb; Armament—none; Accommodation—crew of 5, plus 76 troops or 25,500 lb of cargo; Cost—\$1,180,000.

Performance: Max. speed—370 mph; Range—5,000 miles; Service ceiling—31,200 ft.



C-118

C-119 Flying Boxcar

Unique twin-boom transport allowed for rear loading. First flew in 1947. Saw extensive use in Korea for troop transport. Converted to gunship (AC-119G Shadow and AC-119K Stinger) in Vietnam because tactical airlift requirements prevented conversion of more C-130s. On 8/19/60, a C-119J was used to make the world's first midair recovery of a space data capsule parachuting down after reentry. (Data for C-119G.)

Contractor/Number built: Fairchild Hiller/480.

Specifications: Powerplant—2 Wright R-3350-89 radials of 3,500 hp each; Dimensions—wingspan 109 ft 3 in, length 86 ft 6 in, height 27 ft 6 in; Weight—gross 72,700 lb; Armament—(AC-119K only) 2 20-mm and 4 7.62-mm multibarrel cannon; Accommodation—crew of 6, 62 troops or 26,000 lb of cargo; Cost—\$590,000.

Performance: Max. speed—250 mph; Range—2,280 miles; Service ceiling—22,300 ft.



C-119

C-123 Provider

Utilitarian transport that began life as a glider. First flew in September 1954. Later versions had podded jet engines added under the wing for better performance. Gained notoriety during Vietnam War when it was the primary defoliant sprayship during Operation Ranch Hand. Also used by Gen. William Westmoreland as executive transport in Vietnam. Ski-equipped versions used by ANG in Alaska until 1979. (Data for C-123K.)

Contractor/Number built: Fairchild Hiller/183.

Specifications: Powerplant—2 Pratt & Whitney R-2800-99W radials of 2,500 hp each and 2 General Electric J85-GE-17 turbojet engines with 2,850 lb of thrust each; Dimensions—wingspan 110 ft 0 in, length 76 ft 4 in, height 34 ft 6 in; Weight—gross 60,000 lb; Armament—usually none; Accommodation—crew of 3 or 4, plus 58 troops or 50 litters or 21,000 lb of cargo; Cost—\$601,719.

Performance: Max. speed—228 mph; Range—1,035 miles; Service ceiling—25,000 ft.



Ranch Hand C-123

Trainers

JN-4 "Jenny"

First trainer procured in quantity. Ordered in large numbers after US entered World War I. Used until the mid-1920s. First flew in July 1916. Mainly for primary training, but a number were equipped with machine guns and bomb racks for advanced training. After the war, hundreds were sold on the civilian market and used by barnstormers. (Data for JN-4D.)

Contractor/Number built: Curtiss Aeroplane & Motor primarily/3,495 from several manufacturers.



—Air Force Museum photo

JN-4D "Jenny"



AT-6



C-45



BT-13

Specifications: Powerplant—1 Curtiss OX-5 of 90 hp; Dimensions—wingspan 43 ft 7 in, length 27 ft 4 in, height 9 ft 10 in; Weight—gross 1,920 lb; Armament—usually none; Accommodation—2, in separated, tandem cockpits; Cost—\$5,465.

Performance: Max. speed 75 mph; Endurance—2.5 hours; Service ceiling—6,500 ft.

AT-6 Texan

The final stop for nearly all aviation cadets going on to fighters in World War II. Exposed students to high-performance aircraft with retractable landing gear. First flew in 1937. Also used by USN and more than thirty other countries. Production totaled 15,495. Many were remanufactured in 1948-49 and redesignated T-6G. Used for forward air control duties in Korean War. (Data for T-6G.)

Contractor/Number built: North American Aviation/2,068.

Specifications: Powerplant—1 Pratt & Whitney R-1340-AN1 of 550 hp; Dimensions—wingspan 42 ft 0 1/4 in, length 29 ft 6 in, height 10 ft 10 in; Weight—gross 5,617 lb; Armament—none (except for smoke rockets); Accommodation—2, in tandem; Cost—\$27,000 (for AT-6).

Performance: Max. speed—210 mph; Range—870 miles; Service ceiling—24,750 ft.

AT-7 Navigator/AT-11 Kansas/C-45 Expediter/F-2

Military versions of the popular Model 18. In all versions, 4,526 of these aircraft were procured during World War II. AT-7 was for navigator training. AT-11 featured glass nose, Norden bombsight, and bomb bay for training bombardiers. F-2 was mapping and photoreconnaissance version. C-45 used for utility transport and some advanced training. Many remanufactured after the war. Used until 1963. (Data for C-45H.)

Contractor/Number built: Beech Aircraft/432.

Specifications: Powerplant—2 Pratt & Whitney R-985-AN14B radials of 450 hp each; Dimensions—wingspan 47 ft 8 in, length 34 ft 2 in, height 9 ft 2 in; Weight—gross 9,300 lb; Armament—none; Accommodation—crew of 2, side by side, and 6 passengers; Cost—\$57,838.

Performance: Max. speed—219 mph; Range—1,140 miles; Service ceiling—18,200.

BT-13A/B Valiant

After learning to fly, most aviation cadets moved to the BT-13 and were exposed to things like radio procedures, landing flaps, and variable-pitch propellers. First flew 2/18/40. Canopy had tendency to rattle, hence unofficial



Displayed are: EAP (Experimental Aircraft Programme) – forerunner of the new European Fighter Aircraft, Harrier II GR.5 (advanced V/STOL fighter), Sea Harrier FRS2, Hawk 100 (advanced jet trainer/strike aircraft), Hawk 200 (single-seat fighter), Tornado ADV x 2 (Air Defence Variant), Tornado IDS (Interdictor Strike); Active Sky Flash, Boosted

Sea Eagle, Sea Skua, Seawolf, ALARM air launched weapons; Merlin, Swingfire and TRIGAT anti-tank weapons; Sea Urchin and VEMS underwater systems; British Aerospace Systems and Equipment products (BASE); Rapier, Laserfire and Rapier 2000 surface-to-air defence systems; Royal Ordnance 105mm light gun, 30mm Rarden gun, 81mm Mortar,



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PT-19

nickname of "Vibrator." Also used by the Navy as SNV. Only difference between BT-13A and BT-13B was that B model had a 24-volt electrical system.

Contractor/Number built: Vultee Aircraft/7,832.

Specifications: Powerplant—1 Pratt & Whitney R-985-AN1 radial of 450 hp; Dimensions—wingspan 42 ft 2 in, length 28 ft 10 in, height 12 ft 4 in; Weight—4,498 lb; Armament—none; Accommodation—2, in tandem.

Performance: Max. speed—155 mph; Range—1,000 miles; Service ceiling—21,000 ft.

PT-1 Trusty

Primary trainer of the 1920s. First aircraft procured in large numbers after World War I. Had welded fuselage framework of steel tubing for greater structural strength. Was so sturdy and easy to fly, it bred overconfidence in students. Picked to replace JN-4 in primary trainer role after a 1924 competition. Used until the 1930s. Developed from the Dayton-Wright TW-3 aircraft.

Contractor/Number built: Consolidated Aircraft/221.

Specifications: Powerplant—1 Wright "E" of 180 hp; Dimensions—wingspan 34 ft 9½ in, length 27 ft 8 in, height 9 ft 6 in; Weight—gross 2,550 lb; Armament—none; Accommodation—2, in separate, tandem cockpits; Cost—\$8,000.

Performance: Max. speed 99 mph; Range—310 miles; Service ceiling—13,450 ft.

PT-13/PT-17/PT-18/PT-27 Kaydet

Type replaced the PT-1. Started many thousands of aviation cadets on their way to silver and gold wings during World War II. PT-17, PT-18, and PT-27 were PT-13 design with higher-performance engines. The last biplane bought in quantity by USAAF and its predecessors. Also used by USN. Several hundred still flying today as sport or crop-dusting aircraft. (Data for PT-13D.)

Contractor/Number built: Stearman Aircraft/1,108.

Specifications: Powerplant—1 Lycoming R-680-17 radial of 220 hp; Dimensions—wingspan 32 ft 2 in, length 24 ft 10 in, height 9 ft 2 in; Weight—gross 2,717 lb; Armament—none; Accommodation—2, in separate, tandem cockpits; Cost—\$11,000.

Performance: Max. speed—125 mph; Range—450 miles; Service ceiling—14,000 ft.

PT-19/PT-23/PT-26 Cornell

First monoplane primary trainer bought in large numbers. Production of the Ranger engine for the PT-19 lagged



PT-17



PT-1



XO-60

behind airframe output in 1942, so a Continental radial was fitted, and the aircraft was designated PT-23. PT-26 was PT-19 with enclosed cockpit. Also used by Canada, Norway (forces then in exile), and Brazil. First ordered in 1940. Some in use with USAF as late as 1948. (Data for PT-19A.)

Contractor/Number built: Fairchild Aircraft/3,658.

Specifications: Powerplant—1 Ranger L-440-3 in-line of 200 hp; Dimensions—wingspan 35 ft 11 in, length 27 ft 8 in, height 7 ft 9 in; Weight—gross 2,450 lb; Armament—none; Accommodation—2, in separate, tandem cockpits; Cost—\$7,140.

Performance: Max. speed—125 mph; Range—430 miles; Service ceiling—16,000 ft.

T-28A/D Trojan

Designed as a successor to the AT-6. First flight on 9/24/49. First USAF trainer to have tricycle landing gear and a steerable nosewheel. In production until 1957. USN used higher-powered B and C models. In 1962, Air Force started modifying aircraft for counterinsurgency missions in Vietnam. Modified aircraft were designated T-28D and called Nomad. Used through mid-1960s. (Data for T-28A.)

Contractor/Number built: North American Aviation/1,194.

Specifications: Powerplant—1 Wright R-1300-1 radial of 800 hp; Dimensions—wingspan 40 ft 7 in, length 32 ft 10 in, height 12 ft 8 in; Weight—gross 8,118 lb; Armament—(T-28D only) two podded .50-cal. machine guns and up to 1,800 lb of rockets and bombs; Accommodation—2, in tandem; Cost—\$123,000.

Performance: Max. speed—283 mph; Range—1,000 miles; Service ceiling—25,200 ft.

Helicopters

XO-60

Observation autogyro was AAF's first rotary-wing aircraft. Capable of near-vertical takeoffs and landings. Enclosed cockpit glazing bulged so crew could look down over fuselage sides. Accepted by USAAF in 1943.

Contractor/Number built: Kellett Autogyro/7.

Specifications: Powerplant—1 Jacobs R-915-3 radial of 300 hp; Dimensions—rotor diameter 40 ft, length 28 ft 10 in, height 10 ft 2 in; Weight—gross 2,540 lb; Armament—none; Accommodation—2, in tandem.

Performance: Max. speed—127 mph; Range—360 miles (approx.); Service ceiling—14,000 ft.

R-4 Hoverfly

First helicopter designed specifically for military use. First US helicopter mass-produced. XR-4 first flew 1/13/42. First flown in combat May 1944. Also used by USN, USCG, and RAF.

Contractor/Number built: Sikorsky Aircraft/131 in all versions.

Specifications: Powerplant—1 Warner R-550-3 Super Scarab radial of 200 hp; Dimensions—rotor diameter 38 ft, length 33 ft 11½ in, height 12 ft 5 in; Weight—gross 2,540 lb; Armament—none; Accommodation—crew of 2, side by side.

Performance: Max. speed—75 mph; Range—130 miles; Service ceiling—8,000 ft.

H-13 Sioux

One of the most extensively used helicopters in history (USAF, USA, USN, USMC, and thirty-one foreign countries).



T-28



H-13



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More than 6,000 built between 1945 and 1973. Gained fame in Korea, where it was used by Army and Navy for casualty evacuation. Three principal USAF versions (UH-13H/J, OH-13K). On 7/13/57, President Dwight Eisenhower (in UH-13J) became the first Chief Executive to fly in a helicopter. (Data for UH-13J.)

Contractor/Number built: Bell Aircraft/2.

Specifications: Powerplant—1 Lycoming VO-540-B1B piston of 260 hp; Dimensions—rotor diameter 37 ft 1 1/2 in, length 32 ft 4 3/4 in, height 9 ft 4 in; Weight—gross 2,850 lb; Armament—none; Accommodation—1 pilot and 3 passengers; Cost—\$65,000.

Performance: Max. speed—105 mph; Range—300 miles; Service ceiling—17,000 ft.

CH-21A/B Workhorse

Could be considered USAF's first heavy-lift helicopter. Originally designed for troop and cargo transport. Later used for rescue and combat assault. First flew 4/11/52. Many USAF CH-21s used for Arctic rescue. Also used by US Army and five foreign countries. Modified Army CH-21 made first nonstop transcontinental helicopter flight on 8/24/56. (Data for CH-21B.)

Contractor/Number built: Piasecki Helicopter (later Vertol Aircraft)/163.

Specifications: Powerplant—1 Wright 12-1820-103 radial of 1,425 hp; Dimensions—rotor diameter 44 ft, length 52 ft 7 in, height 15 ft 4 in; Weight—gross 15,000 lb; Armament—none; Accommodation—crew of 2, side by side, plus 20 troops or 12 litter patients or cargo; Cost—\$406,000.

Performance: Max. speed—132 mph; Range—400 miles; Service ceiling—9,450 ft.



CH-21

HH-43 Huskie

Unusual, intermeshing, counterrotating rotors were the trademark of this design. Initially used in Southeast Asia for base crash rescue. Later armed and used for combat rescue (HH-43F). With the advent of the Jolly Green Giant, Huskies returned to base crash rescue. Rotor downwash actually helped suppress fires. Also used by USN, USMC, and six foreign countries. First flew 9/27/56. (Data for HH-43B.)

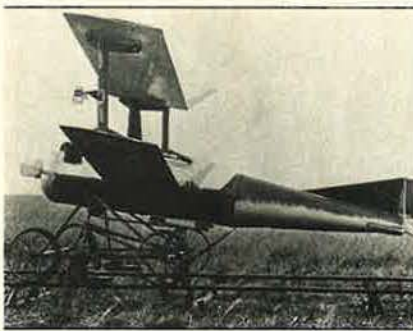
Contractor/Number built: Kaman Aircraft/193.

Specifications: Powerplant—1 Lycoming T53-L-2B turboshaft of 825 shp; Dimensions—rotor diameter 47 ft, length 25 ft 2 in, height 15 ft 6 1/2 in; Weight—gross 9,150 lb; Armament—usually none; Accommodation—crew of 2, side by side, and 2 firefighters or medical personnel, up to 10 troops inside or 3,880 pounds of externally slung cargo.

Performance: Max. speed—130 mph; Range—235 miles; Service ceiling—25,000 ft.



HH-43



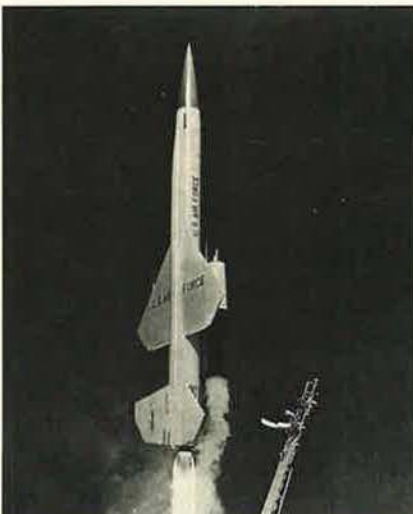
Kettering Aerial Torpedo



Matador



Snark



BOMARC

Strategic, Tactical, and Airborne Missiles

Kettering Aerial Torpedo

World's first guided missile and a precursor to today's cruise missiles. Took off from a dolly running on a track. At a predetermined time, engine would shut off, wings would separate, and missile would dive into target. Testing in 1918 was successful, but World War I ended before "Bug" (as it was nicknamed) could be used in combat.

Contractor/Number built: Dayton-Wright Airplane/approximately 50.

Specifications: Powerplant—1 DePalma 4-cylinder of 40 hp; Dimensions—wingspan 14 ft 1 1/2 in, length 12 ft 6 in, height 4 ft 8 in; Weight—530 lb at launch; Warhead—180 lb high explosive.

Performance: Max. speed—120 mph; Range—75 miles.

TM-61 Matador

First USAF operational tactical guided missile. Originally designated B-61, as it performed the same function as a bomber. Development work began in 1946. First launch 1/20/49. First deployment to Europe in 1954. By 1955, four squadrons were based in West Germany. Deactivated 1959.

Contractor: Glenn L. Martin Co.

Specifications: Powerplant—1 Allison J33-A-37 turbojet of 5,200 lb thrust, plus 1 solid-fuel rocket for zero launch; Dimensions—wingspan 28 ft 8 in, length 39 ft 7 in, height 10 ft 0 in; Weight—13,800 lb at launch; Warhead—1 W-5 nuclear or 3,000 lb high explosive.

Performance: Max. speed—650 mph (higher during terminal dive); Range—690 miles; Max. altitude—40,000 + ft.

SM-62A Snark

First (and only) USAF air-breathing intercontinental guided missile. Flew a preprogrammed flight path that was updated by celestial guidance system. When first proposed in 1946, Snark was to have six turbojets powered by a nuclear reactor. First unit activated in 1958 at Presque Isle AFB, Me. Withdrawn in early 1960s when ballistic missiles proved more practical and considerably more accurate.

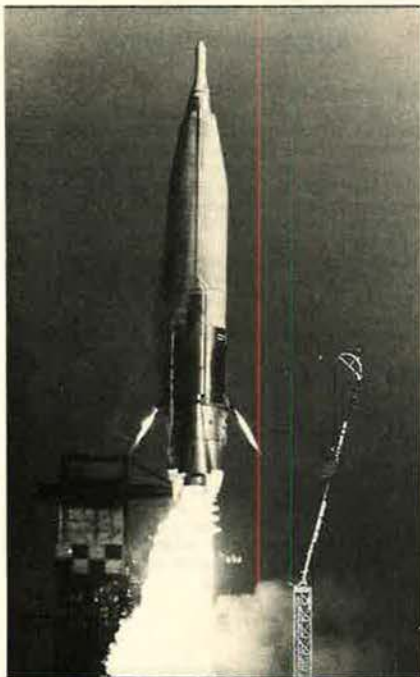
Contractor/Number built: Northrop Aircraft/30 operational.

Specifications: Powerplant—1 Pratt & Whitney J57 turbojet of 11,000 lb thrust, plus 2 solid-fuel rocket boosters for zero launch of 130,000 lb thrust each; Dimensions—wingspan 42 ft, length 67 ft, height 15 ft; Weight—59,936 lb at launch; Warhead—1 W-39 nuclear.

Performance: Max. speed—650 mph (higher during terminal dive); Range—6,325 miles; Max. altitude—60,000 + ft.

CIM-10A/B BOMARC

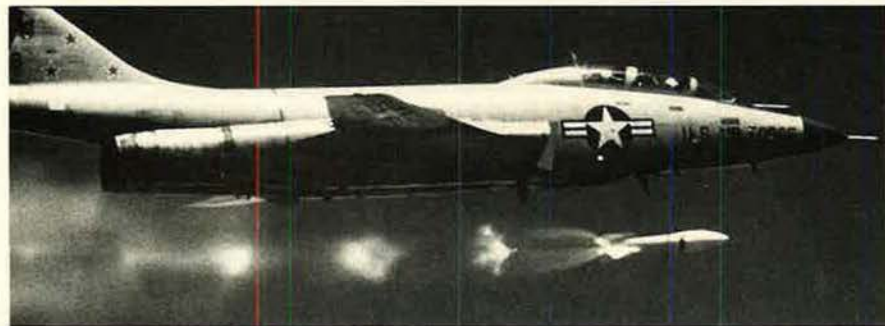
Surface-launched, winged, area defense missile, guided from ground until near target when internal seeker took over. First launched 2/24/55. The A model became operational in 1960. B model operational in 1961. Deployed to six US and two Canadian sites. Missile phased out of inventory by 1972. (Data for CIM-10B.)



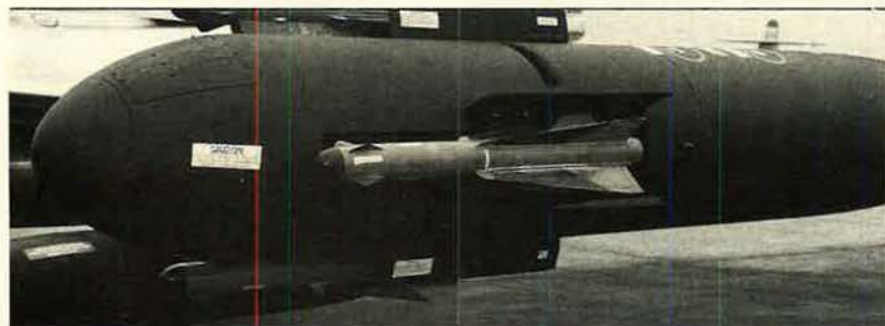
Atlas



Titan I



Genie and F-101



AIM-4 Falcon on F-89H



AGM-28A Hound Dog

Contractor/Number built: Boeing Airplane/188 operational.

Specifications: Propulsion—1 Thiokol rocket of 50,000 lb thrust, plus 2 Marquardt ramjets of 12,000 lb thrust each for supersonic cruise; Dimensions—wingspan 18 ft 2 in, length 45 ft 0 in; Weight—16,000 lb at launch; Warhead—1 W-40 nuclear.

Performance: Max. speed—2,500 mph; Range—440 miles; Max. altitude—80,000 ft.

HGM-16 Atlas

Free world's first intercontinental ballistic missile. Flight test began in 1957. Declared operational in 1959. Stood alert for five years. Found greater fame as an unmanned booster. USMC Col. John Glenn made first US orbital space mission (2/20/62) with help from an Atlas. Remaining Mercury missions also used Atlas. Launched Ranger, Surveyor, and Mariner interplanetary probes. Later, redesigned versions still in use as satellite booster. (Data for HGM-16F.)

Contractor/Number built: Convair Astronautics/126 operational ICBMs.

Specifications: Propulsion—2 Rocketdyne LR105-NA liquid-fuel rockets of 165,000 lb thrust each, plus 1 Rocketdyne LR89-NA-3 liquid-fuel rocket sustainer of 57,000 lb thrust. Also two small vernier rockets for attitude control; Dimensions—length 81 ft 7 in, diameter 10 ft 0 in; Weight—269,000 lb at launch; Warhead—1 W-49 nuclear; Cost—\$1,700,000.

Performance: Max. speed—16,000+ mph; Range—6,800 miles; Max. altitude—640 miles.

LGM-25A Titan I/LGM-25C Titan II

Titan I was first ICBM placed in hardened silos. First Titan I launch 2/6/59. Phased out in favor of Titan II by 1965. Titan II on alert until 1987. Titan II first ICBM to have mixed male-female launch crews. Nine-megaton-yield warhead was largest ever in USAF inventory. Used as booster for Gemini manned space missions. Derivatives still in use as satellite boosters. (Data for LGM-25C.)

Contractor/Number built: Martin Marietta/54 deployed.

Specifications: Propulsion—1 Aerojet General LR87 liquid-fuel rocket of 430,000 lb thrust (first stage), 1 Aerojet General LR91 liquid-fuel rocket of 100,000 lb thrust (second stage), plus vernier rockets for attitude control; Dimensions—length 103 ft 0 in, diameter 10 ft 0 in, Weight—330,000 lb at launch; Warhead—1 W-53 nuclear; Cost (Titan I)—\$1,502,000.

Performance: Max. speed—15,112 mph; Range—6,300 miles; Max. altitude (Titan I)—620 miles.

AIR-2A Genie

First (and only) USAF nuclear-tipped, unguided, air-intercept rocket. On 7/19/57, Genie was launched from an F-89J and became first air-to-air rocket used in a live-fire test. Armed in the air. Directed to target by Hughes radar. In production until 1962. In service until 1985. Primarily used on F-106s. Lethal radius of more than 1,000 ft.

Contractor/Number built: Douglas Aircraft/several thousand.

Specifications: Propulsion—1 Thiokol SR49-TC-1 solid-fuel rocket of 36,000 lb thrust; Dimensions—length 9 ft 7 in, diameter 1 ft 5½ in, fin span 3 ft 3½ in; Weight—820 lb at launch; Warhead—1 W-25 nuclear.

Performance: Max. speed—2,511 mph; Range—6.2 miles.

AIM-4 Falcon

First guided air-to-air missile to enter service. Development work began in 1947. Reached initial operational capability with Air Defense Command in 1956. Early models had radar homing guidance. Later versions had infrared homing. Super Falcon (AIM-4F/G) introduced in 1960 with higher performance and reduced susceptibility to enemy countermeasures. Went out of USAF inventory in 1988 with last of the F-106s. (Data for AIM-4G.)

Contractor/Number built: Hughes Aircraft/2,700 (total production approximately 45,000).

Specifications: Propulsion—Thiokol M46 2-stage solid rocket (first stage of 6,000 lb thrust); Dimensions—length 6 ft 9 in, diameter 6½ in, fin span 2 ft 0 in; Weight—145 lb at launch; Warhead—40 lb high explosive.

Performance: Max. speed—1,675 mph; Range—7 miles.

AGM-28A/B Hound Dog

Air-breathing, nuclear, defense-suppression missile. Two each carried underwing by B-52s. Could be launched and flown at low altitudes. Hound Dog engine could be started to shorten B-52's takeoff roll. Operational in 1959. Phased out mid- to late 1960s. One of the largest air-to-surface missiles ever built. (Data for AGM-28B.)

Contractor: North American Aviation.

Specifications: Powerplant—1 Pratt & Whitney J52-P-3 turbojet of 7,500 lb thrust; Dimensions—wingspan 12 ft 2 in; length 42 ft 6 in; height 9 ft 3 in; Weight—9,600 lb at launch; Warhead—1 W-28 nuclear.

Performance: Max. speed—1,200 mph; Range—700 miles; Max. altitude—52,000+ ft.

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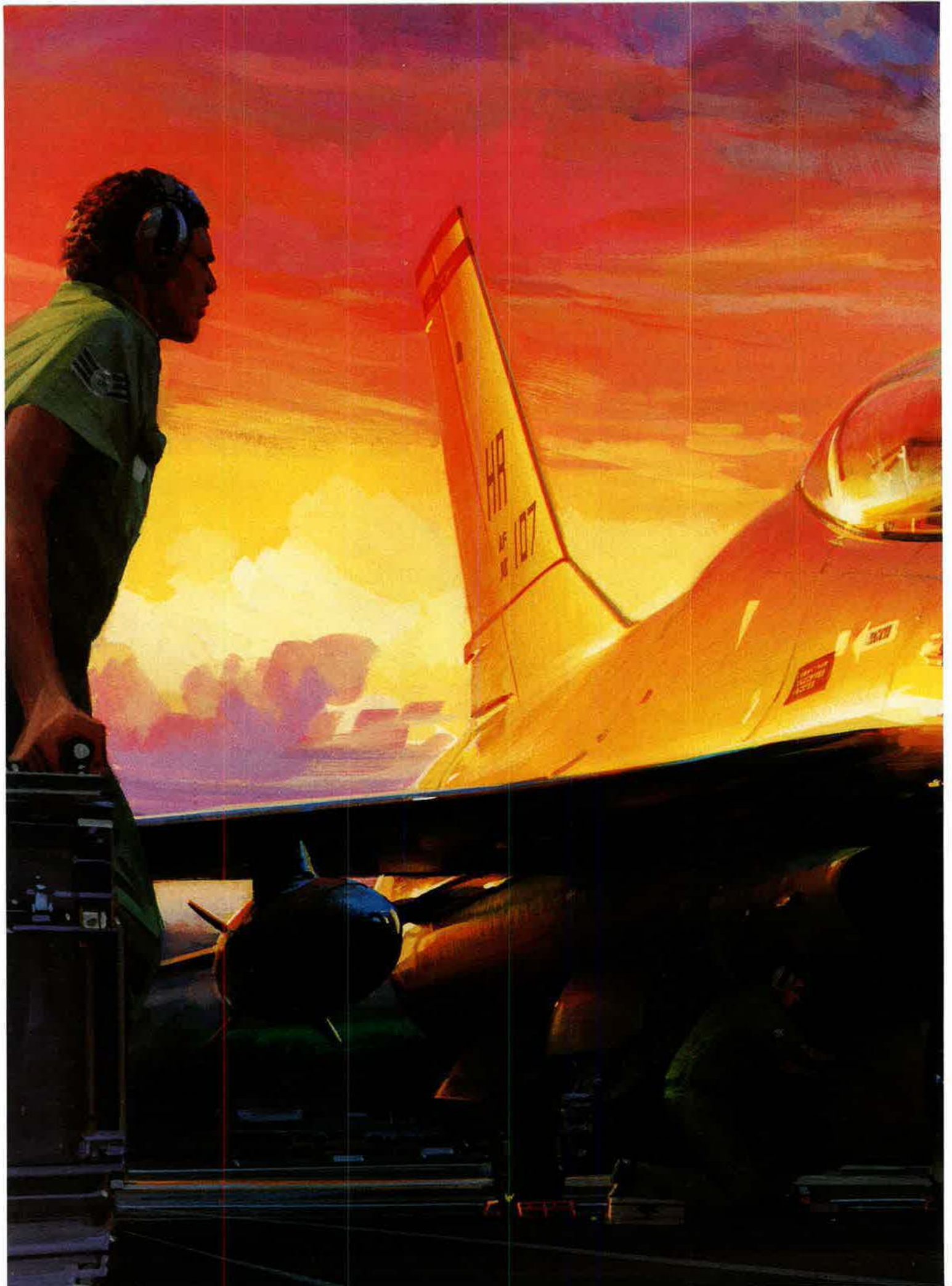
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AFA salutes the outstanding squadron of the Air Force Academy.

THE BARNSTORMERS

BY JAMES A. McDONNELL, JR.

AFA CHIEF, PROGRAMS
AND MILITARY RELATIONS

THE 23d Squadron, known as the Barnstormers, was the focus of attention when AFA extended its annual salute to the Outstanding Squadron of the United States Air Force Academy.

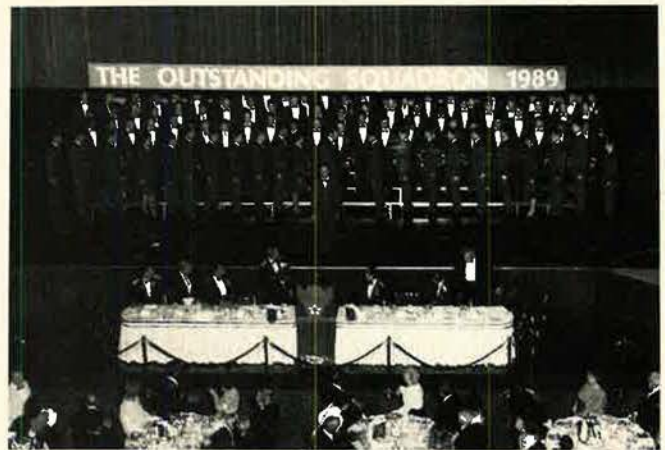
The black-tie celebration, held in Colorado Springs last May, was attended by some 600 squadron supporters and marked the thirtieth time the event has taken place. Cadet Spring Squadron Commander Michael J. Bauer, accepting the award on behalf of the unit, noted that teamwork was exemplified by the squadron and was the foundation for its success.

"We had our intramural stars, our academic scholars, and our military paragons," said Bauer, "but it was not the individual standout who was responsible for our win. It was the teamwork of the squadron that enabled us to be the Outstanding Squadron."

The teamwork, in fact, began at the officer level. For the first time, the Air Officer Commanding (AOC) of the winning squadron was an Army exchange officer, Maj. Ronald H. Alexander. The Squadron Training Officer was a United Kingdom Squadron Leader exchange officer. The Associate AOC was an Air Force Pilot.

Though most trophies awarded during graduation week are for a single accomplishment, the AFA trophy is different. It goes to the unit that excels generally in academics, athletics, and military duties. The Outstanding Squadron Trophy, presented by AFA President Jack C. Price, recognized the 23d for its impressive record in all of these areas.

The squadron was singled out for being first in military proficiency. Several of its members were selected for Group and Wing staff. Others in the unit racked up a va-



Some 600 supporters attended the thirtieth annual AFA salute to the USAF Academy's Outstanding Squadron. This year's winner, the 23d Squadron, was ranked first in military proficiency and boasts numerous individual honors as well.

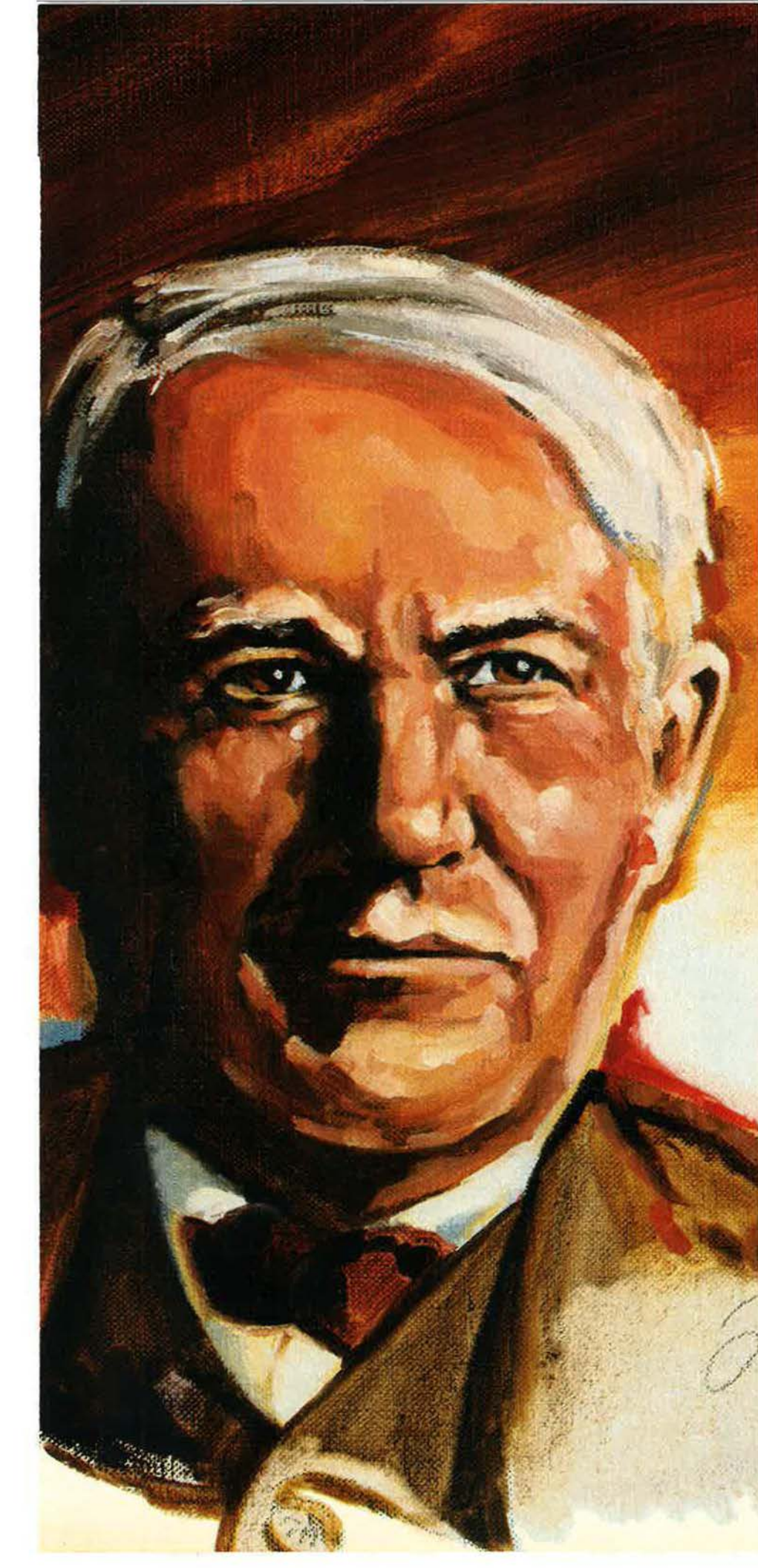
riety of individual honors. Two of its graduates were selected for Euro-NATO Joint Jet Pilot Training, an honor won by few student pilots.

In addition, this squadron was the leader in intramural athletic competition for the second straight year, fielding three championship teams in 1988-89. It was home of the captains of the USAFA varsity tennis and pistol teams.

AFA and community leaders joined in the salute, which is cosponsored by AFA's Colorado Springs/Lance Sijan Chapter, headed by President Frank R. Wisneski.

The master of ceremonies—traditionally a returning member of a past Outstanding Squadron—was Col. Will Stackhouse. He is Assistant for High-Leverage Technology at the Space Systems Division of Systems Command and an Outstanding Squadron Graduate of the 1964 USAFA class.

The Academy Superintendent, Lt. Gen. Charles R. Hamm, also addressed the dinner, as did Lt. Gen. Robert C. Oaks, Commander of Air Training Command. Mr. Price told the cadets: "I know that this is an evening that you will long remember, even after you've forgotten what we do here tonight. But even more so will you—and the Air Force—benefit from the dedication and character you displayed in getting here tonight." ■



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Everything about the B-24 was big—
including the production run.

The Grand Old Liberator

BY COLLEEN A. NASH, ASSOCIATE EDITOR

ON Armed Forces Day 1989, hundreds lined up in the scorching north Texas heat at Carswell AFB. They were awaiting a turn to look inside the Confederate Air Force's *Diamond Lil*, one of only three flyable B-24 Liberators or variants still in existence.

For some, it was an emotional moment. One visitor, a former inmate of a Nazi prisoner-of-war camp during World War II, was especially moved. "He hadn't seen a Liberator since the war," explained CAF member David Liebenson. "When it was his turn to climb aboard, he couldn't help but cry."

Such scenes were common at the festivities, held in May, celebrating the fiftieth anniversary of the B-24 bomber, one of the most famous airplanes of all time. More than 5,000 people flocked to Fort Worth for the first phase of Liberator-related reunions. Part two of the bomber bash will take place September 20–24 in San Diego, Calif.

Bob Vickers, national chairman of the celebration, described the event as a tribute not only to the aircraft but also to the more than 1,000,000 men and women who

built, supported, or flew B-24s in the war years.

The prototype XB-24, developed by Consolidated Aircraft Corp., made its first flight from Lindbergh Field, San Diego, Calif., on December 29, 1939. Soon thousands of workers were building the bomber at plants across the nation—at Consolidated in California and Texas, North American Aviation in Texas, Ford Motor Co. in Michigan, and Douglas Aircraft Co. in Oklahoma.

Between 1942 and 1945, some 3,000 standard B-24s and variants rolled off the mile-long assembly line at Consolidated's Fort Worth plant, which is now the Fort Worth Division of General Dynamics. Peak production saw deliveries of 175 aircraft per month.

Today, however, only a handful remain. CAF pilot David Hughes, working with copilot Harold Smith and flight engineer Sam Manganson, flew *Diamond Lil* to Fort Worth from its home in Harlingen, Tex. An LB-30B, *Diamond Lil* was among a number of B-24As that were to be diverted from the Army Air Corps to the Royal Air Force. The plane never made it to England.

To help with the restoration, send your tax-deductible donation to: Collings Foundation, Box 248, Stow, MA 01775.



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Now we are helping to build one more. By making a grant to help restore one of our original B-24s to its original condition. Soon a B-24 Liberator, which first flew in the Pacific, will fly again, this time in air shows around the USA.

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Diamond Lil was converted to transport use and served as an executive plane during the war.

Those Special Engines

Among participants at the anniversary event was Fort Worth AFA Chapter official Bob Copley. Although he has flown many different bombers, the B-24 is still his favor-

more than 4,000 enemy aircraft during World War II.

It was the B-24's range—up to 3,200 miles—that helped the US and its allies extend their reach around the globe and perform a multitude of critical missions. It had a maximum takeoff weight of 65,000 pounds and could carry more than 8,000 pounds of bombs.

his B-25s were the first American bombers to strike Japan," noted General Smith, "so were the Liberators the first American heavy bombers to attack a European target."

In the second raid on Ploesti, 177 B-24s from two Ninth Air Force B-24 groups and three groups on loan from Eighth Air Force flew out of the Libyan desert on August 1, 1943. It was the first large-scale, low-level strike by heavy bombers against a well-defended target. Despite a disrupted plan of attack, the raid was essential to this country, recalls Medal of Honor recipient Gen. Leon W. Johnson, USAF (Ret.), who commanded the 44th Bomb Group in that raid.

Nearly fifty B-24 reunion groups took part in the anniversary activities in Texas. The participants included two Navy contingents. (The Navy flew B-24s for antisubmarine patrol and other maritime duties. The Navy called its B-24s PB4Ys.) Among the highlights was a memorial tribute, including a special flyby of *Diamond Lil* and *Delectable Doris* (a privately owned B-24J).

One popular exhibit was a fully operating B-24 nose turret, presented by E. R. "Pony" Maples of Nashville, Tenn. Mr. Maples said that the most interesting person who visited his exhibit was an elderly woman who, with no guidance whatsoever, got into the turret, fired it up, and ran it perfectly. When she was eighteen years old, she explained, her husband, a bomb group commander, sneaked her on several flights at night and taught her how to operate the equipment.

Another exhibitor at Fort Worth, Bob Collings, has been restoring a B-24J with the help of General Dynamics, a major corporate sponsor, and other history buffs. The newly restored bomber, dubbed the *All American*, rolled out in July and began to prepare for a first flight. It becomes the third still-flying Liberator in the world.

Capt. Dave Martin, a B-52 pilot with the 9th Bomb Squadron at Carswell, examined the interior of *Delectable Doris* while it was on display at the base. After he had ducked along the narrow catwalk in the bomb bay and examined the cockpit controls, Captain Martin said that he was simply "in awe." ■



Confederate Air Force's *Diamond Lil*, one of only three B-24s still flying, cruises over Fort Worth, Tex., with one of its newest cousins, an F-16C. Some 3,000 standard Liberators and variants were built by Consolidated Aircraft Corp., later General Dynamics, which produces the *Fighting Falcon* today.

ite. What made it so special? "Engines!" says Mr. Copley. "Every man you ask will say the same thing."

The Liberator came equipped with four Pratt & Whitney R-1830 radial engines, each generating 1,200 horsepower. The aircraft boasted a top speed of 300 miles per hour and a cruising speed of about 200 mph.

Retired USAF Maj. Gen. Ramsay D. Potts, former Eighth Air Force bomb group commander and one of five panelists at a special B-24 symposium, maintained that the B-17 was a better high-altitude bomber. Even so, he noted, "it took better pilots to fly the B-24."

Everything about the bomber was big—especially its production run. More than 18,000 B-24s—a greater number than any other warplane in US history—were produced for the war effort.

According to General Dynamics, B-24s flew 312,734 sorties, dropped 634,831 tons of bombs, and downed

Lt. Gen. Carl R. Smith, Assistant Vice Chief of Staff of the Air Force, pointed out that B-24 operations "stretched from the US to Europe and North Africa, across the China-Burma-India 'hump' to the Pacific theater and Alaska.

"Liberators attacked ground targets of every kind. They sank surface ships, hunted and destroyed submarines, flew airlift missions, and rotated ferry crews between Europe and the States." B-24s carried out missions ranging from fuel-hauling to weather flights and naval reconnaissance.

Raids on Ploesti

Among the most famous B-24 missions being recalled in Fort Worth were two raids on enemy oil refineries located at Ploesti, Romania.

The first attack, carried out in June 1942 by thirteen US Liberators, paralleled Gen. Jimmy Doolittle's B-25 bomber raid on Tokyo two months earlier. "Just as

Sixty years ago this month, Jimmy Doolittle took off under a hood and flew solo on instruments alone.

FLYING BLIND

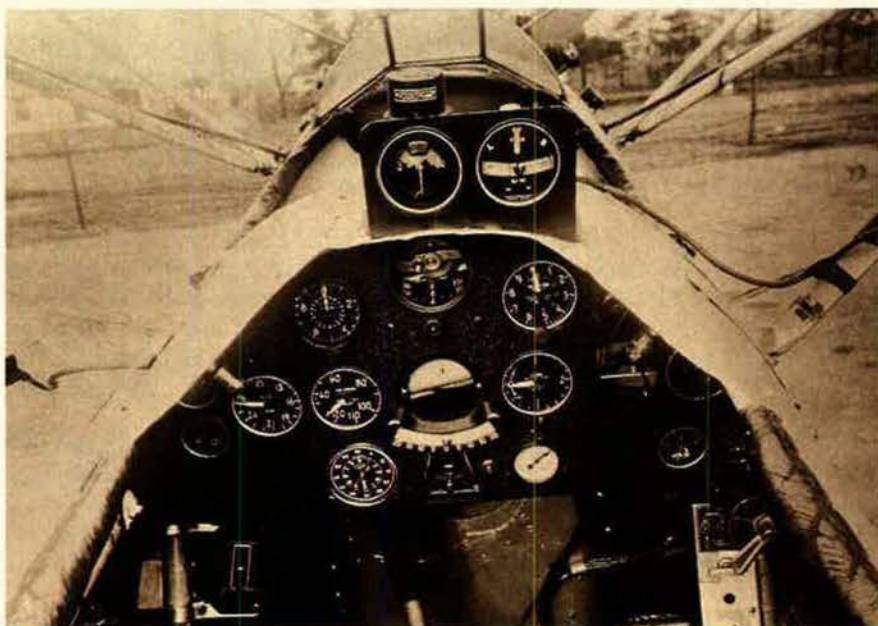
BY C. V. GLINES

THERE are two outstanding and truly significant dates in aerospace history: December 17, 1903, when the Wright brothers proved controlled flight was possible in a heavier-than-air machine, and July 20, 1969, when Neil Armstrong and Buzz Aldrin walked on the moon.

Another date between those two should be remembered for its significance to aerospace progress: September 24, 1929. That was the day Lt. James H. "Jimmy" Doolittle made the first complete flight from takeoff to landing solely by the use of instruments and radio.

Up to that time, scheduled air travel had been stymied because of man's own limitations—susceptibility to vertigo or a false sense of motion. Humans are unable to fly "blind" in the clouds for any length of time, although many tried, convinced that they were so gifted they could fly through any kind of weather "by the seat of their pants." Their contempt for bad weather led to many deaths as aviation went through its gestation period.

The inability of pilots to fly in bad weather meant that the airplane would never be able to compete



This photo of the Consolidated NY-2 trainer's cockpit shows several of the instruments Lt. Jimmy Doolittle used in blind-flight experiments. An artificial horizon and directional gyroscope (center of instrument panel) and a sensitive altimeter proved the right combination for directional control.

with ground transportation. Many thought the problems of blind flight would never be solved.

In the mid-1920s, gyro instruments and more accurate altimeters were being tested, a few pilots were being trained in instrument flying, and air navigation using low-frequency radio ranges was being investigated. An enlightened few

thought that if aircraft instruments could be perfected and married with the burgeoning radio arts of the day, perhaps the mysteries of aircraft flight in bad weather could be solved.

The Full Flight Laboratory

One of those progressive thinkers was Daniel Guggenheim, wealthy

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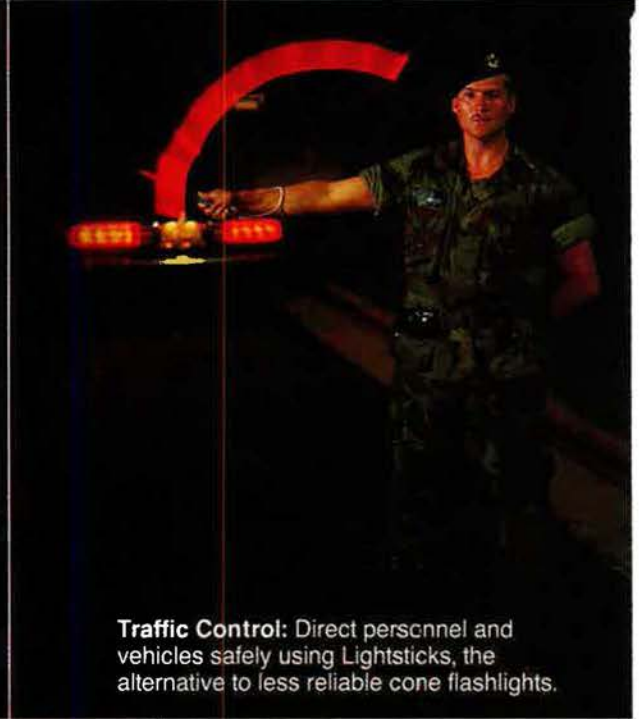
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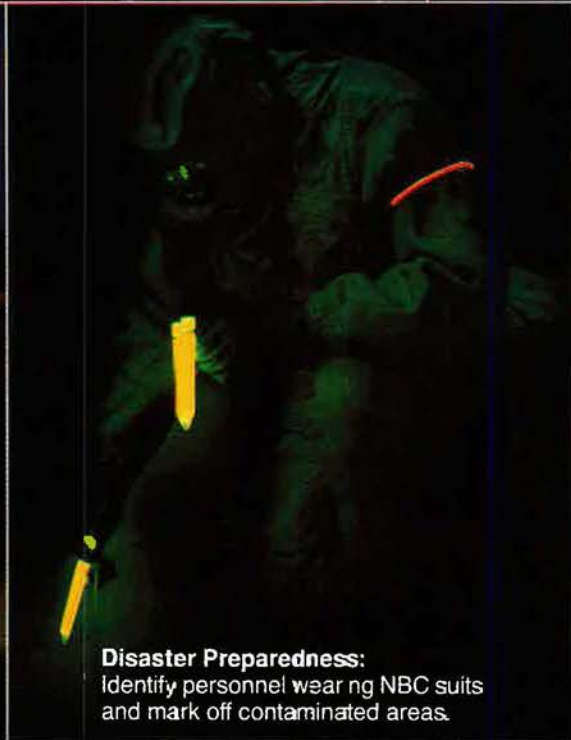
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industrialist and philanthropist, who established the Fund for the Promotion of Aeronautics in 1926. To carry out one aspect of Guggenheim's program, the Full Flight Laboratory was established at Mitchel Field, N. Y. Jimmy Doolittle was borrowed from the Air Corps to share direction of the Laboratory with Prof. William G. Brown of MIT.

Many experiments in blind landing under foggy conditions that had been previously conducted in England and France were studied: tethered balloons lined up with the landing runway to lead planes in, an electrified cable system, and the dragging of weights behind planes. Experiments with sonic and radio altimeters and various fog-dispersal methods were tried. None of these worked.

The Laboratory purchased two aircraft: a Consolidated NY-2 training plane, noted for its ruggedness, and a Navy Vought Corsair O2U-1 for cross-country flying. Several kinds of test instruments were installed on the NY-2, but the Sperry artificial horizon and directional gyroscope proved to be the right combination for directional control, along with the sensitive Kollsman altimeter. Doolittle, with Lt. Ben Kelsey along as safety pilot, made more than a hundred blind flights and landings under the hood.

"To make a landing," Doolittle explains, "the plane was put into a glide at sixty mph, with some power on, and flown directly into the ground. The landing gear absorbed the shock, and if the angle of glide was just right, the airplane didn't even bounce."

During the radio phase of the tests, it was decided that, while aural nulls (periods of silence) over a station were satisfactory for rough aerial navigation, a visual indicator in the cockpit would give the pilot the precise directional control needed during the final phase of blind landings. A pair of vibrating reeds connected to the radio set worked best. Doolittle explains:

"If the pilot was to the right of the radio beam, the left reed vibrated more vigorously and vice versa. If on course, both reeds vibrated through the same arc. As the plane approached the radio station, the amplitude of vibration increased. A



Lieutenant Doolittle prepares for a test flight (note different instruments from those in the preceding picture). To cut off all visual cues other than those provided by instruments, a hood (shown here rolled down) was fitted over the cockpit. Lt. Benjamin S. Kelsey occupied the front cockpit as a safety pilot.

single reed started to vibrate as the fan-type marker beacon was approached. It reached maximum amplitude, quickly dropped to zero when the plane was directly overhead, rapidly built up to maximum again, and then tapered down as the plane pulled away. The homing range indicator also had a distinct null in the headset when the plane was directly over the range station."

Flying Through the Fog

On the morning of September 24, 1929, thick fog engulfed Mitchel Field, and Doolittle decided to make an actual instrument flight—alone. The ground radios were manned and the radio beacons turned on. Doolittle taxied out and took off. "Came through the fog at about 500 feet," he recalls, "and made a wide swing coming around into landing position. By the time I landed ten minutes later, the fog had just started to lift."

Doolittle had wanted Guggenheim to witness the flight in actual weather, but hadn't waited because he was afraid the fog would disperse. When Guggenheim arrived, Doolittle wanted to make another

solo flight under the hood to prove it could be done, but Guggenheim insisted that Ben Kelsey go along as safety pilot. Doolittle made the circuit using the instrument landing procedure he had developed. Kelsey flew with his hands held high in the slipstream so all could see he was not doing the flying.

"However, despite all my previous practice," says Doolittle, with an embarrassed grin, "the approach and landing were sloppy. So far as I know," he adds modestly, disregarding his many hooded practice flights, "this was the first time an airplane had been taken off, flown over a set course, and landed by instruments alone."

This landmark flying feat by the "master of the calculated risk" marked the beginning of a new era for aviation. On Sunday, September 24, 1989, the sixtieth anniversary of that flight, a sculpture of Doolittle will be unveiled near the Jimmy Doolittle Hangar at the former Aircraft Radio Corp.'s airfield at Boonton, N. J., where Doolittle consulted many times with ARC's experts during the Full Flight Laboratory experiments. ■

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 "Mama Joe's Tablecloth" in the August '89 issue.

Does the Constitution's militia clause entitle a state to keep units at home when it disapproves of a federal training deployment?

The Guard and the Governors

BY BRUCE JACOBS

If a governor disapproves of an overseas National Guard training deployment, can he prevent his state's Guard units from participating? Or must he yield to the priorities established by the Defense Department?

That question has preoccupied the Guard and governors alike throughout three years of intense political and legal conflict. The stakes in this battle are high. The issue, as it was recently put by Maj. Gen. Philip G. Killey, Director of the Air National Guard, is nothing less than "the credibility of the National Guard."

Congress and the Pentagon have been trying to deal with the state role in decisions about Guard training for a number of years. In 1986, Congress passed a law calling for Washington to have the final say over deployment of National Guard troops for training outside the US.

That, however, was not the end of the matter. Two states—Minnesota and Massachusetts—challenged the federal law in court, seeking to overturn it. Massachusetts has lost its case outright, with the US Supreme Court last April refusing to hear an

appeal from the First Circuit Court of Appeals in Boston. A broader suit brought by Minnesota, however, was still pending as of late summer. Even though the Eighth Circuit Court of Appeals in June ruled against Minnesota and in favor of the federal government, the Supreme Court has yet to issue a definitive ruling. Unless and until it does, say experts, the matter will remain unresolved.

The controversy over control of the National Guard stems from the so-called militia clause of the Constitution. It calls for the federal government to organize, arm, and discipline Guard members and employ them in service to the US. Authority to train Guard members, however, is reserved for the states.

Training in Central America

The issue emerged during 1985–86. The first instance was the refusal of California to send a small (company-size) armored task force to an exercise in Honduras. The mission was shifted to Texas, where Gov. Mark White agreed to deploy Texas National Guard members to Honduras. As the US Southern Com-

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mand increased opportunities for participation by the Guard in road-building and humanitarian training missions, a number of governors expressed opposition.

Arizona Gov. Bruce Babbitt then stated his opposition to having the Arizona National Guard train in Honduras because the training, in his view, was "part and parcel of a policy" to draw the United States into the war in Nicaragua. But he did not restrain the deployment of an Arizona Army Guard military police company—and even approved an extension for the unit. Vermont Gov. Madeleine Kunin claimed that sending the Guard to Honduras was "a show of force" and "a backdoor escalation of US military action." The governors of Kansas, Washington, Ohio, and Massachusetts also issued statements reflecting concern for the safety of personnel who might be assigned for training in Central America.

When Gov. Joseph E. Brennan of Maine actually refused to send a detachment of forty-five Guard members early in 1986, the issue became a real one.

Governor Brennan's actions and the other governors' words raised concern in Washington. At an April 22, 1986, congressional hearing, Rep. Bill Chappell of Florida asked James Webb, the Assistant Secretary of Defense for Reserve Affairs, if he was concerned about the new assertiveness of the governors. Mr. Webb responded that "present policy" permitted Guard activities to be manipulated at the local level and that options were being considered to either remedy the situation or review the missions being given to the Guard.

Under a provision of the Armed Forces Reserve Act of 1952, governors had the authority to approve or turn down training outside the continental United States. For thirty-three years, this approval had been routinely granted when requested. Now, however, the arrangement seemed to be in danger.

A Plan to Curb the Governors?

Speculation was widespread that the Pentagon wanted new legislation to curb the ability of governors to influence where members of the National Guard might train. Even

so, Secretary of Defense Caspar Weinberger claimed that the Pentagon had no plan to seek new legislation. He promised that DoD would conduct "a careful, thorough, methodical, and orderly review." He also noted that, "contrary to reports by the media, [Mr. Webb] did not recommend that remedial legislation."

The arguments focused not on training, but on whether the Guard could be counted by the nation's leaders as a reliable mobilization entity.

In mid-June, however, Republican Sens. Phil Gramm of Texas and Pete Wilson of California cosponsored new and far more stringent legislation. In language proposed for inclusion in the Fiscal 1987 Defense Authorization Bill, they sought to amend the existing law in a crucial way: All Guardsmen sent to train outside the US were to be placed in federal active-duty status.

Guard annual training had been routinely held under Title 32, which puts the Guard in federal status but retains it under state control. Guard members in Title 32 status, for example, do not count against the ac-

tive service strength. With the Guard in full federal status, a governor's okay would not be needed. The senators' proposal suggested outright elimination of the need for gubernatorial consent.

The proposal failed to generate immediate support in the Manpower and Personnel Subcommittee, which Wilson chaired at the time. The issue was deemed too critical—or, perhaps, too sensitive—to be acted on without further review and hearings.

Such a hearing was held on July 15. It turned out to be a bleak day for the reputation of the National Guard. The Guard found itself assailed by witnesses who challenged its credibility as a partner in the total force. The arguments focused not on training, but on whether the Guard could be counted by the nation's leaders as a reliable mobilization entity.

The centerpiece of the hearing was the unveiling of an argument that the militia clause of the Constitution had been superseded by the army clause. The latter empowers Congress to raise armies. The argument was made that, because the 1933 National Defense Act had created the component known as "National Guard of the United States," this was now the prevailing legal authority. Thus, this argument ran, the militia clause no longer had any serious effect with respect to control of the Guard.

The Montgomery Amendment

In light of all these factors, Rep. G. V. "Sonny" Montgomery (D-Miss.) came to the conclusion that a simple fix could be devised. His objectives were to ensure that the Guard would continue to train in accordance with Army and Air Force readiness requirements and to accomplish this goal within the framework of the militia clause of the Constitution.

In late summer 1986, Representative Montgomery proposed a measure, later known as the "Montgomery Amendment," which sharply defined a limitation on the veto authority of the governors. His proposal was aimed at prohibiting any gubernatorial objection to overseas training based on objection to location or purpose of the training. It passed both chambers.

There was considerable consternation in statehouses around the nation. Confusion and frustration were evident at the annual meeting of the National Governors' Association in Hilton Head, S. C., in the waning days of August. Hanging over all was the suspicion that a move was under way to take peacetime command of the National Guard away from the governors.

The operative portion of the Montgomery Amendment reads thus: "The consent of a Governor . . . may not be withheld . . . with regard to active duty outside the United States, its territories, and its possessions, because of any objection to the location, purpose, type, or schedule of such active duty."

A Challenge in Federal Court

The measure was signed into law in October 1986. However, the idea that passage of the Montgomery Amendment had put the basic issue to bed was soon dispelled. Opposition came right away from Minnesota Gov. Rudy Perpich.

Minnesota's Attorney General, Hubert H. Humphrey III, advised his governor on December 17, 1986, that he believed that "a challenge to the law in the federal court is probably the only manner in which its validity can be finally resolved." Governor Perpich contacted fellow governors to test support for an assault by Minnesota on the Montgomery Amendment. In a letter to Gov. Bill Clinton of Arkansas, he suggested that the governors act as a group in challenging the new federal law. Despite Governor Perpich's suggestions, there were few takers at the time.

Governor Perpich filed his lawsuit against the Department of Defense, the services, and the National Guard Bureau on January 22, 1987, in Minnesota federal court. The date for a trial on the merits was set for June 15 in St. Paul. In late May, Iowa and Massachusetts took the lead in proclaiming that twelve more states had joined Minnesota's legal action.

Neutral observers studied with astonishment the list of states in support of Governor Perpich. Listed as joining the suit were Maine, Massachusetts, Rhode Island, Iowa, Vermont, Arkansas, Colorado, Ohio, Delaware, Kansas, Loui-

siana, and Hawaii. A little investigation, however, showed that some state attorneys general had acted prematurely and that, in a few cases, governors had not even been consulted. A number of governors acted quickly to withdraw their states from the Perpich action. When the dust settled, the hard-core support for Governor Perpich

Hanging over all was the suspicion that a move was under way to take peacetime command of the National Guard away from the governors.

came down to only five states: Massachusetts, Maine, Vermont, Ohio, and Colorado. At the same time, twenty-three governors rallied behind a brief, filed by the National Guard Association of the US, supporting the new law.

Following arguments in US District Court in St. Paul, US District Judge Donald Alsop issued his decision on August 3, 1987. He dismissed the Perpich case in its entirety. The Montgomery Amendment, he held, easily passed constitutional muster.

Crucial Timing

The timing of the decision was

extremely important. At the time, many in Congress had begun to doubt the constitutionality of the Montgomery Amendment. Some questioned whether it was possible to enforce the law, even if it were constitutional. Senators had begun considering legislation that would restore full authority to the governors, but make it possible for the President to send National Guard troops overseas for training if he could certify that it was in the national interest. This putative plan of action, however, was abandoned.

Undeterred, Minnesota moved quickly to file its motion in appeal and requested an expedited hearing. This was granted, and the Eighth US Circuit Court of Appeals put the matter on the docket for hearing on February 9, 1988. The "expedited hearing" took place before a three-judge panel in the St. Paul Court, and the judges took the matter under advisement.

Meanwhile, the situation was made more complex by the actions of a Democrat then little-known outside of Massachusetts—Gov. Michael Dukakis. Governor Dukakis's evident anxiety about the lack of legal progress in Minnesota caused him to take direct legal action against Washington to prevent a thirteen-member Guard unit from deploying to Central America.

Just before the hearing in St. Paul, Massachusetts Attorney General James M. Shannon filed suit in US District Court in Boston. He stated that the Governor wanted to block the forthcoming training mission of the 65th Public Affairs Detachment, Massachusetts Army National Guard, to Central America. Shannon further noted that, "in the event that other Massachusetts National Guard units are called to active duty for training in Central America, the Governor intends to withhold consent if he objects to the location, purpose, type or schedule of such training."

To get a decision in his case, Governor Dukakis would not have to wait as long as Governor Perpich. Less than one month after arguments were heard on April 9, 1988, US District Judge Robert Keeton announced his ruling: The Montgomery Amendment was valid, and Governor Dukakis could not block the deployment.

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The judge wrote: "The Militia Clause retains meaning and purpose both (a) as it limits congressional power over the militia when it is not on active duty as a part of the army and (b) as it enables Congress to exercise more sparingly its broad army power. This blend of limiting and enabling functions serves the framers' intent that Congress have the power to provide for the defense of the nation while maintaining only a small standing army. The Montgomery Amendment is a valid exercise of Congress's power under the Armies Clause and does not violate the Militia Clause."

Governor Dukakis, though by that time busy with presidential campaigning, had his attorney general file an appeal. By the time the appeal was heard, the 65th Public Affairs Detachment had long since completed its training mission in Central America, but the underlying issue remained alive. On October 4, the First US Circuit Court of Appeals in Boston announced that appellate justices had voted unanimously to uphold Judge Keeton's trial-court ruling.

Heading for the Supreme Court

With opponents of the Montgomery Amendment being routed repeatedly in courtrooms, it seemed that the issue would speedily be resolved. This, however, was not to be. Matters were thrown into disarray with the decision, on December 6, 1988, of another federal appeals court. A three-judge panel of the Eighth US Circuit Court of Appeals, headed by US District Judge Gerald Heaney, announced its decision in the Perpich case. By a two-to-one vote, the panel backed the Minnesota governor against the new law.

The appellate court's reversal of the decision by Judge Alsop confronted the Guard with contradictory results in two different jurisdictions. This might lead to a drawn-out battle that would almost inevitably have to find its way to the Supreme Court.

Government attorneys moved quickly for a rehearing before the full appellate court, with all justices participating in the decision. Meanwhile, in Boston, Massachusetts Attorney General Shannon sought to get his governor's views before

the US Supreme Court with a writ of *certiorari* asking the high court to review the ruling by the First Circuit Court.

With the two legal cases proceeding on these two different tracks, the issue of training the National Guard outside the continental US dragged on into a third year of controversy. On February 16, a panel of

Guard members believe that this dispute could have, and should have, been resolved without recourse to the bitter public debate that ensued.

nine judges of the Eighth Circuit Court convened in St. Paul and listened intently to the arguments. Again there would be long months of silence from the St. Paul courtroom.

The first signs of a definitive judgment in the matter came this past spring. On April 16, 1989, the Supreme Court announced its decision not to disturb the findings of other courts in the Massachusetts case.

The Supreme Court, though it did not issue an opinion of its own, simply chose not to review Governor Dukakis's defeat. This was a blow to advocates of the Dukakis-Perpich position.

Another Setback

Then, on June 28, they suffered another major courtroom setback. From St. Louis, headquarters of the Eighth Circuit Court, came the announcement that the full appeals panel had voted seven to two to overturn the three-judge panel's decision and thus had restored the judgment of Judge Alsop. Once more, a court in the Minnesota case held that the states' authority to train their militias did not inhibit the power of Congress to provide for active-duty training of the National Guard of the United States.

Minnesota officials, after the decision, held open the possibility of carrying their case all the way to the Supreme Court, where it would be likely to receive a full review. Whether there will be a further challenge is uncertain. Even if Minnesota chooses not to take this step, the matter seems certain to remain a significant legal issue until the high court issues a definitive ruling.

In the main, Guard members believe that this dispute could have, and should have, been resolved without recourse to the bitter public debate that ensued. Events made it impossible for the system to fix itself, and so the need arose for a legislative measure such as the one embodied in the Montgomery Amendment.

With the ruling on the Minnesota case, it appears that the dispute is ending. The author of the amendment, Representative Montgomery, had this comment on the events:

"I hope this ruling will get the National Guard out of the courtroom and back to the business of training. Having the ability to go overseas will allow the Guard the chance to offer its personnel the best training available, so it can continue to maintain the highest possible level of readiness." ■

Maj. Gen. Bruce Jacobs, NGUS (Ret.), is Executive Director of the Historical Society of the Militia and the National Guard and Assistant Executive Director of the National Guard Association. He is the publisher of National Guard Magazine and the author of a number of books. The views expressed in this article are not necessarily those of the National Guard Association.

Did the Wright brothers really get their idea of wing-warping from the birds?

The Critical Twist

BY BRUCE D. CALLANDER

WHAT did they know, and when did they know it?

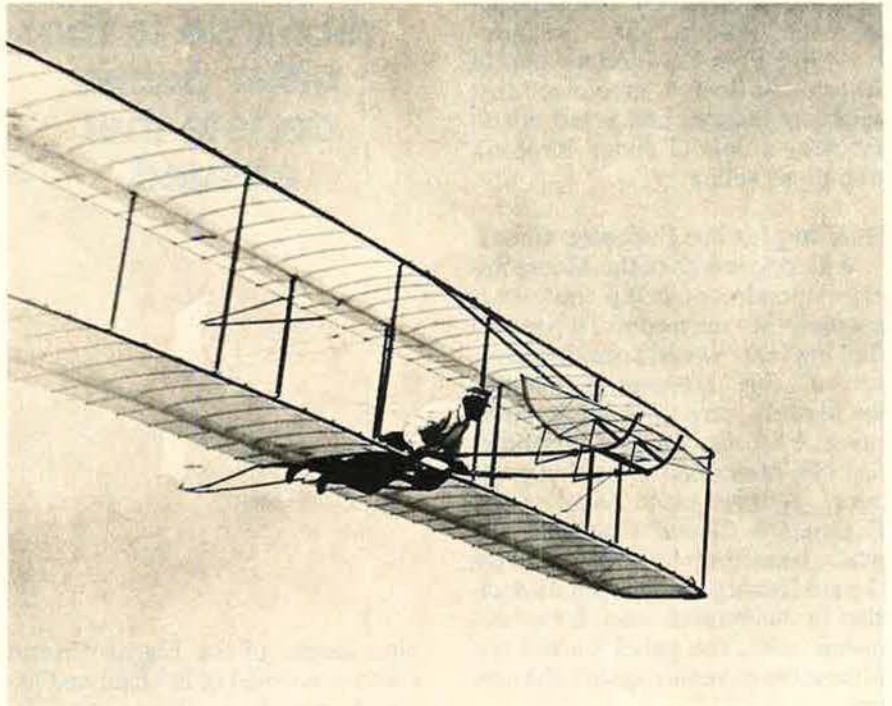
Long before Watergate made this question trendy, it was being asked of the two Ohio brothers now acclaimed as the fathers of aviation. The burden of answering it may have hastened the death of one. It dogged the other for life.

The issue arose in 1909. The venue was a patent suit. The defendant, plane-builder Glenn Curtiss, had been hauled into court by Orville and Wilbur Wright, the Ohioans who six years earlier had invented the airplane.

Or had they?

Curtiss provided cause for doubt. He charged that the "secret" of the Wrights' invention was, in fact, nothing more than a basic aeronautic principle. Worse, he alleged that it had been discovered years before the Wrights embarked on serious aviation careers.

It was a sensational charge, one that did not die there. The claim haunted the brothers through a long series of lawsuits waged at home and abroad. Time and again, they were pressed to prove their paternity of the idea at the core of their

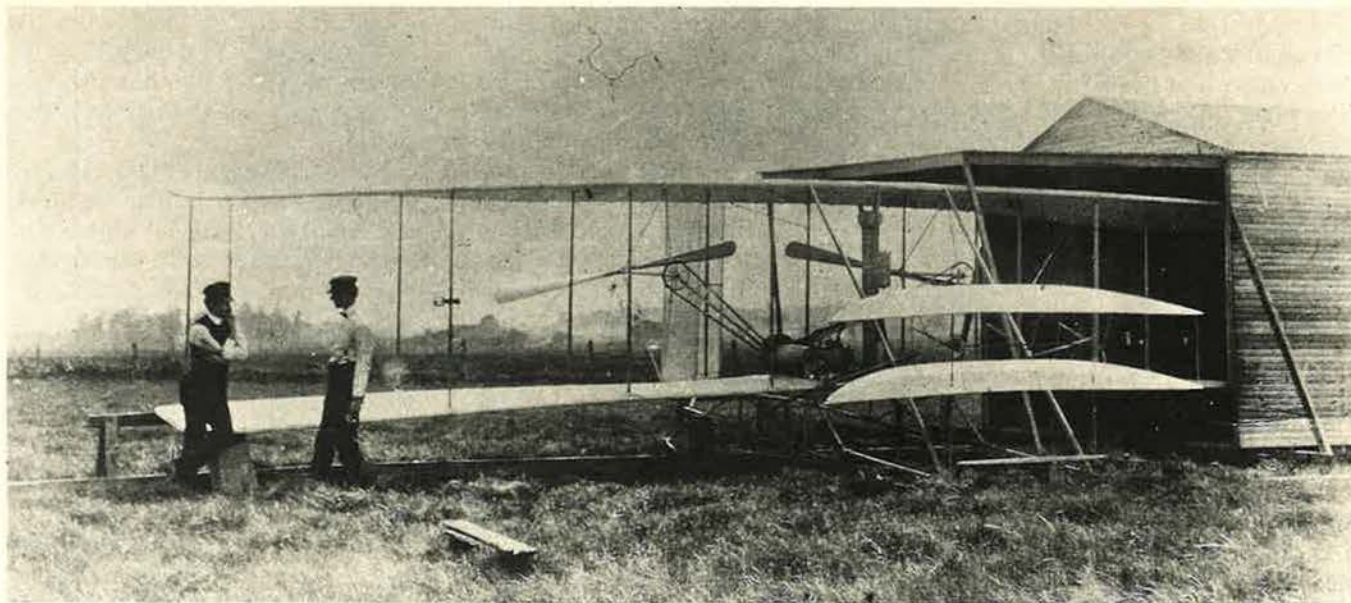


Wilbur flight-tests the 1902 Wright glider. Control of fixed-wing aircraft was reliable only in calm air; neither auto-type steering nor body-weight shifting—the two approaches most favored by flight experimenters—could compensate for the effects of wind shifts on such aircraft. Early Wright gliders continued to sideslip, despite wing-warping, until the addition of a movable rudder.

invention—an idea that they called "wing-warping."

Wing-warping was a novel flight-control system. It entailed twisting the ends of wings in opposite directions at the same time. With it, the Wrights' flyer managed to retain balance in air, execute turns on command, and thus stage, in 1903, the first powered flight.

Not long afterward, the Wrights received patents on wing-warping. However, Curtiss soon began using the technique in his own airplanes, employing different mechanical means. The Wrights sued, crying patent violation. Curtiss responded that, while the brothers could patent their specific mechanical means of applying the wing-warping princi-



This photo of the Wrights' second powered flyer, the Wright Flyer II, taken at Simm Station on Huffman Prairie (now part of Wright-Patterson AFB) in Ohio, clearly shows the twist in its wings. The wing-warp and rudder controls were still connected, which caused serious control problems that would not be solved until 1905.

ple, they could not patent the principle itself, particularly since they hadn't discovered it.

With the Wrights maintaining that they had made the discovery, and Curtiss insisting they had not, resolution of the matter turned on the question of when, where, and how the Wrights first hit on the basic idea of wing-warping.

From the Birds

The simplest answer provided by the Wrights was that they had learned about it from the birds. Wilbur Wright advanced this claim as early as the spring of 1900, long before the lawsuit, in his first letter to Octave Chanute, a French-born glider enthusiast.

Wilbur wrote: "My observation of the flight of buzzards leads me to believe that they regain their lateral balance, when partly overturned by a gust of wind, by a torsion of the tips of the wings. If the rear edge of the right wing tip is twisted upward and the left downward the bird becomes an animated windmill and instantly begins to turn, a line from its head to its tail being the axis."

Wilbur added that he planned to build an apparatus that would add this torsion principle to a double-deck glider, one similar to the type Chanute had used. Wilbur said that he already had tested the idea on a kite and was sufficiently encouraged to lay plans for a trial using a full-size machine.

Even earlier, in an 1899 letter that Wilbur wrote to the Smithsonian Institution seeking information about flight, he had mentioned his habit of observing birds.

Did the Wright brothers really get their idea of wing-warping from the birds? Perhaps. Years later, however, Orville would discount the value of such observations. He stated that he could think of nothing original the brothers had learned in this way.

"Learning the secret of flight from birds is a good deal like learning the secret of magic from a magician," he explained. "After you know the trick and know what to look for, you see things that you did not notice when you did not know exactly what to look for."

For some, this raises the question of whether the Wrights learned "the trick" from others. In his 1899 Smithsonian letter, Wilbur mentioned reading a work by Etienne Jules Marey that described the action of birds' wings. Similar descriptions of the flight of birds are found in pamphlets provided by the Smithsonian and in books that it suggested to the Wrights.

Understanding the birds' secret of control was one thing. Finding a practical means of applying that secret to a man-carrying flyer, however, was quite another. On this key issue, the Wrights again claimed that they had worked out a solution independently.

From their reading, the Wrights said, they had learned that experimenters pursued one of two tracks. One group tried to build stable machines that could be steered like autos. The other tried to compensate for wind changes by shifting a pilot's body weight in flight. The "drivers" found that their machines could remain balanced only in calm air. Their rivals found that "body English" alone was insufficient for airborne control.

The Wrights decided to build a hybrid—an unstable machine equipped with mechanical means of control. The answer was a system to duplicate the birds' twisting of their wingtips.

An Accidental Solution

After a false start, Wilbur hit on a solution by accident. A customer had come to the Wrights' bicycle shop to buy an inner tube. Wilbur pulled one from a pasteboard box. While the two chatted, Wilbur idly twisted the box in his hands. Suddenly, he realized he was producing the kind of torsion he wanted.

In 1898, the Wrights tried out the concept in the double-decker kite Wilbur described to Chanute the following year. The kite proved the principle. Over the next three years, they built a series of gliders using the same wing-warping system. When the gliders tended to slew and sideslip, the Wrights added fixed rear fins. When that failed to work,

they converted the fixed fins into a movable rudder connected to the wing-warping control.

In 1903, they built a flyable powered machine. Yet it and two subsequent machines continued to display control problems. It was not until 1905 that the Wrights separated warping and rudder controls so each could move independently. Thus was born a machine with the basic ingredients of a modern plane.

Satisfied that they had perfected a practical craft, the Wrights stopped flying for more than two and a half years.

During part of the time, they waited for approval of their patent. They had applied in March 1903, nine months before their historic first flight. In May 1906, it was granted. Soon, the brothers were seeking customers; by the summer of 1908, the Wrights were flying once more.

By then, however, they did not have the air to themselves. Their success had rekindled enthusiasm among experimenters. The rival machines varied in design, but the successful ones shared a common feature: some means of changing the trailing edges of the wings so they would work in opposite directions.

Aileron Controversy

The first such machine to arouse the Wrights' concern was made by Curtiss. A motorcyclist and engine builder, Curtiss had joined the Aerial Experiment Association. In January 1908, the Wrights gave AEA information about their control system on the understanding that it would be used for experimental work, not for production of commercial machines.

The association built three planes. The last, known as the *June Bug*, was designed by Curtiss. The Wrights were miffed when Curtiss used it to win a trophy from *Scientific American Magazine* for the first officially recorded American flight of more than a kilometer. The Wrights themselves had covered greater distances, at least since 1905, but no official observers had been present.

Soon, Orville was warning Curtiss that the *June Bug's* use of movable wing surfaces was covered by the Wrights' patents. He invited Curtiss to seek a license. Curtiss

ignored the warning and, in 1909, formed a company with Augustus Herring to produce machines for sale. Their first was the *Gold Bug*, sold to the Aeronautic Society of New York. They built a second, the *Golden Flyer*, for Curtiss to fly in the Gordon Bennett trophy race in Reims, France. On the eve of the race, the Wrights filed formal patent suits against the Herring-Curtiss Co., Glenn Curtiss, and the Aeronautic Society of New York.

None of Curtiss's machines used the Wrights' wing-warping system. Instead, they had small, movable surfaces mounted between the ends of the upper and lower wings. As one of these ailerons was raised, that on the opposite side automatically lowered. The effect of ailerons was the same as that of wing-warping.

Curtiss did not claim to have invented ailerons. What's more, the experimenter who did invent them conceded that he had been inspired by the Wrights' success with wing-warping. Ironically, the man at the heart of the aileron business was none other than the Wright's old friend and mentor, Octave Chanute.

Chanute Talks

Since Wilbur's first letter to Chanute, he and his brother had kept in touch with the older man. Chanute encouraged them to share their results with other experimenters. At first, the Wrights did so. As they neared success, however, they grew more guarded about the information they disclosed.

It was one thing for the Wrights to keep their mouths shut, but restraining the voluble Chanute was quite another matter. In April 1903, months before the Wrights' first flight, Chanute gave a brief description of their wing-warping idea in a speech before France's Aero Club.

The talk was covered by aviation journals, and the next year, French experimenter Robert Esnault-Pelterie attempted to copy the Wright glider. Deciding that twisting the wings would weaken its structure, he designed a system in which the wings would remain rigid and smaller, separate surfaces would move. He called them "horizontal rudders," but they soon became known as ailerons (from the French word for wing, *aile*).

Esnault-Pelterie's machine didn't work well, but others picked up on the idea of ailerons in their own aircraft. Among these inventors was Curtiss.

When the Wrights sued Curtiss, Chanute vowed to remain neutral, but he fed the Wrights' opposition its best arguments. In an August 1909 letter to *Aeronautics Magazine*, Chanute claimed that the Wrights' suit would not only antagonize many, but might also "disclose some prior patents which will invalidate their more important claims." Later, Chanute wrote the editor again, giving specifics. He claimed that, after first making contact with the Wrights, he provided them with a copy of an 1897 patent granted Louis-Pierre Mouillard for a system that "clearly covers the warping of wings."

Chanute had carried on a lengthy correspondence with the French inventor, giving him encouragement and financial support. When Mouillard had little success with his control system and showed no interest in seeking a patent, Chanute himself applied for a US patent on it in Mouillard's name and his own. It was granted in 1897, a few months before Mouillard died.

Chanute said that he had told the Wrights they were free to use Mouillard's system because Mouillard was dead and his heirs had made no claim to it. Years later, Orville said that he did not remember Chanute's offer and that, in any event, the Wrights had not been interested, having already developed their own wing-warping controls.

By October 1909, Chanute was talking not only to the press but to the rival legal camp, suggesting other impediments to the Wrights' claims. In a formal legal statement on the origins of wing-warping, he wrote: "The bare idea of warping and twisting the wings is old, but there are several ways of accomplishing it." He named others besides Mouillard who had described the principle or actually developed systems for using it.

The Last Straw

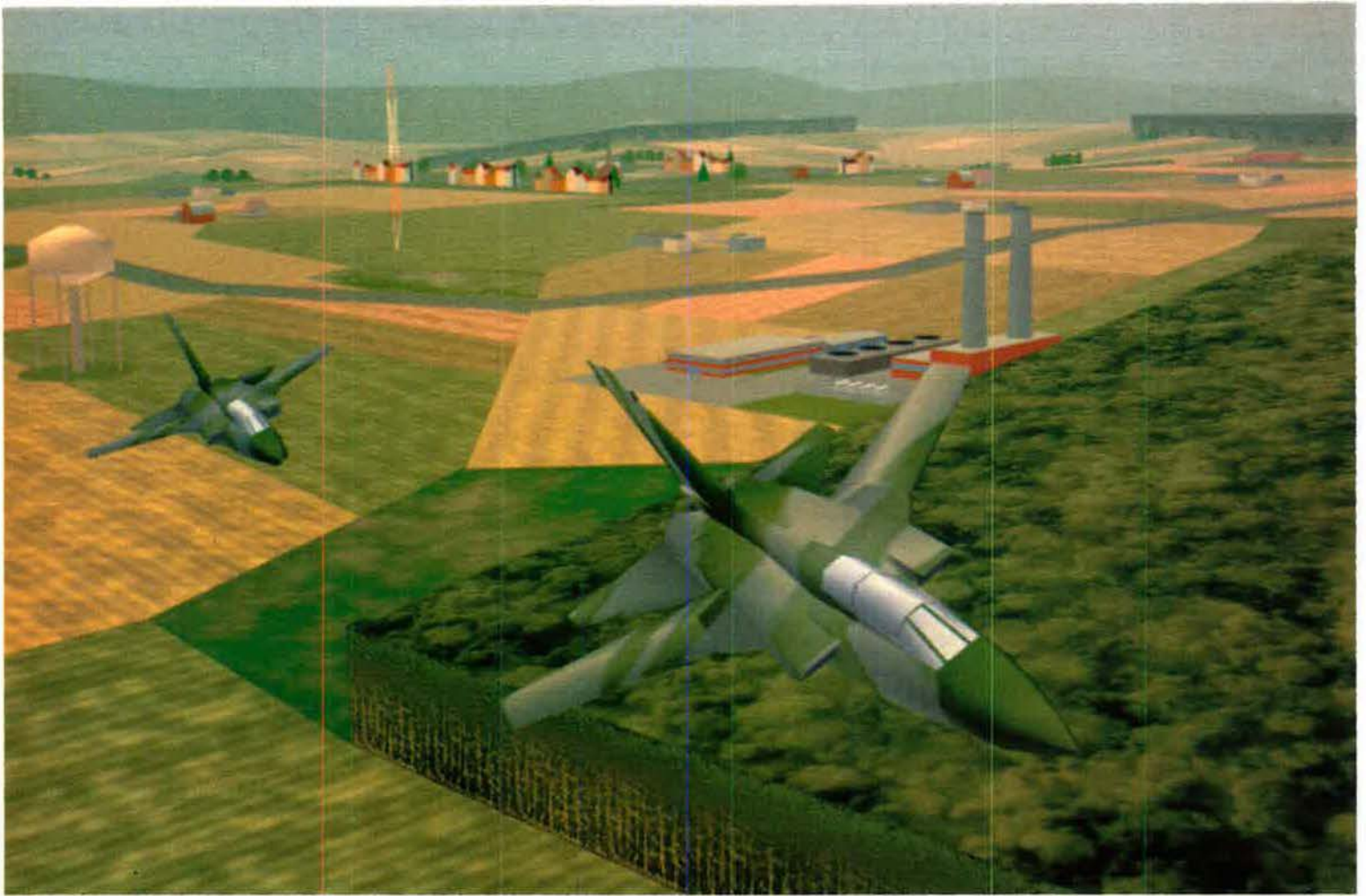
The New York *World* quoted Chanute in a series of articles questioning the Wrights' claim. The paper suggested that they had gotten most of their ideas from Chanute himself.

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For the Wrights, that was the last straw. Wilbur fired off a scorching letter to Chanute, reminding him that Chanute had assured them as early as 1901 that their system was an original.

In his reply, Chanute conceded that the Wrights' system was original, but added that "it does not follow that it covers the general principle of warping or twisting wings; the proposals for doing this being ancient."

Chanute said that he thought he had called the Wrights' attention to Mouillard's system. "If the courts will decide that the purpose and results were entirely different and that you were the first to conceive the twisting of the wings," he said, "so much the better for you, but my judgment is that you will be restricted to the particular method by which you do it."

Chanute added, "I am afraid, my friend, that your usually sound judgment has been warped by the desire for great wealth."

suggestions can hope to link their names with the honor of its discovery."

Chanute aired a long-festering grievance. He said that he resented the impression the Wrights had given that he had thrust himself on them and had been of no real help in their work.

Wilbur's answer was equally bitter. If Chanute resented being given too little credit for his contribution, he said, then the brothers resented his giving the impression that they were no more than his pupils.

"As to inordinate desire for wealth," Wilbur concluded, "you are the only person acquainted with us who has ever made such an accusation. We believed that the physical and financial risks which we took, and the value of the service to the world, justified sufficient compensation to enable us to live modestly with enough surplus income to permit the devotion of our future time to scientific experimenting instead of business."

A Partial Victory

By then, a New York circuit court had ruled that the Mouillard system, which turned down one wingtip at a time, was meant only to turn the airplane. If Mouillard had tried to use it to maintain balance, the court said, it would have disturbed the equilibrium rather than restored it. In any case, the court said, it did not bear on the Wrights' claim.

The victory was partial. It did not involve the case against Curtiss, but rather an injunction against Louis Paulhan, a French flyer whom the Wrights had accused of infringing their patents by bringing European machines into the US for exhibitions. Within a year, however, the Wrights had won favorable rulings in French courts and were beginning to work out royalty arrangements with European plane makers. "The French decision," Orville wrote to a friend, "virtually clinches our case in the American courts."

His prediction was premature. The Curtiss case dragged on. In



Lt. Harold Geiger in a Curtiss Pusher S. C. #8 airplane at San Diego, Calif., in 1913. Curtiss planes made use of wing-warping but employed independent ailerons for control. The Wrights' patent suits against Glenn Curtiss dragged on for eight years, outlasting their ownership of the Wright Co. and its patents and outlasting Wilbur himself.

This last barb doubtless was calculated to draw blood. The Wrights' greatest booster was accusing them of greed. In his first letter to Chanute, Wilbur had said, "I make no secret of my plans for the reason that I believe no financial profit will accrue to the inventor of the first flying machine, and that only those willing to give as well as to receive

The rift lasted for months. Finally, Wilbur wrote a conciliatory note suggesting they mend their friendship and work out a statement describing Chanute's contribution. Chanute said that he too was eager to resume good relations. They never worked out the statement, however, and Chanute died that November at seventy-eight.

1910, the Wrights offered to end it if Curtiss would take out a license under their patents and settle for past infringements. Curtiss demurred, and the Wrights dropped the offer. By late 1911, they had won injunctions against Curtiss, but no final judgment.

Meanwhile, the Wrights suffered a setback in the German courts.



In an attempt to discredit the Wrights' claim by proving that Samuel Langley's aircraft could actually have flown in 1903, Curtiss rebuilt Langley's "aerodrome"—with improvements. Here, Langley's original is fished from the Potomac River after an unsuccessful attempt. In both of its 1903 flight tests, its wings collapsed.

German law held that disclosure of an invention before application for a patent invalidates the patent. Again, it was Chanute who had created the problem. When the court learned of his description of the Wrights' wing-warping to the French Aero Club, it ruled that it was enough to compromise their claim. German patents had not been sought until March 1904.

Back in the US, Curtiss appealed the injunction and, by posting a bond, was able to continue to build planes. By May 1912, Wilbur was seriously ill with typhoid fever. The long legal ordeal weighed heavily on him. In a letter to a friend, he complained that competitors already were selling machines at prices below those the Wrights were asking. If the case dragged on much longer, he said, others would find new ways of evading their claims, even in the event of a favorable judgment. Wilbur died a few weeks later. Orville was convinced that the ordeal of the long court battles had helped to kill him.

Orville continued the patent fight alone and, for a time, seemed to be winning. In January 1914, a federal appeals court in New York rendered judgment in the Curtiss case, upholding the Wright patents. But, with his business threatened, Curtiss tried to skirt the court order by

modifying his control system so that each aileron could be worked independently. Orville brought another suit, and the whole process began anew.

Restoring Langley's Machine

Curtiss now looked for a new way to discredit the Wrights' claim. A possibility, he decided, would be to prove that Samuel Langley's "aerodrome," which did not use wing-warping, could fly. That machine was designed by Langley while he was Secretary to the Smithsonian Institution. It had been tested twice, a few weeks before the Wrights' successful flight of 1903. Both times, its wings collapsed before it was airborne. Langley, ridiculed for his failure, died a few years later. He had been able to fly successful steam-driven models as early as 1896, however, and supporters still believed that his full-sized aerodrome would have worked.

Curtiss approached the Smithsonian with the idea of restoring the Langley machine and attempting a flight. The Institution, eager to redeem Langley's reputation, agreed.

Curtiss took the machine to his factory at Hammondsport, N. Y., and not only restored it but rebuilt it. He strengthened the wings, changed their curvature, added a new control system, and substituted a Curtiss engine for Langley's original. The aerodrome collapsed again on its first trial, but Curtiss continued to change it until he was able to coax it into the air for a few short flights.

Without disclosing the craft's modifications, the Smithsonian announced that Langley's machine had flown. The aerodrome was returned to its original condition and displayed at the museum with a sign describing it as "the first man-carrying aeroplane in the history of the world capable of sustained free flight." That made Orville so angry that he sent the original Wright flyer to a British museum, where it remained for years. He agreed to bring it back only after the Smithsonian removed the sign and admitted how much the aerodrome had been altered to make it fly.

Whether the aerodrome hoax would have worked for or against Curtiss in court remains moot. Orville's new suit against Curtiss never came to a judgment. In 1915, he sold the Wright Co. and patents to New York capitalists. The new company continued the suit, but Curtiss managed to delay until 1917, when a cross-licensing agreement eased all patent restrictions to speed wartime production.

The Wrights had not made a fortune, but Orville did have enough to live modestly and devote his time to experimenting. He became embroiled in other suits, most claiming that someone else had flown first or had developed a control system that predated the Wrights'. None succeeded.

Even today, however, writers plow the old ground, seeking proof that the Wrights really weren't first. The Wrights may have borrowed more than they liked to admit and may have given Chanute and others less credit than they deserved. The fact remains that they were the first to put it all together and fly. ■

A World War II B-24 bombardier, Bruce D. Callander was recalled to active duty during the Korean War. Between tours of active duty, he earned a B.A. in journalism at the University of Michigan. In 1952, he joined Air Force Times, becoming Editor in 1972. His most recent article for AIR FORCE Magazine was "Enlisted Pilots" in the June '89 issue.

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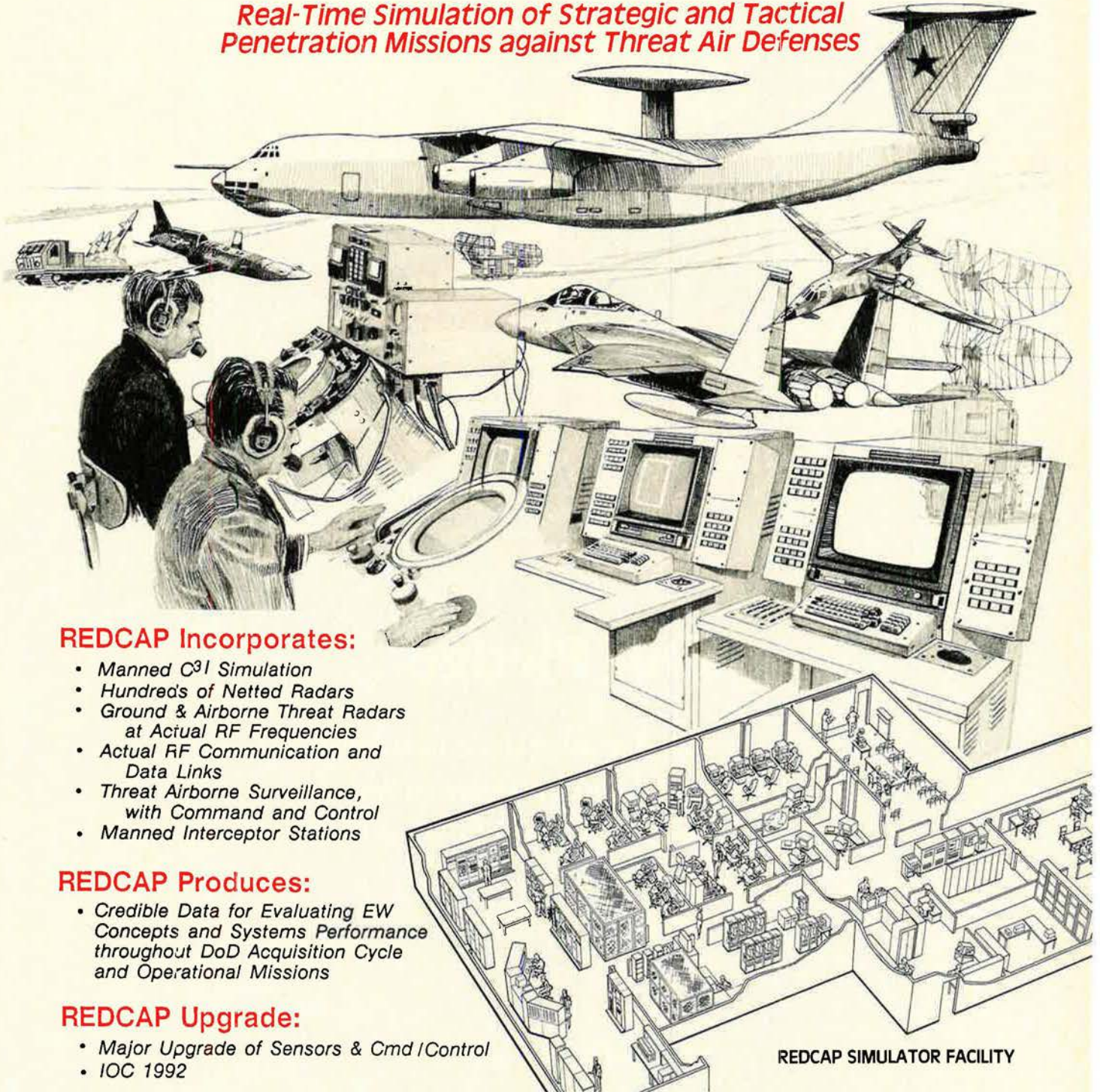
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The Turning Point

By Gen. T. R. Milton, USAF (Ret.), CONTRIBUTING EDITOR

Long-range bombers, free of the need for forward basing, will continue to be important for a nation with global responsibilities. The pity is that there will be so few of them.



Our new friends in Moscow are making it difficult for people who believe in strategic weaponry. The B-2 has begun its flight-test program, to the immense relief of Northrop and

the Air Force, but it is facing an uncertain future in Congress. What with the Soviet navy making courtesy calls at Norfolk and a variety of friendly gestures elsewhere, strategic weaponry has become a hard sell.

Now that our longtime major enemy is making peaceful sounds, new arms-control negotiations are under way, and the defense budget is facing added strictures, it is inevitable that the B-2 should encounter opposition. What is not inevitable, but rather a sign of confusion as to our defense objectives, is that the V-22 tilt-rotor airplane and the elderly F-14 should emerge as competitors to Stealth for funding.

It is a fair guess that not even the fiercest proponents of the V-22 consider it a significant factor in deterring or fighting a major war with the USSR. The V-22 is for lesser events, like amphibious landings, rescue, and forays in connection with unconventional or limited conflicts. By all accounts, it is a splendid airplane for these purposes. As for the F-14D, the last in that distinguished line, it is designed not only to improve fleet air defense but also to keep Grumman alive.

Mr. Cheney left both of these projects moribund in the Pentagon. His budget, scrubbed mercilessly before it reached Capitol Hill, kept the B-2

program intact. That program is now viewed as the piggy bank to fund the V-22 and the F-14D.

National strategic aims have never been the United States' long suit. In the days when the oceans provided a defense barrier, our policy was simply isolation, in keeping with George Washington's admonition to avoid foreign ties. The two great world wars caught us unprepared, and both left us with no clear strategic goals. The Berlin Crisis of 1948 and the resulting airlift woke the United States to the fact that the Soviets, strange enough allies during World War II, were the new enemy. The creation of NATO soon followed.

The Alliance, together with a capability to strike the USSR with nuclear weapons, has been the focus of our defense policy ever since. Other problems, such as the Mideast and Central America, merit occasional attention. Vietnam was a strategic aberration, a war fought with no clear goal and directed by dilettante US strategists.

This year marks a turning point for the defense budget. The 1990 reductions are just the beginning, with more austerity to come. Since there had to be major subtractions from the services' wish lists, Mr. Cheney designated the V-22 and the F-14D expendable and the B-2 essential. A sizable number of legislators disagree, some for clearly parochial reasons and others because they doubt the need for the B-2.

The price tag is an illusory reason for opposing the Stealth. The airplane itself costs \$274 million, not \$500 million—still a lot of money, but nowadays not out of the ballpark for a major weapon system. A more valid question has to do with the B-2's mission. Originally—and still, for that matter—the B-2 has the job of penetrating Soviet defenses in search of mobile and hard targets the ICBMs have failed to hit. Mathias Rust, the German teenager who flew unmolested, if not undetected, to Red Square in his Cessna 172, provided B-2 skeptics with great comedy lines. The

more recent unmanned MiG-23, flying serenely across East Germany into NATO territory like an aerial Flying Dutchman while Soviet air defenses searched for it in vain, was another source of Stealth gibes.

But this misses the point. Without question, a stealthy bomber is one more headache for Russian defense planners, and hence one more deterrent. If one seriously believes the Soviet Union is no longer a threat, that argument is moot: We don't need any more deterrents. However, if we still have doubts in the light of continuing Soviet modernization of its strategic arsenal, the B-2 proponents have a case.

Since World War II, bombers have had an uneven time of it. All of them were conceived with the same basic mission in mind—to strike targets in the USSR. The early postwar jet models, the B-47 and the B-58, were short-legged and needed forward basing and air refueling to reach the USSR. When the B-52 came along, forward basing was discarded, but the mission remained the same: a steadfast alert for nuclear war. Vietnam brought the bombers back into conventional warfare, where, after a shaky start, they were a huge success when given any real targets to hit.

With one KC-10 tanker refueling, the B-2 can reach any target in the world from Missouri, Guam, or Diego Garcia. With a 50,000-pound payload of conventional ordnance, a near-invisible radar return, and, we are told, high delivery accuracy, the B-2 should have a convincing role in power projection. The argument against using it in that way cites the B-2's cost. But if a few B-2s can do the work of a task force, cost is no argument.

In any case, the airplane is now flying, and we will see soon enough whether it lives up to its promise. Long-range bombers, free of the need for forward basing, should be an unquestioned requirement for a nation like ours, with world responsibilities and a reactive, rather than an aggressive, national policy. The pity is that there will be so few of them. ■



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Airman's Bookshelf

By Jeffrey P. Rhodes, AERONAUTICS EDITOR

Admiral Harold R. Stark: Architect of Victory 1939-1949, by B. Mitchell Simpson III. Laymen tend to characterize Adm. Harold Stark's entire Navy career with the statement, "He failed to warn Pearl Harbor of the Japanese attack." While he did make mistakes in the days before December 7, 1941, his career was much broader than that, and the things he should be remembered for are often obscured. As Chief of Naval Operations, Admiral Stark planned the shipbuilding program that produced the US's two-ocean Navy, and he laid the foundation for the naval and military alliance with Britain. Serving in London after stepping down as CNO, he planned and supervised naval preparations for the invasion of Europe. The author is a former faculty member of the Naval War College. University of South Carolina Press, Columbia, S. C., 1989. 326 pages with notes, bibliography, and index. \$24.95.

Alpha Strike Vietnam: The Navy's Air War 1964 to 1973, by Jeffrey L. Levinson. This work gives a history of the Navy's ground attack war in Vietnam through the eyes of twenty-two aviators who were there. Starting with an account of a lieutenant flying a covert mission to drop mercenaries into North Vietnam in 1964 through accounts of POW life in 1967 and the mining of Hai-phong harbor in 1972 to the final homecoming in 1973, this work, while not a definitive history, gives a complete recap of the Navy's air war. The aviators tell what it took to survive in the sky over Vietnam, discuss their personal insights into life as attack pilots and on shipboard, and examine how their initial enthusiasm for combat gave way to disillusionment. A highly interesting book. Presidio Press, Novato, Calif., 1989. 312 pages with map, glossary, photos, interview list, and bibliography. \$18.95.

Arms and the Enlisted Woman, by Judith Hicks Stiehm. This book takes a highly controversial look at the enlisted woman in the US armed services. Ms. Stiehm divides her narrative into three sections—how the enlisted female soldiers, sailors, and airmen feel about themselves; how policy is made for these members of the military; and an interpretation of how public opinion and basic biology influence the policymakers. The author's assessment of the enlisted woman's experience is based on personal narratives, field interviews, historical research, and analysis of the minutes of meetings and memos issued from various policymaking bodies. Temple University Press, Philadelphia, Pa., 1989. 318 pages with appendices, abbrevi-

ation list, notes, bibliography, and index. \$29.95.

The Black Watch: The Men Who Fly America's Secret Spy Planes, by Ernest K. Gann. Noted mostly for his fine works of fiction, the author turns his wonderfully lyrical style to nonfiction for a look at the 9th Strategic Reconnaissance Wing's 99th Strategic Reconnaissance Squadron—the unit that flies the high-altitude (and still secretive after all these years) U-2/TR-1 reconnaissance aircraft. The book is a work of "faction"—all of the stories and experiences are true, but some of the names and places have been changed. Many of the characters are composites, primarily so that the story of this squadron could be told. The U-2 drivers do their wartime job every day, and while nobody in this book shoots down a MiG, drops a bomb, or air-drops supplies behind enemy lines, it still reads like a top-shelf thriller. Broken into sections—the planes, the types of men who fly U-2s, and finally, the story of one man—*The Black Watch* is an enormously enjoyable and informative book. Random House, New York, N. Y., 1989. 210 pages with author's note. \$18.95.

Chaining the Hudson: The Fight for the River in the American Revolution, by Lincoln Diamant. War is often the mother of innovations that seemingly could never work, but instead are so simple and so effective that their execution is brilliant. Such is the case of the chain (as in "anchor") strung across the Hudson River at West Point, N. Y. For sixty months, this 1,600-foot-long chain kept the Royal Navy from sailing up the river and isolating New England from the rest of the new republic. The author recounts earlier, failed attempts to close the river and then how the forging of the two-foot-long, 100-pound links and the stringing of the chain were accomplished. Pieces of the chain still exist, and the author traces the stories of these links to the past and where they can be seen. Lyle Stuart/Carol Publishing Group, New York, N. Y., 1989. 233 pages with photos, illustrations, bibliographical notes, and index. \$21.95.

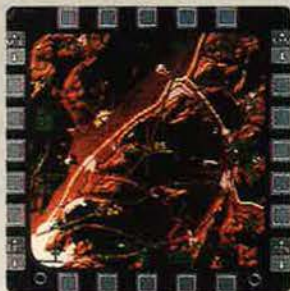
The Defense Procurement Mess, by William H. Gregory. The US could save up to \$50 billion a year—and, not incidentally, itself—by simplifying and streamlining its defense acquisition system, ridding it of most regulations and bureaucratic trappings. The author makes this point among many others in his lucid and logical exposition of a murky and disorderly topic. By continuing with more of the same—more

governmental micromanagement, rules, regulations, and legislation—the US would "run the risk of seeing the defense industry slide into nationalism" and would exacerbate the already grave problem of growing sluggishness in meeting its "basic objective"—equipping the troops with new technologies, the author claims. Mr. Gregory brings to this work the talents for writing and analysis that distinguished his many years with *Aviation Week & Space Technology Magazine*. His book is easy to read, and thus, deceptively but decidedly deep. The Twentieth Century Fund/Lexington Books, Lexington, Mass., 1989. 219 pages with index. \$19.95.

The Fight for the "Malvinas": The Argentine Forces in the Falklands War, by Martin Middlebrook. Judging by the scale of the defeat inflicted on Argentina during the 1982 Falklands War, it might appear that the Argentine forces were second-rate. However, such actions as the invasion of the Falklands and the sinking of the HMS *Ardent* and *Sheffield* were planned and carried out with the utmost military precision. Mr. Middlebrook, a noted historian with a reputation for fairness, was the first British author allowed a visa to travel to Argentina since the war. He concentrates solely on the military aspects of the war and scrupulously avoids sovereignty questions. His interviews with sixty-two Argentines (including some of the major figures) who took part in the war obtained much new information. Viking Press, New York, N. Y., 1989. 321 pages with maps, photos, appendix, acknowledgments, bibliography, and index. \$24.95.

Soviet Military Doctrine: Continuity, Formulation, and Dissemination, by Harriet Fast Scott and William F. Scott. Rather than giving a weapon-by-weapon breakdown of Soviet and US forces, this book documents, with information from original Soviet sources, the development of Soviet military doctrine and its impact on the Soviet armed forces. The beginnings of Soviet doctrine in 1917 and how it has changed are discussed in the first section of the book; then the authors look at the effects the Communist Party and the Soviet government have on formulating military policy. The Scotts, longtime contributors to this magazine, note that the concept of *glasnost* has penetrated Soviet military thinking, but whether or not it produces a genuine fundamental shift remains to be seen. Westview Press, Boulder, Colo., 1988. 315 pages with tables, acronym list, notes, appendix, bibliography, and indices. \$45. ■

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The Iron Hand of Fate

When the B-24 was crippled by flak, no one could have foreseen the tragedy that lay ahead.

BY JOHN L. FRISBEE

FATE is no respecter of heroes. The record tells of many airmen who survived extraordinary feats of valor in combat, only to be struck down by forces over which they had no control. One of the most poignant tales is that of Lt. Col. Leon Vance, a 1939 graduate of the US Military Academy at West Point.

Vance spent his first three years after flying training as an instructor, squadron commander, and director of flying. He was marked as a young officer with a future. His supervisors commented regularly on his ability as a pilot and his inspirational leadership, which were apparent in every unit in which he served.

After B-24 Liberator transition in 1943, Vance, now a lieutenant colonel, was assigned to the new 489th Bombardment Group as Deputy Commander. He moved with that group to Molesworth Airfield in the UK in the spring of 1944. The group flew its first mission on May 30. For the next few days, it pounded German fortifications on the northwest coast of France in diversionary attacks that helped tie down enemy forces north of the beaches in Normandy where the Allies landed on June 6, 1944.

The day before the invasion, Vance, flying his second mission, led the group in an attack on heavily defended coastal positions near Wimereaux, France, a few miles south of the Belgian border. As he approached the target, his aircraft was hit repeatedly by flak. A series of bursts knocked out three of the four engines, killed the pilot, and wounded several crew members, including Colonel Vance, whose right

foot was almost severed, left hanging by only a tendon. Vance, who had been standing behind the pilots, ordered the attack to be completed with only one engine still turning. Only then did he apply a tourniquet to his leg with the help of the radar operator.

Leon Vance could see that the B-24 was approaching a stall, with the one operating engine about to

Vance ordered the crew to bail out, but, on being told that there was a wounded man in the rear unable to jump, he stayed with the bomber.

fail. He struggled to an upright position near the copilot, his right foot caught behind the seat, and took control of the aircraft. When the faltering engine's propeller had been feathered, he put the bomber, with a 500-pound bomb hung up in the bomb bay, into a glide, and headed for the coast of England across the Strait of Dover. As they approached land, Vance ordered the crew to bail out, but, on being told that there was a wounded man in the rear unable to jump, he stayed with the bomber. He would ditch, giving the man in the rear a chance to survive.

Since Vance could not free his virtually severed foot, he flew the B-24 from the floor of the cockpit, using only ailerons and elevators and

judging altitude by what little he could see through a side window.

The B-24 was not an easy aircraft to fly under ideal conditions. Early on, it had been thought that a Liberator could not be ditched successfully. Nevertheless, in pain and flying under the most difficult conditions, Leon Vance splashed down with the big bomber nearly intact. It was a remarkable feat of piloting, probably never equaled in the history of bomber operations.

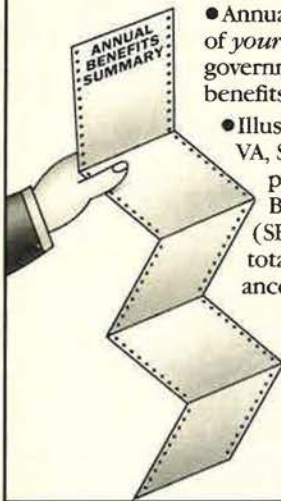
The B-24 began to sink almost immediately. Vance was pinned by the upper turret, which had crashed down during the ditching, and by his shattered foot, still caught behind the copilot's seat. As the bomber slipped beneath the waves, an unexplained explosion completely severed his foot and blew him out of the aircraft and away from the wreckage. After clinging for a few moments to a piece of floating debris, he mustered enough strength to inflate his life vest and began searching for the crewman he thought was in or near the remains of the bomber. Finally giving up the fruitless search, Vance started to swim toward the coast. Nearly an hour later, he was plucked from the water by an air-sea rescue craft.

Following preliminary surgery in England, Colonel Vance, who had triumphed over almost unimaginable odds, was flown by air-convoy to the States for further treatment. Then tragedy struck. Somewhere between Iceland and Newfoundland, the C-54 carrying Vance disappeared. No trace of the aircraft was ever found.

Leon Vance was posthumously awarded the Medal of Honor for "conspicuous gallantry and intrepidity above and beyond the call of duty on 5 June 1944." Today, Vance AFB at Enid, Okla., Vance's birthplace, commemorates this valiant man who risked his life for others, only to lose it in a bitterly ironic catastrophe. Fate is, indeed, no respecter of heroes. ■

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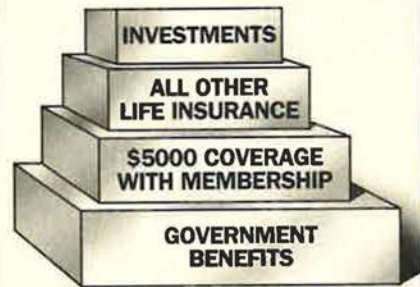
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The AFA Almanac

1989



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(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. Stearn (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)

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.)

AFA's Network of Active Units Overseas

AFA UNIT

LOCATION

United States Air Forces in Europe (USAFE)

Athens	Hellenikon AB, Greece
Charlemagne	Brunssum, The Netherlands
Cotswold	RAF Fairford, United Kingdom
Gateway to Freedom	Berlin, Germany
Hahn AB	Hahn AB, Germany
Lufbery-Campbell	Ramstein AB, Germany
Maj. Gen. Robert M. White	Heidelberg, Germany
RAF Greenham Common/Welford	RAF Greenham Common, United Kingdom
Spangdahlem	Spangdahlem AB, Germany
Wiesbaden	Lindsey AB, Germany

Pacific Air Forces (PACAF)

Bataan Memorial	Clark AB, Philippines
Keystone	Kadena AB, Japan
Manila	Manila, Philippines
Misawa	Misawa AB, Japan
Tokyo	Tokyo, Japan

Supreme Headquarters Allied Powers, Europe (SHAPE)

General Lauris G. Norstad	Mons, Belgium
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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)	YEAR	RECIPIENT(S)
1948	Hon. W. Stuart Symington, Secretary of the Air Force	1974	Gen. George S. Brown, USAF, Chairman, Joint Chiefs of Staff
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift	1975	Hon. James R. Schlesinger, Secretary of Defense
1950	Airmen of the United Nations in the Far East	1976	Senator Barry M. Goldwater
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command	1977	Senator Howard W. Cannon
1952	Senators Lyndon B. Johnson and Joseph C. O'Mahoney	1978	Gen. Alexander M. Haig, Jr., USA, Supreme Allied Commander, Europe
1953	Gen. Hoyt S. Vandenberg, former Chief of Staff, USAF	1979	Senator John C. Stennis
1954	Hon. John Foster Dulles, Secretary of State	1980	Gen. Richard H. Ellis, USAF, Commander in Chief, Strategic Air Command
1955	Gen. Nathan F. Twining, Chief of Staff, USAF	1981	Gen. David C. Jones, USAF, Chairman, Joint Chiefs of Staff
1956	Senator W. Stuart Symington	1982	Gen. Lew Allen, Jr., USAF (Ret.), former Chief of Staff, USAF
1957	Edward P. Curtis, Special Assistant to the President	1983	Ronald W. Reagan, President of the United States
1958	Maj. Gen. Bernard A. Schriever, Commander, Ballistic Missile Division, ARDC	1984	The President's Commission on Strategic Forces (the Scowcroft Commission)
1959	Gen. Thomas S. Power, Commander in Chief, Strategic Air Command	1985	Gen. Bernard W. Rogers, USA, Supreme Allied Commander, Europe
1960	Gen. Thomas D. White, Chief of Staff, USAF	1986	Gen. Charles A. Gabriel, USAF (Ret.), former Chief of Staff, USAF
1961	Hon. Lyle S. Garlock, Assistant Secretary of the Air Force	1987	Adm. William J. Crowe, Jr., USN, Chairman, Joint Chiefs of Staff
1962	Dr. A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories	1988	The men and women of the GLCM Team
1963	The 363d Tactical Reconnaissance Wing, TAC, and the 4080th Strategic Wing, SAC	1989	Gen. Larry D. Welch, USAF Chief of Staff
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		

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



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Foundation**

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

AFA's National Presidents

Gainesville	160
General James R. McCarthy	282
General Nathan F. Twining	418
Gold Coast	460
Indian River	70
Jerry Waterman	1,517
John C. Meyer	261
John W. DeMilly, Jr.	673
Miami	469
Morgan S. Tyler	241
Ocala	63
On Wings of Eagles	69
Panama City	1,345
Peace River	97
Southwest Florida	234
Tallahassee	245
West Palm Beach	470

Georgia	5,743
Athens	138
Atlanta	519
Carl Vinson Memorial	3,274
Chattahoochee Valley	60
Coosa Valley	65
Dobbins	842
Savannah	277
South Georgia	497
Southeast Georgia	71

North Carolina	3,968
Blue Ridge	212
Cape Fear	98
Durham-Chapel Hill	116
Eastern Carolina	74
Foothills	32
Havelock-Cherry Point	48
Kitty Hawk	72
Piedmont	379
Pope	1,076
Roanoke Valley	42
Scott Berkeley	1,269
Tarheel	313
Triad	237

Puerto Rico	271
San Juan	271

South Carolina	3,528
Charleston	1,182
Columbia	481
Ladewig-Shine Memorial	659
Strom Thurmond	319
Swamp Fox	887

SOUTHWEST REGION	34,452
Q. R. Crawford	

New Mexico	3,330
Albuquerque	1,647
Fran Parker	1,013
Llano Estacado	670

Oklahoma	6,463
Altus	849
Central Oklahoma (Gerrity)	4,311
Enid	880
Tulsa	423

Texas	24,659
Abilene	1,017
Aggieldand	166
Alamo	8,790
Austin	2,074
Concho	567
Corpus Christi	154
Dallas	1,264
Del Rio	556
Denton	193
Fort Worth	5,102
Ghost Squadron	155
Heart of the Hills	168
Houston	1,252
Lee Glasgow-Waco	213
Lubbock	753
Northeast Texas	285
Panhandle AFA	143
Paso Del Norte	226
Permian Basin	200
Wichita Falls	1,381

*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.



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)



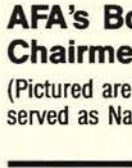
Martin H. Harris
(1984-86)



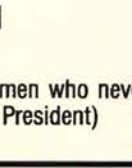
Sam E. Keith, Jr.
(1986-88)



Jack C. Price
(1988-89)



Julian B. Rosenthal
(1989-90)



Jack B. Gross
(1983-84)



Daniel F. Callahan
(1979-81)



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. Steam
(1985-86)

AFA's Board Chairmen

(Pictured are Chairmen who never served as National President)

Aerospace Education Foundation Fellows

(The following is a listing of Individual Fellows who have become Fellows since the last such listing in the September 1988 issue of this magazine.)

Individual Jimmy Doolittle Fellows

(in order of affiliation)

NAME	SPONSOR
(1988)	
Robert S. Seidel	AFA Texas
Charles G. Durazo	Central East Region
Walter Cronkite	Iron Gate Chapter
Lt. Gen. Claudius E. Watts III, USAF	Iron Gate Chapter
Joel T. Wareing	AFA and AEF
Emlyn I. Griffith	Colin P. Kelly Chapter
Donald E. Zweifel	Vietnam Veterans Historical Association
Strategic Air Command Consultation Committee	Ak-Sar-Ben Chapter
Charles A. Anderson	Fort Worth Military Ball Committee
Col. Alan M. Shoemaker, USAF	Iron Gate Chapter
Lt. Gen. Michael J. Dugan, USAF	Iron Gate Chapter
(1989)	
Rev. Robert D. Coward	Central Florida Chapter
Gen. Samuel C. Phillips, USAF (Ret.)	Central Florida Chapter
Apollo 11 Crew	Central Florida Chapter
Brig. Gen. Robert D. Knapp, USAF (Ret.)	57th Bomb Wing Association
Lt. Col. John W. Dillin, USAF (Ret.)	57th Bomb Wing Association
William R. Berkeley <i>(in memoriam)</i>	Bob Hope AFA Charity Golf Tournament
Maj. Gen. Edward P. Barry, USAF	Bob Hope AFA Charity Golf Tournament
Col. Brooke P. Bailey, USAF	Bob Hope AFA Charity Golf Tournament
Col. Richard O. Covey, USAF	Cape Canaveral Chapter
Hon. John C. Stennis	Mississippi State AFA and the Golden Triangle and John C. Stennis Chapters
Robert J. Puglisi	Ohio State AFA
Charles B. Spencer	Ohio State AFA
Marvin R. Jones	Thomas B. McGuire, Jr. Chapter
George Mattson	Thomas B. McGuire, Jr. Chapter
Col. Frank M. Pearce	Thomas B. McGuire, Jr. Chapter
Dan F. Huebener	Iron Gate Chapter
Maj. Gen. Richard Gillis, USAF	Carl Vinson Memorial Chapter
Maj. Gen. James A. Grimsley, Jr., USA (Ret.)	South Carolina State AFA
John Paul Riddle	Florida State AFA
Col. Joseph C. Sides, USAF (Ret.)	Florida State AFA
Hon. Richard B. Cheney	Nation's Capital Chapter
Mrs. Joe Doolittle <i>(in memoriam)</i>	New Jersey State AFA/AEF
Brig. Gen. James E. Young, ANG (Ret.)	New Jersey State AFA/AEF
Frank and Gloria Hicks <i>(in memoriam)</i>	New Jersey State AFA/AEF
Maj. James "Snake" Clark, USAF	New Jersey State AFA/AEF
Maj. Gen. Francis R. Gerard, ANG	New Jersey State AFA/AEF
James M. Still, Jr.	Iron Gate Chapter
Robert H. Batta	Iron Gate Chapter
John T. Buck	Iron Gate Chapter
Irwin Gorman	Iron Gate Chapter
Lt. Col. Julianne L. Kelly, USAF	Iron Gate Chapter
William I. Lees	Iron Gate Chapter
Joseph P. Popple	Iron Gate Chapter
Lt. Gen. H. T. Johnson, USAF	Iron Gate Chapter
Lt. Col. Dana Spears, USAF	Arnold Air Society/Angel Flight
Arley McQueen <i>(in memoriam)</i>	New England Region
Corinna L. Petrella	Scott Memorial and Spirit of St. Louis Chapters
Orville Blair	Scott Memorial and Spirit of St. Louis Chapters
Frecce Tricolori	Associazione Arma Aeronautica and North Babylon High Flight Club
William A. Belanger	Anheuser-Busch, Inc.
Panhandle Chapter	AFA Texas
CMSgt. Michael Di Gregorio	Paul Revere Chapter
Harold B. Strach	Harold A. Strack
Maj. Gen. Stanton R. Musser, USAF (Ret.)	Bob Hope AFA Charity Golf Tournament
Robert Borland	Bob Hope AFA Charity Golf Tournament
Missile Systems Group, San Bernardino Area Chapter	Bob Hope AFA Charity Golf Tournament
Charles F. Bock	Iron Gate Chapter
Lt. Col. J. Scott Keegan, CAP	Dr. Arthur R. MacFadden
New Mexico State AFA	New Mexico State AFA

NAME	SPONSOR
(1989)	
Felix J. Scheffler	Robert H. Goddard Chapter
Donald D. Adams	Midwest Region
Gen. John A. Shaud, USAF	AEF

Individual Ira Eaker Fellows

(in order of affiliation)

NAME	SPONSOR
(1988)	
Maj. Gen. William S. Chairsell, USAF	Nevada State AFA and the Thunderbird and Dale O. Smith Chapters
Jim and Teddy LaBlanc	South Central Region
Col. Richard Paul, USAF	Paul Revere Chapter
Margaret D. Strack	Brig. Gen. Harold A. Strack, USAF (Ret.)
Zack T. Mosley	Florida State AFA
Dr. R. Kirby Godsey	Carl Vinson Memorial Chapter
(1989)	
John B. Winch	Central Florida Chapter
Joseph G. Gavin, Jr.	Central Florida Chapter
George W. Jeffs	Central Florida Chapter
Gen. Alfred G. Hansen, USAF	Iron Gate Chapter
Gen. Bernard P. Randolph, USAF	Iron Gate Chapter
Gen. Robert D. Russ, USAF	Iron Gate Chapter
Lt. Gen. John M. Loh, USAF	Charles A. Lindbergh Chapter
Gen. Duane H. Cassidy, USAF	Scott Memorial and Spirit of St. Louis Chapters
Personnel of Air Force Communications Command	Scott Memorial and Spirit of St. Louis Chapters

Individual Barry Goldwater Fellows

(in order of affiliation)

NAME	SPONSOR
(1989)	
Gen. William L. Kirk, USAF (Ret.)	AFA Chapters and Friends in Europe

Aerospace Education Foundation 1988-89 AFJROTC Contest Winners

Subject: "Why We Serve"

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(Category: Artwork)

Individual Category Winners (\$500 and distinctive plaque)

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Essay: Shiloh High School, Lithonia, Ga.

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

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

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Bulletin Board

C-123 memorabilia, including photos, slides, and clippings showing C-123s in Vietnam service. Especially interested in insignia from 315th TAW and 19th TAS; will return donated items on request. **Contact:** William J. Gibson, Air Force Heritage Museum, Hill AFB, Utah 84056.

Contact with anyone involved with the **Regulus II Drone Program** for training BOMARC crews at Eglin AFB in the late 1950s and early 1960s. **Contact:** David K. Stumpf, 630 N. La Cholla Blvd., Tucson, Ariz. 85745.

Information on members of the **92d Bomb Gp. Hq.** based at Spokane AFB (now Fairchild AFB) from 1948 to 1951 with TDYs to RAF Sculthorpe, UK, and Yokota AB, Japan. **Contact:** Herbert L. Zuidema, 3220 Primavera St., Pasadena, Calif. 91107.

Information on the **F-100's** participation in air races. Seeking contact with personnel who served with 322d FDW and 450th FDW at Foster AFB, Tex., from 1955 to 1958 and those who served with 323d FDW at Bunker Hill AFB, Ind., from 1956 to 1957. **Contact:** R. M. Robinson, 37 Home Farm Rd., Houghton, Huntingdon, Cambs. PE17 2BN, England.

Information on the history of **Grumman Aircraft Co.**, particularly the F-14, the A-6, and the

Hawkeye. Submitted photos and information will be returned on request. **Contact:** Ryan D. Wettlaufer, 219 Bel-Air Ave., Winona, Ont. LOR 2L0, Canada.

If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," Air Force Magazine, 1501 Lee Highway, Arlington, Va. 22209-1198. Letters should be brief and typewritten. We cannot acknowledge receipt of letters to "Bulletin Board." We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Photographs cannot be used or returned.—THE EDITORS

Complete lyrics and melodies from the **songs** that contained the lines, "Fours, fours, B-24s/ They sent us to war in a B-24" and "And we shall see/A world that's free/When we fly home again," respectively. **Contact:** Dr. Charles W. Getz, 105 Braemar Dr., Hillsborough, Calif. 94010.

Seeking to contact **C-141A StarLifter flight crews** that served on active duty during the Vietnam War. **Contact:** Susan Holland Tolles, 7708 Wolford Way, Lorton, Va. 22079.

Information on **315th Bomb Wg.**, 20th Air Force, stationed on Guam in 1945. **Contact:** Lawrence J. Healy, Old State Rd., P. O. Box 322, Lanesborough, Mass. 01237.

Seeking to contact civilian and military personnel stationed at Roswell AAFB in July 1947, especially those who knew **Capt. Oliver Wendell "Pappy" Henderson** and **Maj. Jesse Marcel**. **Contact:** Stanton T. Friedman, 79 Pembroke Crescent, Fredericton, New Brunswick E3B 2V1, Canada.

Tactical Air Control Parties and **Radio Jeep Teams** who served during the Korean War are asked to contribute their experiences. Also looking to buy or trade USAF flying unit histories and color unit emblems. **Contact:** Ron Sinnott, N. 4907 Maple St., Spokane, Wash. 99205.

Information on the current whereabouts of aviation students belonging to the **38th College Training Detachment** at Erskine College, Due West, S. C., during the years 1942-44. **Contact:** Robert J. Shirkey, P. O. Box 57, Roswell, N. M. 88202.

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9-89

Air Forces Flyers Club is seeking **former or current aircrew, ground crew, and support personnel** to participate in "on the air" nets. Applicants must hold FCC Amateur Radio license and send large SASE. **Contact:** Lt. Col. Harry R. Balfe, USAF (Ret.), 6231 Little Fawn Dr., San Antonio, Tex. 78238.

Contact with veterans of the **381st Bomb Gp.** based at Ridgewell, Essex, UK, especially anyone who knew local resident **Joseph Marks**. **Contact:** David Marques, 16 Blakemere Rd., Welwyn Garden City, Herts. AL8 7PQ, England.

For a free copy of *Ex-CBI Roundup Magazine*, **veterans of the CBI** should contact the address below. **Contact:** Dwight O. King, P. O. Box 2665, La Habra, Calif. 90631.

Information on the **B-17 "Sack Hound"** of the 613th Sqdn., 401st Bomb Group, based at Deentroppe, England, and shot down over Belgium on March 2, 1944, while returning from a raid on Frankfurt. In particular, any information on Lt. Robert Davis (navigator), Lt. Elliot Egden (copilot), SSgt. Richard Rickey (engineer/top-turret), and SSgt. Don Silverstein (radio operator). **Contact:** Bill Harness, P. O. Box 1485, APC New York 09283.

Attempting to locate people who knew **Lt. Edgar B. Scott** of the 12th Fighter Sqdn., 18th Fighter Gp., 13th Air Force, who was declared MIA in 1945. **Contact:** Leil H. Daggett, 1426 Genoa Way, Santa Maria, Calif. 93455.

C-47 radio operator, veteran of Indochina in 1954, seeks whereabouts of pilot **Maj. Robert K. Scudder** and **Col. Norman T. Kincade**. **Contact:** Warren E. Egbert, 306 Alta Vista Dr., Hot Springs, Ark. 71913.

Information on whereabouts of **David Wilkerson**, who served at Keesler AFB, Miss., from 1970 to 1974. He was a medic on the pediatric ward and originally came from Oregon. **Contact:** Wayne D. Landreth, P. O. Box 635, Soddy Daisy, Tenn. 37379.

Information on the following combat pilot veterans of the **306th Bomb Gp.** during World War II: Lt. Wesley E. Courson, Lt. Col. Gordon L. Dobbs, Maj. Warren H. Fisher, and Lt. Col. Lee B. Goff, Jr. **Contact:** Russell A. Strong, 5323 Cheval Pl., Charlotte, N. C. 28205.

Information on **Lt. Col. Claude James**, USAF (Ret.), last known to be stationed at Little Rock AFB, Ark. **Contact:** P. Cash, P. O. Box 310, Morganton, N. C. 28655.

Information on **Lawrence McCloud**, stationed at Stanstead, Essex, England, from 1945 to 1946. A Kansas City, Kan., native, he served in the 5th Air Force and returned to the US in March 1946. **Contact:** Norma Clarke, 8 Russell Rd., Forty Hill, Enfield, Middlesex EN1 4TN, England.

Whereabouts of **Thomas H. McGuigan**, last known to be in Northridge, Calif. He served a tour as a B-17 instructor at Avon Park, Fla. **Contact:** Ted Q. Mahoney, 1202 Indian Prairie, Victor, Mont. 59875.

Seeking photographs from **Air Force Detachment to Selma, Ala.**, in August 1940. **Contact:** Wiley E. Carr, P. O. Box 16855, Mobile, Ala. 36616.

Whereabouts of **Pvt. Wilbur Daly**, who served with the 8th Air Force in England in 1942. He was originally from Scranton, Pa. **Contact:** John Barry, 123 Keightley Rd., Leicester, England.

I would like to hear from any enlisted pilots who received their instruction at **San Angelo, Tex.**,

during World War II. **Contact:** Kenneth L. Ross, P. O. Box 158557, Nashville, Tenn. 37215-8557.

Information on **Willie Stokes "Red" Elliot**, who served in Vietnam and prior to that at Lackland AFB, Tex., as a reservist. He is also known to have lived in the Greensboro, N. C., area in 1962. **Contact:** Mary Ann Cloutier, 622 Meadowbrook Dr., King, N. C. 27021.

Information on **Jack V. Arterburn**, a flight engineer warrant officer on B-29 missions over Japan. During 1944-45, he served on Saipan with the 882d Bomb Sqdn., 500th Bomb Gp., XXI Bomber Command. Once flew on B-29 *Frisco Nannie*. Last known address was in Beverly Hills, Calif. **Contact:** T. R. Williams, Jr., 6400 Middle Ridge Lane, Chattanooga, Tenn. 37343.

Information on the following: **Charles Marcus Mann**, of Jacksonville, Fla., who was stationed near Kimbolton Huntingdon, UK, during 1944, and **Clyde Ira Birdwell**, of Texas, who was stationed near Peterborough, UK, in 1944-45. **Contact:** Ruth Samuel, 12 Park Rd., Sudbury, Suffolk CO10 6QB, England.

Whereabouts of **Maj. John P. Gibeau**, who served in Thailand and later with SAC in the Midwest. **Contact:** Jack Richardson, P. O. Box 331111, Atlantic Beach, Fla. 32233-1111.

Cadet Alumni Officer looking for all USAF veterans who graduated from University of North Texas/North Texas State, especially graduates of **AFROTC Det. 835**, in order to send them alumni newsletter. **Contact:** Cadet Stacy G. Dunn, 835th AFROTC Cadet Gp., University of North Texas, Denton, Tex. 76203-5398.

Interested in contacting **veterans of Hq. 7th Air Force** who knew Gen. John D. Lavelle. **Contact:** MSgt. Thomas W. Young, Sr., USAF (Ret.), 830 W. Amsden St., Denison, Tex. 75020-0007.

Collecting **patches** from 99th Combat Support Gp. (Westover AFB), 4683d Air Base Gp. (Thule AB), 380th Combat Support Gp. (Plattsburgh AFB), and 3d Combat Support Gp. (Clark AB). **Contact:** Joe Haffly, 201 Silvercreek Pkwy., #18, Guelph, Ont. N1H 3T4, Canada.

Personnel Identification Panels from all units can be obtained from ALTRIPAN. **Contact:** George Monsive, 112 Glenarm, San Antonio, Tex. 78201.

Aircraft and armor **model kits**, various scales, complete with instructions and decals, available. Also collection of 750 assorted USAF **patches** for sale as a unit. **Contact:** Randy A. Edens, 1635 Fogelson Dr., Indianapolis, Ind. 46229.

Looking for reputable collector or museum to house **material from World War I**, including ornate certificate and two volumes of the book *Lafayette Flying Corps*, by Charles Nordhoff and James N. Hall. **Contact:** John E. Malone, P. O. Box 146, Irvington, Va. 22480.

Looking for **Army Air Corps and early USAF memorabilia**, including uniforms, patches, photos, flight gear, war stories, etc. **Contact:** George Dively, Jr., P. O. Box 10743, Alexandria, Va. 22310-0743.

Interested in purchasing the following: **Voodoo Medicine Man shoulder patch** (RF-101, F-101) and **RAF corporal stripes** from the era 1940-50. **Contact:** Edward J. P. Cadogan, 5420 Pentland Circle, Huber Heights, Ohio 45424.

Requesting photos and slides of present-day **nose art and tail markings** along with photo-

credit if possible. Will return material on request. **Contact:** Andreas Hunold, Postfach 1205, D-5133 Gangelt, West Germany.

Seeking any items connected with **Presque Isle AFB** and **Limestone AFB, Me.** **Contact:** K. Shanahan, 23 Hillcrest Dr., Presque Isle, Me. 04769.

Seeking **patches** from the following: 1st, 6th, 7th, 10th, 12th, and 13th Air Forces; Ferry Command; Air Transport Command; US Strategic Air Force; Air Materiel Command; Alaskan Air Command; USAF; and Desert Air Force. **Contact:** Dave Johnson, 1426 Crockett St., Garland, Tex. 75042.

Seeking a copy of the book *Stand By-y to Start Engines*, featuring the exploits of Cmdr. "Curley" Cue, by Daniel V. Gallery. **Contact:** Jim Donaven, 2466 N. George, York, Pa. 17402.

Information on **Capt. Richard Don Hood** of the 602d Air Commandos, who served in Bien Hoa, Vietnam, in 1965. Also, a squadron patch from that unit. **Contact:** Capt. A. K. Greenwood, 2549 Washington Blvd., Ogden, Utah 84401.

I have been searching for a clear photograph or drawing of the radiator on either the **P-40F** or **P-40L**. Especially interested in a photo of the rear

portion showing the vanes and vents associated with changes made for using the Merlin engine, as well as side- and bottom-view photos. **Contact:** Marvin M. Shimel, 12335 Vivienda Ave., Grand Terrace, Calif. 92324.

Names and addresses of alumni of **AFROTC Det. 415**, University of Minnesota. **Contact:** AFROTC Det. 415, Room 3 Armory, 15 Church St. S. E., Minneapolis, Minn. 55455.

I would like to hear from any of my classmates or instructors from the communications course at **Keesler AFB, Miss.**, in 1968-69. **Contact:** Edgardo Yañez Parra, P. O. Box 45, Los Cerrillos, Santiago, Chile.

Seeking contact with any US citizen who served in the **Royal Canadian Air Force or Army** between the start of World War II and Pearl Harbor. **Contact:** Hugh Stevely, 2020 Hopkins Dr. W., Brandon, Fla. 34207.

Copies of the **predecessors to Air Force Magazine** published between 1918 and 1947. **Contact:** Harold Burritt, 328 Patton Dr., Cheshire, Conn. 06410.

Seeking contact with other **patch collectors** interested in trading. **Contact:** Danny Ginsberg, 5661 Woodsong Dr., Dunwoody, Ga. 30338.

Unit Reunions

Cannon AFB Alumni

Military and civilians who served at Cannon AFB, N. M., have scheduled a reunion for June 15-17, 1990. **Contact:** Cannon AFB Alumni, 312 W. Yucca Ave., Clovis, N. M. 88101. Phone: (505) 762-0594 (G. Telshaw) or (505) 763-3198 (Bertha Wells).

National Guard Units

National Guard units will celebrate the fiftieth anniversary of military aviation in Rhode Island and will hold a reunion for all National Guard aviation units on October 13-14, 1989, at the Rocky Point Palladium in Warwick, R. I. **Contact:** Capt. Michael Zinno, 143d Tactical Airlift Group, Quonset Point State Airport, North Kingstown, R. I. 02852-0794. Phone: (401) 885-3960.

5th Combat Cargo Squadron

Members of the 5th Combat Cargo Squadron will hold a reunion October 12-15, 1989, in Tucson, Ariz. **Contacts:** Harold L. "Bud" Abrams, P. O. Box 77909, Tucson, Ariz. 85703-7909. Phone: (602) 887-1727 (work) or (602) 742-5973 (home). Merl Lehenbauer, 2201 Merrimac, Enid, Okla. 73703. Phone: (405) 242-4452.

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.

8th Air Force Historical Society

The fifteenth annual reunion of the 8th Air Force will be held October 4-9, 1989, in Denver, Colo. **Contact:** Robert H. Nolan, P. O. Box 1579, Oldsmar, Fla. 34677. Phone: (813) 725-4979.

9th Bomb Wing

Members of the 9th Bomb Wing and associated units who served at Mountain Home AFB, Idaho, between 1953 and 1966 will hold a reunion March 13-14, 1990, in Las Vegas, Nev. **Contact:** J. C. Mitchell, 5300 Tupelo Lane, Las Vegas, Nev. 89122. Phone: (702) 451-9020.

12th Fighter Squadron

The 12th Fighter Squadron will hold a reunion May 8-11, 1990, in Las Vegas, Nev. **Contact:** Paul S. Bechtel, 155 Carrigan Blvd., Merritt Island, Fla. 32952. Phone: (407) 453-4252.

20th Bomb Squadron

Members of the 20th Bomb Squadron (Barksdale AFB, La./Carswell AFB, Tex.) will hold a reunion October 13-15, 1989, at Carswell AFB, Tex. **Contact:** Lt. Col. Clifford E. "Kip" Courtney, USAF (Ret.), 3821 Delmas Dr., Fort Worth, Tex. 76116. Phone: (817) 244-2170.

25th Fighter Squadron

Members of the 25th Fighter Squadron who served between 1942 and 1945 will hold a reunion September 13-16, 1989, in conjunction with the 14th Air Force Association Convention in Portland, Ore. **Contacts:** Stanley A. Strout, 4717 Montgomery Dr., Santa Rosa, Calif. 95409. Phone: (707) 539-0357. Clifford R. Long, 1833 Page Pl., Malvern, Pa. 19355. Phone: (215) 296-5988.

Class 40-A

Members of Class 40-A will hold their fiftieth reunion March 22-24, 1990, in San Antonio, Tex. **Contact:** Lieutenant Colonel Keyes, 6003

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Unit Reunions

Royal Breeze Dr., San Antonio, Tex. 78239.
Phone: (512) 657-7671.

Class 41-H

Members of Class 41-H (Brooks and Kelly Fields, Tex.) will hold a reunion October 27-29, 1989, at Kelly AFB, Tex. **Contact:** Verne Lollar, 10102 N. Manton, San Antonio, Tex. 78213. Phone: (512) 344-8200.

Class 48-A

Members of Class 48-A (Barksdale AFB, La.) will hold a reunion February 23-25, 1990, at Shreveport, La. Classmates from Williams AFB, Ariz. are also welcome. **Contact:** Richard A. "Dick" Vogel, 2208 Admiral Circle, Virginia Beach, Va. 23451. Phone: (804) 481-0694.

54th Fighter Squadron

Members of the 54th Fighter Squadron who served on the Aleutian Islands will hold a reunion September 28-October 1, 1989, at the Quality Inn in Tucson, Ariz. **Contact:** Bill Preble, P. O. Box 18473, Tucson, Ariz. 85731. Phone: (602) 885-3481.

57th Fighter Group

Members of the 57th Fighter Group will hold a reunion October 5-7, 1989, in San Antonio, Tex. **Contact:** A. B. "Nick" Nickels, P. O. Box 791431, San Antonio, Tex. 78278-1431. Phone: (512) 820-8643 (work) or (512) 344-5788 (home).

58th Air Service Group

The 58th Air Service Group, 5th Air Force, will hold a reunion September 18-21, 1989, at the Patterson Inn in Fairborn, Ohio. **Contact:** Ray A. Wilkins, 1304 Heritage Pl., Morgantown, W. Va. 26505. Phone: (304) 599-4145.

75th Bomb Squadron

Members of the 75th Bomb Squadron who served on Guadalcanal are planning to hold a reunion in September 1990. **Contact:** Jerry Berg, 6338 Kevin Ave., Cheyenne, Wyo. 82009. Phone: (307) 632-1447.

99th Service Squadron

The 99th Service Squadron, 84th Service Group of the 365th Fighter Group (World War II), will hold a reunion September 14-16, 1989, in Colorado Springs, Colo. **Contact:** Col. W. S. Langebartel, USAF (Ret.), 2520 Homestead Rd., Enid, Okla. 70703. Phone: (405) 237-5627.

339th Fighter Squadron

The 339th Fighter Squadron, comprising the 339th All Weather and 339th Fighter-Interceptor Squadrons, will hold a reunion September 28-October 1, 1989, at the Marriott Hotel in Colorado Springs, Colo. **Contact:** Richard Cowles, 745 Harrison, Belding, Mich. 48809. Phone: (616) 794-2083.

398th Bomb Group

Members of the 398th Bomb Group (World War II/Nuthampstead, England) will hold a reunion September 20-23, 1989, in Dayton, Ohio. **Contact:** George R. Hilliard, 7841 Quartermaine Ave., Cincinnati, Ohio 45236.

448th Bomb Group

The 448th Bomb Group (World War II) will hold a reunion April 5-9, 1990, in Tucson, Ariz. **Contact:** Lt. Col. Leroy J. Engdahl, USAF (Ret.), 1785 Wexford Dr., Vidor, Tex. 77662.

461st Bomb Group

Members of the 461st Bomb Group, 15th Air Force (World War II), will hold a reunion October 11-15, 1989, at the Holiday Inn Westport in St. Louis, Mo. **Contact:** Harry Oglesby, 2758 W. Macon, Decatur, Ill. 62522. Phone: (217) 429-6892.

Det. 510

AFROTC Detachment 510, University of New Mexico, will hold its homecoming reunion honoring the University's centennial and Detachment 510's fortieth anniversary in October 1989. **Contacts:** Captain Batten or Diana Wymer, 1901 Las Lomas N. E., Albuquerque, N. M. 87131. Phone: (505) 277-4230. AUTOVON: 246-4926.

63d Fighter/63d Fighter-Interceptor Squadrons

For the purpose of planning a reunion in conjunction with the Sabre Pilot Association in May 1990, in Las Vegas, Nev., I would like to hear from members of the 63d Fighter/Fighter-Interceptor Squadrons who flew the F-86 Sabre at Oscoda (now Wurtsmith) AFB, Mich., between 1951 and 1954.

Please contact the address below.

Charles J. Young, Jr.
553 Kingsley Ct.
Toms River, N. J. 08753

Phone: (201) 929-0527 (home)
(609) 723-2370 (work)

Class 69-03

Reese AFB Pilot Training Class 69-03 ("Sock It to Me") are trying to find lost class members for the purpose of organizing a reunion in 1990.

Former class members of John Parmeter and John White should contact the address below.

Terrance H. Fregly
P. O. Box 3886
Tallahassee, Fla. 32315

Phone: (904) 386-5184
(601) 693-1982 (Bob Soulé)

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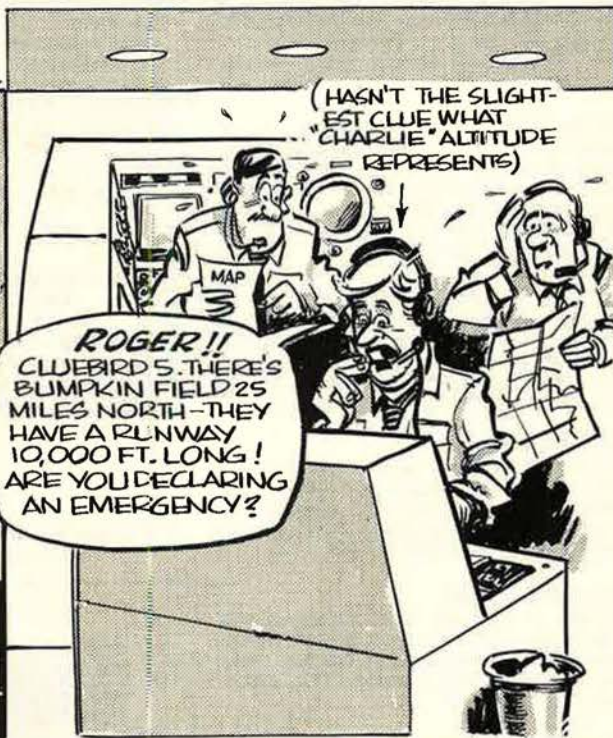
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CONTROLLED PANIC REIGNS AT CENTER-



NEGATIVE, CENTER, NOT AT THIS TIME. I THINK WE'LL JUST HEAD BACK TO TINKER WHERE WE CAN GET 'ER WORKED ON...

PREGNANT PAUSE

ER, YOU'RE CLEARED DIRECT TINKER. ALTITUDE PILOT'S DISCRETION. ER, AH, REPORT PASSING FL 60, PLS.



TINKER... IN OKLAHOMA?



ROG ON THAT, CENTER. LEAVING CHARLIE PLUS 15, ESTIMATE FL 60 IN - ER - ABOUT 20 MIN OVER - AHH, CENTRAL NEBRASKA.



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