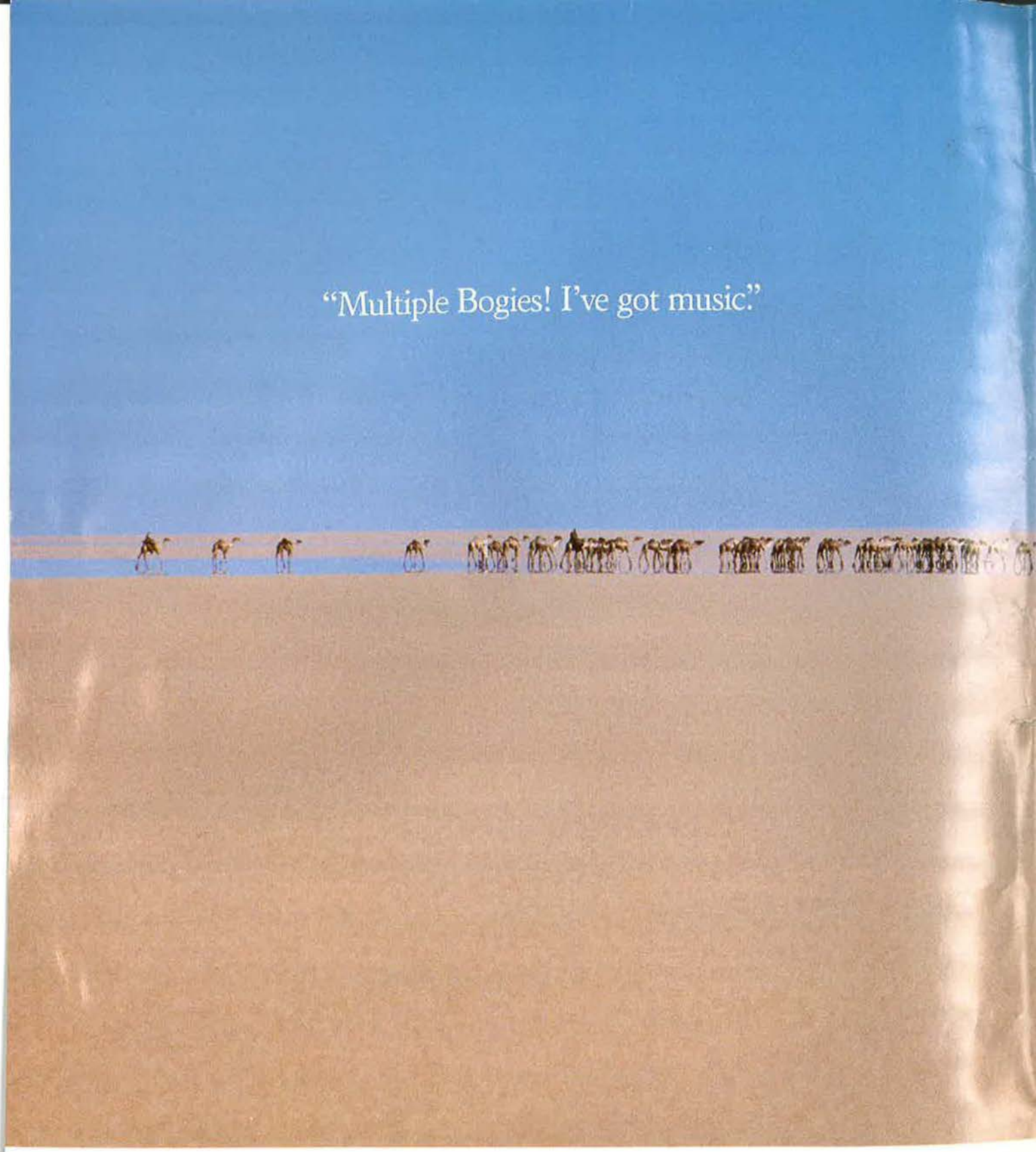
MAY 1987/$5

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

USAF Almanac



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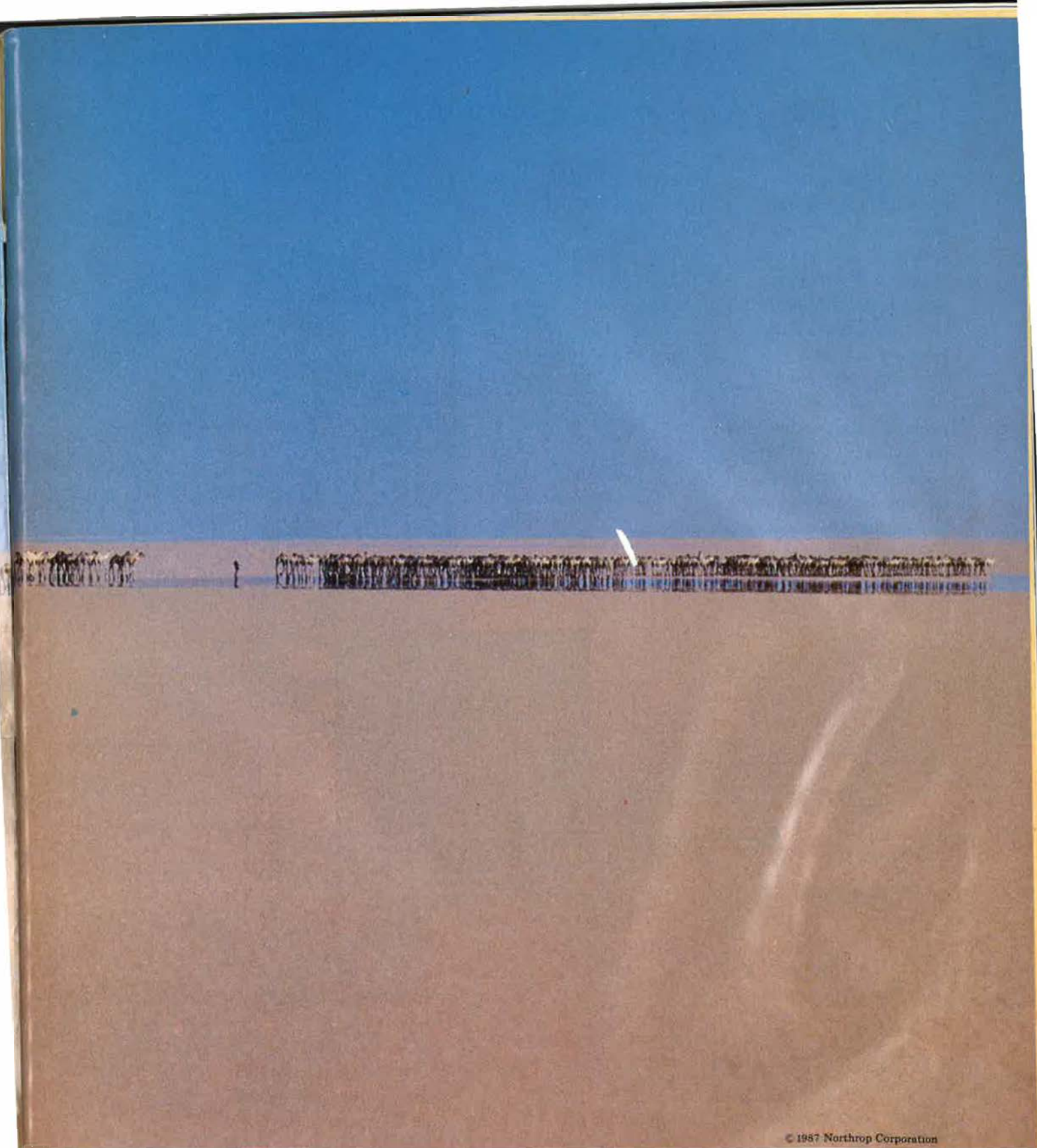

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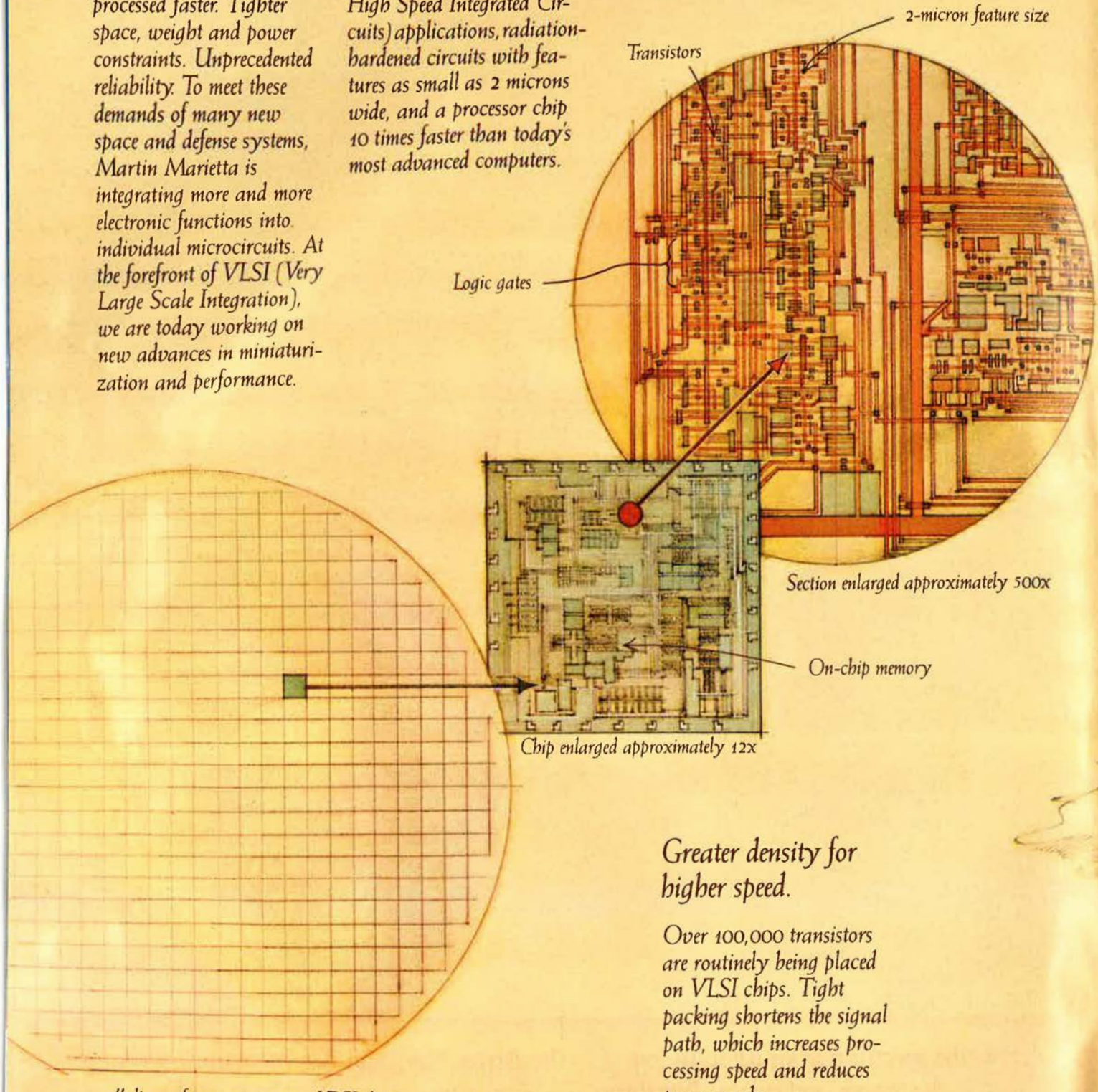

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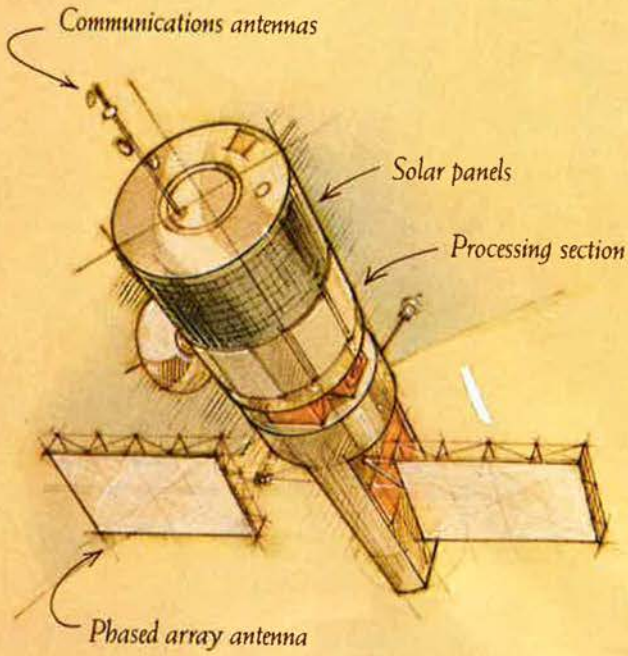

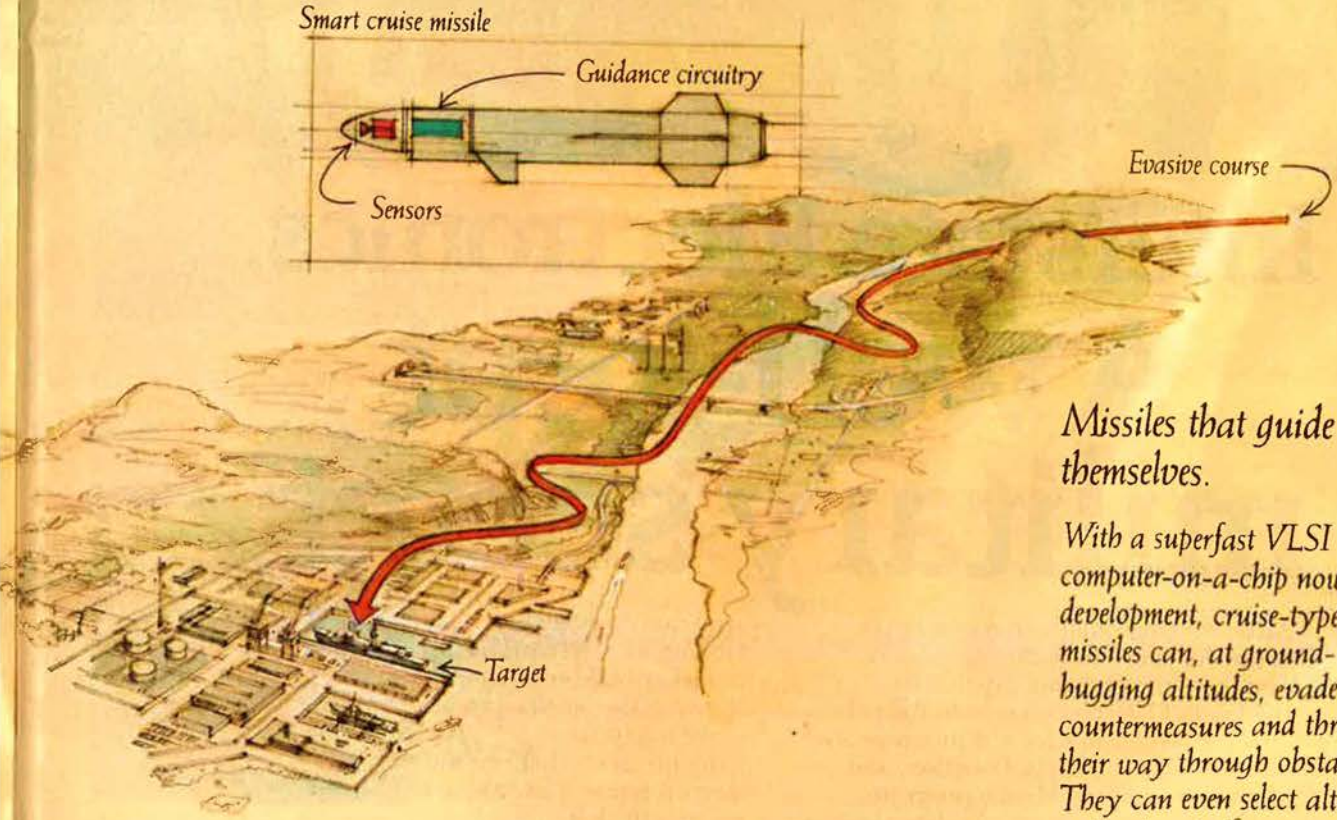

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MAY 1987
VOLUME 70, NUMBER 5

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

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About the cover: A recent addition to USAF's arsenal, the McDonnell Douglas F-15E, introduces this thirty-sixth annual Air Force Almanac issue—a comprehensive guide to today's USAF. (Cover photo by Dave Scaglione)

Air Force Almanac 1987

Departments

AIR FORCE Magazine (ISSN 0730-6784) May 1987 (Vol. 70, No. 5) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, Va. 22209-1198. **Phone** (703) 247-5800. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $18 per year; $42 for three-year membership. **Life Membership:** $300. **Subscription rate:** $18 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.

AN EDITORIAL

Glimpses of Valor

By John T. Correll, EDITOR IN CHIEF

In February 1983, this magazine began the regular presentation of a new series we called "Valor." Each month since then, these short articles have recounted instances of individual bravery from the eighty-year history of the US Air Force and its predecessor organizations. Some have told of heroism in peacetime, and a few have been about moral courage. Most, however, have been stories of the valor of American airmen in the two world wars, Korea, and Vietnam.

In a sense, each Valor episode stands alone, an account of how one airman responded to a unique situation at a particular time and place. But can we find patterns in the diversity? Do these glimpses of valor, taken together, help us understand something about the essential nature of military heroism? Valor is probably too complex to be analyzed and explained completely, but a few conclusions are possible.

Some have said that situations and circumstances make heroes. The Valor casebook confirms this, up to a point. Furthermore, military professionals are inclined to accept danger as part of the job. Yet opportunity and circumstances provide only a setting for valor. They do not make it happen. Otherwise, spectacular heroism would be far more common than it is.

For the past four years, the Valor series has been written by John Frisbee, a bomber and fighter pilot during his Air Force career and a former Editor of this magazine. He once asked Col. Robinson Risner, Korean fighter ace and leader among American POWs in Vietnam, how he figured the odds on survival in combat. "You don't figure the odds," Risner said. "You see what has to be done, and you do it." The difference is that not everyone sees "what has to be done" as starkly as Risner might, and fewer still would have the courage to press on without regard for the odds.

Those who do press on come in several categories. Most of the fifty-eight airmen awarded the Medal of Honor in four wars, for example, were men who engaged the enemy in direct combat exchanges. They are in the mold of Lt. Col. James H. Howard, who took on thirty Luftwaffe fighters by himself to protect a formation of B-17 bombers on January 11, 1944. He shot down three fighters, scored one probable, and damaged at least two others. When he ran out of ammunition, he broke up further attacks by diving his P-51 Mustang at the Germans.

In another category of courage are those who steel themselves to press on through fire and flak to deliver ordnance or carry out other missions that may not include shooting back at those shooting at them. John Frisbee says: "At the top of my mission hierarchy are the rescue people who fly their barn-size, slow-moving choppers into flak traps and hover there, a fat target for enemy gunners, and the pararescue men who go down into a firefight to save others."

We can further conclude that fearlessness seldom has anything much to do with valor. There are probably exceptions, and one of them may have been the impetuous Frank Luke, World War I ace and the first airman to be awarded the Medal of Honor. Luke threw himself into battle with no apparent heed to personal risk. The judgment of a flight leader in Luke's squadron, however, was that Luke wasn't fearless; he simply was unable to imagine that anything could possibly happen to him.

More typical are the heroes who felt fear but overcame it with self-discipline and inner reserves of character. Many not only recognized the danger but also faced up to the near certainty that they could not live through the actions they were about to undertake. This is especially true in the situation in which combat heroism has most often been manifest: the attempt to save the lives of comrades and allies. Majs. Louis J. Sebille and Charles J. Loring, Jr., for example, deliberately crashed their fighters into North Korean positions to save Army troops.

Some heroes may have been swept along by the quick-developing events of the moment, but others had plenty of time to think about it. Reflexive response is not a common denominator of valor in battle or elsewhere. Sgt. Paul R. Ramoneda, a cook, had been at the scene of a B-29 crash for ten minutes and had helped pull eight men from the burning wreckage on August 9, 1950. He had heard the warning that the aircraft was about to explode. He was well aware of the danger when he wrapped an apron around his head and face and waded in after additional survivors, losing his life in the attempt. Even more deliberate was Lt. Col. John Paul Stapp, the flight surgeon who twenty-nine times rode a rocket sled at speeds up to 632 miles an hour with a sudden stop at the end in order to learn whether pilots could eject safely from supersonic aircraft.

To the extent that generalizations are possible, heroes tend to be strong in their beliefs, with definite perceptions about right and wrong. They often possess a highly developed sense of responsibility. A number of them have been deeply religious. Their individual motivations may have differed, but in the end, all of them chose to apply the standard of "Duty, Honor, Country" in an exceptional way.

These glimpses of valor—what airmen have done over the Saint-Mihiel salient and Ploesti, in MiG Alley and Route Pack Six—are a powerful part of the heritage of airpower. There is much that we can and should learn from the study of it. The importance is obvious for military professionals, who themselves might face the supreme tests of duty and danger someday.

But citizens, too, have a moral obligation to learn and remember. In two centuries, the United States has sent its armed forces to war nine times. Each time, there have been heroes who did what had to be done, without calculating the odds. It may be that the nation will again have to send its forces to war, expecting them to press on with courage. If so, all of us should have a full appreciation of what we are asking. ■

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AIRMAIL

The Top Ten

The article "The Top Ten" by Jeffrey P. Rhodes in your April 1987 issue was informative, entertaining, and thought-provoking. However, in my view (and my view only), very few of those making their choices did so with an unprejudiced view of aviation history. . . .

This amateur historian found the number ten too restrictive for a true assessment and put together a list of the "top twelve," based on the contribution made by each aircraft. Let's see how this list holds up.

- Langley Aerodrome (initial development). With this machine, the tail/lifting-surface relationship was set where it's been ever since. . . .
- Boeing P-12 (early pursuit). In 1928, this model set the pace for everything and was the bridge between the P-1 and the Curtiss P-40. The P-12 did everything but fight a war.
- Martin NBS-1/MB-2 (early bomber). Stable, reliable, and tough, the Martin set the pace. . . .
- De Havilland DH-4B (early multipurpose). The last (and only?) Liberty-powered single-engine craft, the DH-4 was flown by more pilots between 1918 and 1930 than any other machine.
- Lockheed Lodestar (bridging the gap between the wars). A forgotten workhorse and real record-setter. . . .
- Douglas DC-3/C-47 (early transport). All-star workhorse number one. Frank Andrews saw the value of this beauty and used a pioneer model from Langley Field in the early days.
- Boeing 727 (jet transport). Workhorse number two and a short-field wonder. Why this aircraft was never ordered in quantity by the military has long been a mystery to me.
- North American P-51 (World War II fighter). Yes, yet another vote. There were many close contenders, but nothing better ever surfaced in great quantity during that conflict.
- Boeing B-17 (World War II bomber). No contest. The B-29 was considered, but only because of its fairly long postwar service as a tanker and as the B-50 variant. Anyway, who wants to argue with General LeMay?
- Douglas A-4 series (greatest jet fighter). More A-4s were built in more variants and served longer than any other US jet fighter. Serving since 1950, she's still out there. Seen "Top Gun"?
- Grumman F-14 and McDonnell Douglas F-15 (a tie for the modern fighter). For systems and weapons, the F-14 has no superior. If we were serious, that's the weapon that our Air National Guard units would be using to defend our northern borders. For total capability, including close-in combat, the F-15 has no superior. To set the record straight, the F-16 is too small ever to approach the capability of either the F-14 or the F-15. So was the F-20, at least in the modern computer era.
- Boeing 757/767 series (modern transport). These are the first "fighters" that Boeing has built since the P-12. We should have bought a tanker version of the 767 instead of the KC-135R.

Sadly, I had to bypass everything I ever flew. That includes some mighty fabulous machines, such as the Lockheed F-80, the Republic F-84, and the legendary North American F-100. . . .

My choices are based on nothing more than an educated observance of history. I hope no one is insulted. Let's hear from others!

Col. C. L. Weidinger, USAF (Ret.)
Alexandria, Va.

The Deficit Question

Hats off to David L. Gray! His editorial on "Where the Deficit Didn't Come From" in the March 1987 issue sets the record straight with regard to the defense budget share of our current federal deficit. In showing how the "Superfunction" programs have increased in relation to defense spending since 1969, Mr. Gray makes it clear that an *informed* person should conclude that defense is not the culprit.

President Reagan has strongly supported our military since taking office, but the recent shift of power in the Senate may prove disastrous to the implementation of his defense programs. We are constantly bombarded with defense-slashing rhetoric from key members of Congress. The public deserves to be accurately informed, but instead receives a steady diet of fiction from our newspapers and magazine columnists.

As taxpaying citizens, we must urge our congressional representatives to leave defense alone when they lower the axe. We must push for reforms to trim the fat from our social programs. The American public must realize that the threat is real and is constantly modernizing and growing (as evidenced in the March 1987 "Soviet Aerospace Almanac"). Meanwhile, the congressional proponents of a strong defense have to struggle year after year.

A study of the most recent additions to the Soviet Air Force reveals good examples of how the technology gap has closed considerably. The Soviets have demonstrated their proficiency at implementing some of our most up-to-date technologies. If defense is slashed, what will go first? Will funding for R&D programs that show great promise be halted? We should not be put in the position of playing catchup with the national aerospace plane ten years from now, as we now find ourselves with space station development and deployment.

Yes, the current deficit is unacceptable, but let's put the blame where it really lies and not be misled by those who distort the facts. And when considering the current arms-reduction talks, we must realize that a weakened defense is no bargaining chip.

Let's send a message to the Sovi-

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 legible (preferably typed). We reserve the right to condense letters as necessary. Unsigned letters are not acceptable, and photographs cannot be used or returned.

ets: Our own internal shift in the political balance of power doesn't necessarily mean that we will weaken ourselves.

Terry S. Baugh
Grand Rapids, Mich.

I read with dismay the March 1987 editorial "Where the Deficit Didn't Come From." The publisher feels that Social Security payments amount to government overspending.

I paid in to Social Security for forty years and look on it as a paid-for retirement. If it weren't for Social Security, many of us retirees could never make it.

Social Security is not a welfare fund. It is self-sustaining and will continue to be so long as the government maintains a hands-off policy toward the fund.

Chester S. Dodge
Stone Lake, Wis.

Close Air Support

Edgar Ulsamer's "New Roadmap for AirLand Battle" in the March 1987 issue resurrects a crucial debate with regard to the Air Force's responsibility for providing close air support for the Army. Unfortunately, the article reads like propaganda for a service that wants to fly at suborbital altitudes and hypersonic speeds rather than to get "down and dirty" where the war really is.

The A-10 concept is a viable one and must be maintained in order to provide close interface with ground forces and cost-effective destruction of enemy ground assets. An aircraft designed around a gun system is the way to go, and the A-10 demonstrates this admirably. If an "all-weather" A-10 is wanted, development money can be poured in (in the same manner as the weather capabilities of the F-16 were developed).

The issue of speed always seems to come up when the Air Force talks about the A-10. The Air Force has a big burden of proof in showing that the accuracy of delivering "dumb" bombs at high speed and low level has improved significantly since the Vietnam War. (Under operational conditions, it wasn't that good then.) Until such proof is offered, speed in close air support is going to be a "warm fuzzy." Remember also that it's hard to see the troops when you are moving at a significant Mach number. Moreover, smart weapons cost big money.

A lot of people don't like the idea of a slow, straight-wing, soft-field-capable airplane in a high-tech, supersonic air force. Some other people will tell us that the need for austere operations has "just never materialized." When the hot war does hit, gentlemen, we will just see who has runways.

Close air support is an important issue to those tasked with ground combat, and any compromise of the dedicated mission is unsatisfactory. If the Air Force doesn't want the mission or is not prepared to do what it takes to support a ground army, then give the task to the Army. Put the job and the right equipment in the hands of those who will be at home on the edge of the battlefield, as the Marines do. . . .

Brian M. Martinez
San Clemente, Calif.

The articles "New Roadmap for AirLand Battle" and "Long Night at Mo Duc" in the March 1987 issue make interesting reading in conjunction. Maybe it is time to reassign the close air support (CAS) mission to the Army.

During the late 1960s, it was understandable why the Air Force jealously fought off Army claims to the CAS mission. In Vietnam, CAS was the bread-and-butter way to build combat mission totals. However, in the modern European scenario, there's enough available air-to-air and deep-interdiction glory to satisfy any hot jock. In recognition of this, the CAS mission and its aircraft have become the Air Force's homely stepchild.

USAF's tactical aircraft basing is set in concrete (pun intended). The scenario involves fixed bases, hotly defended from continuous interdiction, located up to 200 miles or more (hopefully) from the forward edge of the battle. Meanwhile, evolving VTOL technology is permitting future armies to take fully integrated, responsive, high-performance CAS into the field with them. Such CAS aircraft could set down almost anywhere for a reload, a sandwich, and a cup of coffee.

I'd bet on an army with this capability against one without it.

Paul J. Madden
Seattle, Wash.

McNamara's "Accomplishments"

I agree partly with Jim Slough's comments in "Airmail" regarding Robert McNamara's "accomplishments" *(March '87 issue, p. 10).* I take exception to his last paragraph, in which he suggested that Mr. McNamara go back to writing about something he knows something about—building cars for Ford Motor Co.

Lest we forget the Edsel, I recall a private dinner attended by a Ford vice president after Mr. McNamara left Ford and moved to the Department of Defense. The Ford executive began his conversation with the military officers at the dinner by saying, "Our gain will be your loss." Needless to say, I was ever reminded of his dire prediction later during my combat tour in Southeast Asia.

McNamara, in my mind, has yet to prove he has learned anything about anything.

Lt. Col. John C. Augsburger,
USAF (Ret.)
Phoenix, Ariz.

A Well-Calibrated Dart Board

I'm an Air Weather Service captain currently studying for a doctorate in meteorology under an AFIT program at the University of Utah. I caught your "back-up weather station" in "There I Was . . ." in the March 1987 issue of AIR FORCE Magazine and decided to clear up some points.

You left out some critical observations. For instance, if the rock is glowing green or crackling, then it's a thunderstorm. If it's missing, then it's a tornado. A bouncing rock indicates an earthquake.

Construction materials can be critical. The sticks should not be made of old dry wood, which can crack and expand and thereby destroy the calibration of the instrument.

A smooth rock is better than a rough one. It withstands the blistering language that navigators emit when actual temperature and pressure altitude are *far* from that forecast.

The string choice is not important—any of those threads hanging from the flight suit will suffice.

Remember also that the system must be calibrated for altitude: approximately three inches in length for sea level to 3,000 feet, two and a half inches for 3,000 feet to 6,000 feet, etc. (These are ballpark figures; your local WX station can give you specifics for your local flying area.)

Personally, I don't have a lot of faith in the instrument—I'll take a well-calibrated dart board anytime.

Capt. Stephen J. Sycuro, USAF
Salt Lake City, Utah

In Defense of Bombers

As a former B-52 and current B-1B aircrew member, I found the recent letter from Col. Peter Boyes, USAF (Ret.), to be ludicrous and completely unfounded *("Airmail," March '87 issue, p. 13).* In summary, he stated that bombers (particularly the B-52 force) are obsolete for contingency/conventional operations. I will address each of his points.

In his letter, Colonel Boyes states that bombers are obsolete in light of

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

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BPA Circulation audited by Business Publication Audit

AIRMAIL

the present air defense environment of "our only likely adversary, the USSR." Clearly, Colonel Boyes has not done his homework.

As part of the US strategic nuclear triad, the manned bomber is our most flexible and recallable nuclear deterrent. It is interesting to note that the Soviets have built one of the most dense and complex air defense systems in the world, with thousands of interceptors and surface-to-air missiles within the confines of their own country. All of this expensive effort is directed against fewer than 350 bombers flying under SAC colors. I wonder if the Soviets consider our bombers obsolete today.

Colonel Boyes states that the B-52s succeeded in North Vietnam because of limited missile and interceptor forces. This is fantasy.

Our bomber forces were attacking targets in and around the Hanoi/Haiphong area that were defended by the greatest concentration of Soviet-supplied surface-to-air missiles, AAA, and fighters assembled since the air battle for Berlin during World War II. Unescorted, our bombers penetrated enemy airspace and destroyed their assigned targets in support of our national objectives. This was accomplished during Linebacker I and Linebacker II with very few losses—several bombers lost vs. dozens of bombers being lost on a single raid during World War II. The record speaks for itself.

In citing the role of the B-52 today, Colonel Boyes states that, in effect, the B-52 is ill-suited for maritime operations, comparing it to the P-3 Orion aircraft and its theoretical inability to avoid seaborne SAMs. These two aircraft cannot be compared.

Naturally, a turboprop-driven, slow-moving aircraft would be concerned about avoiding SAMs, particularly if it were not equipped with appropriate ECM equipment. The B-52 is well suited for naval/maritime operations. The US Navy has taken a keen interest in using our bomber forces to the maximum amount. This ranges from deploying Harpoon missiles on selected aircraft to patrolling vast areas of ocean with mapping radar to dropping mines to bottle up vital chokepoints. All this requires the very best in bombing and navigation equipment as well as electronic countermeasures, not to mention some of the finest airmen in the world to fly and maintain these systems.

Colonel Boyes asks if the B-52 is the best vehicle for standoff ALCMs and other munitions. The answer is a resounding yes!

Until the B-1B and the ATB are firmly in place, the B-52 will remain our best standoff-missile carrier. By employing the offensive avionics system, coupled with the B-52's long range, the aircraft can navigate anywhere in the world and stand off an adversary's borders with an enormous amount of loiter time. If conventional warheads were to be fitted, this would increase the bomber's versatility even more.

To conclude, Colonel Boyes, our bomber forces are dynamic, vibrant instruments of national policy, changing with the times. You did not mention if you were rated or nonrated, but it is painfully obvious to me that you have never set foot in a bomber cockpit, much less have served one day in Strategic Air Command.

Capt. Roy E. Walker, Jr., USAF
Abilene, Tex.

Locating Dolly Parton

Edgar Ulsamer's "In Focus . . ." article "Two-Missile Program Continues" in the February 1987 issue regarding the proposed rail-garrison concept for the MX ICBM seems to me to be extremely flawed.

He states that the twenty-five trains carrying Peacekeepers "would be indistinguishable from other rolling stock. . . . Soviet overhead sensors or even ground-based intelligence agents would be hard pressed to tell the individual MX launch cars apart from thousands of look-alike commercial rolling stock."

Nonsense! Inside boxcar lengths vary from thirty-six feet to sixty feet six inches. Standard lengths are forty feet six inches to fifty feet eight inches. Piggyback flatcars (easily distinguished from overhead) and auto carriers (obvious when viewed from the side) are among the precious few cars that would be able to accommodate the seventy-foot-long MX.

Any computer with photo-scan capabilities of satellite data could, in a matter of minutes, eliminate the three-quarter million pieces of rolling stock in the standard category. The remaining long beds number in the few hundreds, not thousands. Don't forget that we can now isolate a single set of fingerprints by computer, and that's a lot more complicated than the task described above.

The boxcar containing the MX will

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Closing on his enemy at 50 miles a minute, a fighter pilot needs all the help he can get. A good back-seater can give him the advantage by feeding him urgent data in tight spots, warning him of equipment problems or approaching danger, and advising him in tactical situations.

Which is just what the Pilot's Associate does.

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The Pilot's Associate is being developed now by Lockheed-Georgia under a contract for the U.S. Air Force and DARPA. By the late 1990s, it will be flying alongside combat pilots, giving them an intelligent edge that decreases their work loads and increases their chances of survival.

Lockheed-Georgia

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One of the most awesomely effective weapons ever developed for Close Air Support/Battlefield Air Interdiction, the Hypervelocity Missile (HVM) weapon system was designed to deliver maximum firepower at a cost far below anything in our current inventory. A product of the Missiles Division of LTV Missiles and Electronics Group, HVM is a masterpiece of simplicity and ingenuity. It carries no warhead, relying instead on its blistering 5000-foot-per-second speed to blast a penetrator rod through heavy multi-plate armor, even at highly oblique angles at extreme range.

Its guidance system is a simple CO_2 laser, mounted on the aircraft. With only an aft-looking receiver on the missile, the amount of expensive "throwaway" hardware is held to an absolute minimum. And because HVM is a "wooden round" with no warhead, storage and handling are simpler, safer and cheaper.

Multiple Targets, Maximum Effect

The system can track and attack multiple targets simultaneously—any ground vehicle, fixed or mobile. In live fire tests an HVM was purposely aimed more than 100 feet off-target. Automatic guidance brought the missile to impact near the target center.

With no bulky on-board guidance system or warhead, the HVM is small enough to permit a large loadout—up to 24 per aircraft, at a low installed drag.

No other weapon system has ever given the CAS/BAI pilot the HVM's unique advantages in speed, accuracy and survivability—advantages matched only by its cost-efficiency and low susceptibility to countermeasures.

LTV Missiles and Electronics Group, Missiles Division, P.O. Box 650003, Mail Stop MC-49, Dallas, Texas 75265-0003.

LTV Missiles and Electronics Group
Missiles Division

L T V : L O O K I N G A H E A D

AIRMAIL

be as long or *longer* than anything now in existence. Since the missile is seventy feet long, might not the gantry and boxcar extremities add something to the total? It will certainly weigh more than any other boxcar on the rails—the 190,000-pound MX plus gantry and boxcar would surely exceed 300,000 pounds, and the rail trucks, with twice the normal number of wheels in order to handle that weight, will be impossible to hide.

To sum up, I believe that locating rail-based MX missiles among commercial rolling stock would be about as difficult as locating Dolly Parton in a crowd.

John C. Morton
Yuba City, Calif.

Godspeed to Goldwater

I would like to commend you for your truly outstanding article "Goldwater's Parting Shot," which appeared in the February 1987 issue of AIR FORCE Magazine.

As Senator Goldwater steps down from his position as Chairman of the Senate Armed Services Committee and retires from the Senate, I only hope for the sake of our national security that his successor, Sen. Sam Nunn (D-Ga.), will pursue his new duties with the same dedication and patriotism that were synonymous with Senator Goldwater's *modus operandi*. If the United States is to continue its successful efforts in deterring the "Bear," the new Chairman as well as all members of Congress would do well to emulate Senator Goldwater's uncompromising commitment to a strong defense for America.

As an Air Force blue-suiter and one who personally appreciates Senator Goldwater's relentless support of US aerospace power, I would like to say: Thank you, Senator Goldwater. It is because of great leaders like you that the United States Air Force is ready to "fly and fight."

Godspeed!

TSgt. Troy D. Cash, USAF
Kadena AB, Japan

Is SDI Necessary?

Re: The "Airmail" letter "Perfection and SDI" from J. David Byrd III in the February 1987 issue.

Mr. Byrd's reasoning is faulty and reflects a lack of understanding of the use of nuclear force and deterrence. The rules for and results of nuclear and conventional warfare are considerably different. We can accept a less than perfect defense in a conventional conflict, but any defensive system, such as SDI, that allows just a few nuclear warheads to contaminate and effectively destroy a major portion of our food and water supply or even one major population center is not a viable defense.

Mr. Byrd says, "The whole point . . . is the effectiveness of SDI as a means of establishing the credibility of our defense. . . . SDI is not designed to eliminate nuclear weapons as a threat. It is designed to eliminate or reduce ballistic missile attack as a threat." Those two statements do not correlate. How credible can a defense be that stops only part of an attack? If only part of an aggressor's nuclear attack gets through, he will have been successful in destroying us.

But this is all irrelevant anyway. The Soviets will never risk nuclear attack because they would, in return, be destroyed themselves. We do not need SDI to protect our civilian population or our deterrent, because our deterrent is its own defense. If it needed to be protected, it would cease to be a deterrent. Our triad of land-, air-, and sea-launched nuclear weapons cannot be nullified and is invulnerable for the foreseeable future.

There can never be such a thing as a successful first strike. When one of us launches, it doesn't matter who is first—it is all over! Within minutes, the other will retaliate, and we are both finished. There would be survivors, but our countries could not survive as entities.

Nuclear aggression is not a viable action. SDI, therefore, is not only an ineffective and worthless system, it is completely unnecessary.

Joseph Raintree
San Diego, Calif.

The letter from J. David Byrd III in the February 1987 issue was right on target.

If we are waiting for the 100 percent invulnerable defense system, then we will have a long wait. This type of system never existed and never will.

Regardless of cost, I would rather have a less than 100 percent system, defensive or offensive, than have none at all.

Richard Jungels
Aurora, Ill.

Dambusting Yank

The famous raid on the dams serving the industrial complex of the Ruhr

on the night of May 16–17, 1943, by RAF No. 617 Squadron "Dambusters" is well documented. Eight of the nineteen crews failed to return, with a total loss of fifty-six airmen.

One of the replacement crews for No. 617, which flew the mighty Lancaster bomber, was skippered by Lt. William E. Adams of Boston, Mass. My late brother-in-law, Flt. Sgt. Gilbert R. Pratt, was Bill's wireless operator. They had completed a number of bombing missions with No. 630 Squadron before transferring to No. 617 based at RAF Woodhall Spa, Lincolnshire, and went on to drop the incredible 22,000-lb "Grand Slam" on, among other things, the Bielefeld Viaduct and the Arnsberg Bridge. "We'd fly anywhere with Bill. He was a cracking pilot," Gilbert used to say.

This year, a memorial in the form of a dam will be dedicated at Woodhall Spa to all wartime crews of No. 617 Squadron who lost their lives during the course of the war. I am endeavoring to contact as many of Lt. Bill Adams's surviving crew as possible in the hope of bringing them together for a crew reunion at the time of the memorial's dedication.

Could any readers provide any assistance in winkling out Bill Adams? Over here, the cry has been heard, "What's this? Are you telling me that we had a Yank in the Dambusters?" It's true! . . .

Ivan M. L. Henson
% The Post Office
Hillesley
Wotton-Under-Edge
Gloucestershire GL12 7RD
United Kingdom

AIRMAIL

401st Bomb Group

The company grade officers at Torrejon AB, Spain, are renovating a portion of the officers' club and decorating it with photos, mementos, and artifacts recalling the World War II exploits of the 401st Bombardment Group (H). The 401st flew B-17 combat operations from Deenethorpe, England, from October 1943 through the end of the war.

We are looking for photos of our B-17s in combat as well as those depicting nose art, crew lineups, maintenance operations, and general wartime living conditions at Deenethorpe. In addition, such mementos as original squadron insignia, small items of flight gear, or personal souvenirs would be greatly appreciated. Photos can be quickly returned once they are copied.

We are also looking for information concerning the whereabouts of a former Eighth Air Force P-51 pilot, 1st Lt. Dale Spencer. On May 29, 1944, Lieutenant Spencer singlehandedly attacked and shot down four of forty German fighters that were attacking 401st B-17s returning from a mission to Sorau, Germany. Mr. Spencer may now be living somewhere in the state of New York.

If anyone, especially 401st veterans, can help with our project or provide information about Mr. Spencer, they should contact me at the address below.

Capt. James E. Moschgat, USAF
CGOA Project Officer
P. O. Box 533
APO New York 09283-5361

Bell P-39N Airacobra

I am researching the history of a Bell P-39N Airacobra fighter that was brought back to the United States from New Guinea and is now being restored.

The Airacobra carries serial number 42-19027 and is a P-39N-5. Air Force records indicate that it served in Fifth Air Force from May 1943 to July 1944, when it was condemned for salvage.

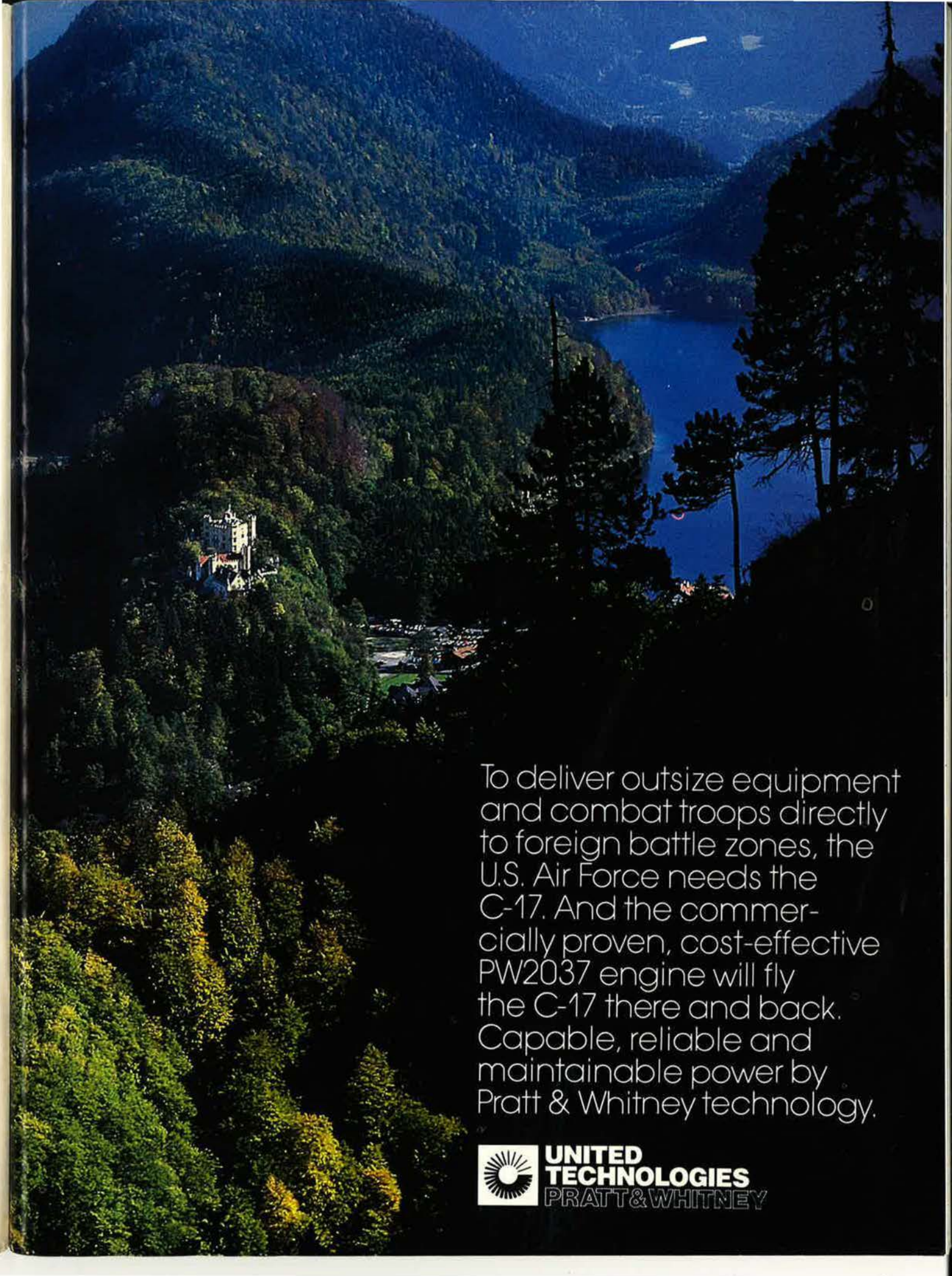
This aircraft carries faint remnants of paint on the left side of the cockpit indicating at least five bombing missions and three symbols that may stand for strafing missions. On the right side of the nose, almost illegible, is faint lettering that seems to spell out "Small Fry."

Plans call for this combat-veteran Airacobra to be restored to its original wartime markings. I am trying to put together a comprehensive package of those markings to aid in the restoration. Any readers recognizing this particular P-39N are asked to contact me. I hope to locate wartime snapshots of this plane and to find its pilot and crew chief. (Photos can be returned after copying, if desired.)

Frederick A. Johnsen
P. O. Box 98718
Tacoma, Wash. 98498

Lajes Field

The curator of the Angra Museum here on Terceira Island in the Portuguese Azores has invited us to provide material for a display of American involvement on the island over the past forty years. We're very proud of this prestigious invitation and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thought that readers may be able to help.

We would greatly appreciate any photographs, negatives, documents, uniforms, correspondence, medals, official orders, and any other memorabilia pertaining to the American presence at Lajes Field that might be useful in such a display. These "historical highlights" would give museum visitors valuable insights and would provide a favorable perspective for our community relations program here at Lajes Field.

We hope that readers will be able to help us make the display an accurate and visually exciting chronicle of US activities on Terceira.

Gina Cloonan
Wing Historian
1605th MASW/HO
APO New York 09406
AUTOVON: 723-1410 (ext. 7185)

Roll Call

I am in the process of working on the history of the 331st Bomb Group. Our group was stationed at Northwest Field, Guam, after having been organized in Dalhart, Tex., and trained at McCook AAB in Nebraska.

In addition to any and all members of the 315th Bomb Wing, I am especially interested in locating the following men.

Crew 6B5: Charles I. Lees, Thomas M. S. Spencer, Sumner M. Lieberman, Joseph Levin, Raymond W. Buechel, Howard J. Epstein, John B. Mangieri, Andy J. Matonak, and Dante B. Petitte.

Crew 5A2: William Quinn, Clark E. Van Deusen, Eugene F. Grove, Paul E. Colarusso, Peter S. Carbone, Warren D. Pearson, and Alvin Salzman.

Time is fast running out, so don't put it off. Please contact the address below today.

Clarence M. Juett
3057 Page St.
Redwood City, Calif. 94063
Phone: (415) 366-6687

I would like to hear from any of the fourteen B-29 crew members who flew with me on the night of December 5, 1951. We were on a Shoran bombing mission against Uiju Airfield in North Korea.

I was released from active duty shortly thereafter and received the Silver Star at Luke Field, Ariz., as a civilian. I would like to know if these crew members and the crew chief received the decorations and awards they so richly deserved. We were with the 381st Bomb Squadron, 307th Bomb Wing, based at Kadena, Okinawa.

In addition, I would like to hear from crew members who flew with me during the seventy B-25 bombing missions accomplished during World War II in the European theater. We served with the 486th Bomb Squadron, 340th Bomb Group, stationed on Corsica during 1944–45.

George Henthorn
P. O. Box 127
Santa Teresa, N. M. 88008
Phone: (505) 589-8410

AIRMAIL

I am seeking information about one of our much admired and respected F-102 pilots, Capt. Robert (Bobby) Lucas, who was lost in 1963 or 1964.

Captain Lucas was in the 64th Fighter-Interceptor Squadron at Paine Field, Wash., and disappeared while on a training mission over the Olympic Peninsula. Countless hours were expended on the search-and-rescue effort, but to no avail.

I was with the 64th FIS from 1956 to 1968, and I have always considered the disappearance of Captain Lucas a chapter in my USAF career that has never been closed. I would certainly appreciate any further information from anyone who could shed more light on this mystery.

MSgt. Jackie L. Burris,
USAF (Ret.)
631 East Ave., J-4
Lancaster, Calif. 93535

The recently elected Executive Board of the New Jersey Chapter of the 8th Air Force Historical Society is trying to contact all those persons living in New Jersey who are veterans of or who are related to veterans of the Eighth Air Force during World War II. We would also like to contact any Garden State residents who are interested in perpetuating the history and memory of the "Mighty Eighth" and who are not yet members of our state chapter.

For information on membership, meetings, reunions, etc., please contact the address below.

Marvin Speidel
708 Dianne Ct.
Rahway, N. J. 07065

I am searching for information on my late uncle, Lt. Irwin G. Zaetz, who was reported missing in action in the China-Burma-India theater in January 1944. He served as a B-24 navigator with the 425th Bomb Squadron, 308th Bomb Group.

AIRMAIL

Anyone who knew him is asked to contact me at the address below.

Gary D. Zaetz
124 Long Shadow Pl.
Cary, N. C. 27511

I was once a member of the finest Air Force squadron ever—the 496th Fighter-Interceptor Squadron, a squadron that produced several colonels, a major general, and a lieutenant general who walked on the moon.

I would like very much to hear from any men who served in the 496th from May 1953 to June 1957.

MSgt. Gilbert J. Estrada, USAF (Ret.)
444 Porter Ave., Apt. 6
Biloxi, Miss. 39530

I am trying to locate members of AAC Flying Class 41-G. I would like to hear from any graduates from all eight graduating schools (Barksdale, Brooks, Craig, Kelly, Luke, Mather, Maxwell, and Stockton).

In particular, I am looking for William Barbour Adams. His first base of assignment was in Pendleton, Ore.

Any 41-G graduates who would like to receive newsletters, etc., should contact the address below.

George Commenator
6120 E. 5th St., #121B
Tucson, Ariz. 85711

Former overseas high school students are being sought by more than 120 overseas alumni groups and reunion committees representing more than seventy schools in twenty-eight countries. If you are a graduate of an overseas high school, we would like to learn where you went to school and when you graduated.

Please contact the address below.

Overseas Brats
P. O. Box 29805
San Antonio, Tex. 78229

I am searching for James E. McDonald, who flew as engineer on Robert Potter's B-17 crew in 1944 with the 509th Bomb Squadron, 351st Bomb Group. I am trying to locate him to inform him of a crew reunion.

Anyone with any information about this individual is asked to contact the address below.

Don Edwards
4617 Crestview
Sylvania, Ohio 43560

I am searching for all former members of the 33d Air Depot Group to help commemorate the forty-fifth anniversary of the establishment of this unit at a ceremony to be held at Robins AFB, Ga., in October 1987. Also, items of memorabilia are needed for the construction of a display at the Museum of Aviation that will depict this unit's activities.

Please contact the address below.

John D. Walker
308 Tarrasa Dr.
Warner Robins, Ga. 31088
Phone: (912) 953-4552

I am trying to locate Robert R. Kucheravy, who was radioman-waist gunner with my B-25 crew in 1944–45 on Corsica and in Italy. I am planning a crew convention in Texas for September 1987, and he is the only member of the crew whom I have been unable to locate.

Please contact me at the address below.

Maj. James C. Harris, USAF (Ret.)
2490 S. Ola Vista, #23
San Clemente, Calif. 92672
Phone: (714) 492-0894

Collectors' Corner

I have a collection of official World War II photos of Army, Navy, and Marine air campaigns and encounters. There are twelve sets of twenty four-inch-by-five-inch glossy black-and-white photos plus six selected eight-inch-by-ten-inch enlargements.

I have had this collection packed away for more than thirty-five years and believe that a serious collector would find these photos useful. There are scenes of aerial combat and bombing missions taken by participants that I have never seen in a WW II photo display. I feel that this is a rare and possibly unique collection now, and I would like to receive any offers from serious collectors, even though I hate to part with them.

Interested collectors should contact me at the address below. I will be happy to send sample photocopies to serious investors.

Peter M. Hansen
3822 Jason Circle
Torrance, Calif. 90505

I would like to contact anyone concerning squadron patches, stickers, T-shirts, and other memorabilia of the 64th Fighter Weapons Squadron (Aggressors) based at Nellis AFB, Nev.

Any help that readers can provide will be appreciated.

James Lee Toth
2730 De Soto
Costa Mesa, Calif. 92626

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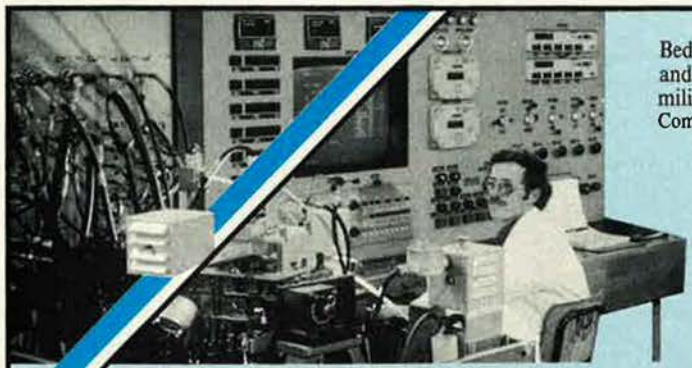

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FOUGA/AMIT	+	+	+

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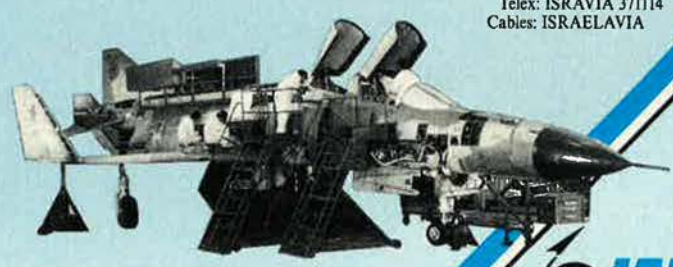

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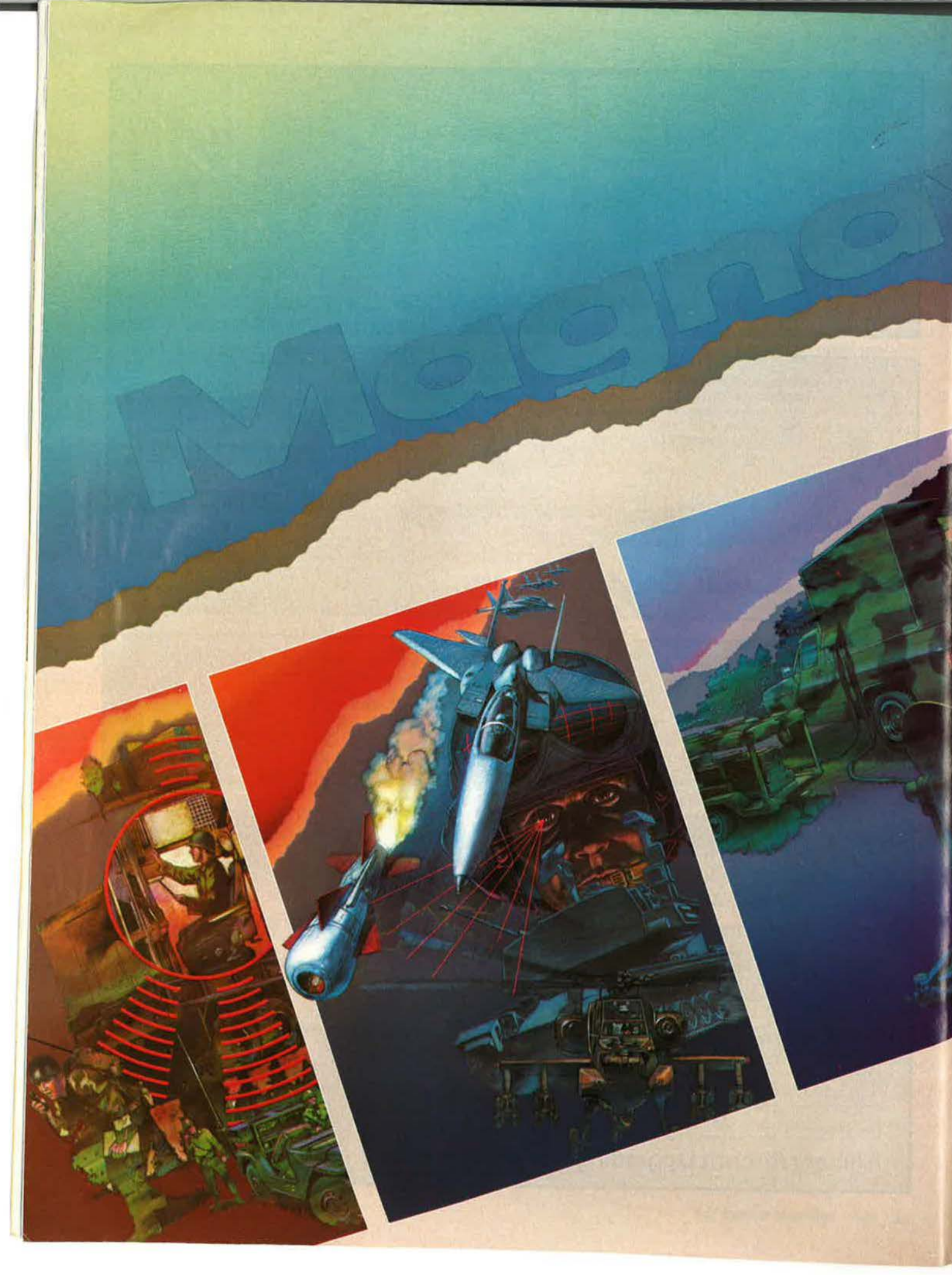
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IN FOCUS...

Moving Targets

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

US intelligence is batting near zero in its efforts to locate some of the USSR's mobile, camouflaged weapons. The Pentagon is seeking solutions to the "relocatable target" problem.

Washington, D. C., April 1

One of the most formidable and weighty technological challenges confronting the US is how to neutralize the burgeoning number of relocatable targets (RTs) in the Soviet Union in case of war. RTs consist of mobile ICBMs as well as more traditional mobile forces, such as long-range bombers and ground forces. One of the key problems with RTs, especially mobile ballistic missiles, is finding these weapons once they have been fielded. At this time, the US intelligence community is batting close to zero in terms of finding some of these mobile, camouflaged weapons.

The Defense Department is now drawing up an RT master plan that will initially probe the technical feasibility and affordability of systems that can cope with the RT challenge and then chart a "clear course of action to develop the sensors, C³I architectures, and force structure to put RTs at risk," Dr. Lawrence W. Woodruff, Deputy Under Secretary of Defense for Strategic and Theater Nuclear Forces, told Congress recently.

Stressing that this country's ability to deter Soviet attack could erode seriously if Soviet RTs continue to enjoy "sanctuary" status, Dr. Woodruff said the RT Capability Program launched by the Air Force last year must be accelerated to "upgrade the sensor and avionics systems for strategic bombers."

The Defense Advanced Research Projects Agency (DARPA), at the same time, launched a complementary program to "conduct a rigorous scientific investigation of the problems associated with target detection" of fielded, relocatable systems. The goal of the DARPA program is "to develop sensor systems that can detect targets in a high-clutter environment, such as forested areas." In a broader sense, the RT master plan is to provide in-depth analyses of specific concepts for holding targets of this type at risk, especially by means of the prompt kill capability of ICBMs and SLBMs. Dr. Woodruff added that a major benefit of these analyses "will be the insights they provide to potential threats to the survivability of our own mobile, land-based systems."

Some elements of the RT master plan as well as of the President's strategic modernization program appear to be the object of internal dissent within the Pentagon's civilian hierarchy. At the core of the dispute are divergent assessments about potential Soviet and US ballistic missile defense capabilities. According to one school of thought, it is futile to make major long-term investments in complex, costly sensor systems tailored to RT detection that won't become available until the next decade. By then, both Soviet and US ABM capabilities may obviate the need for these detection systems if such ABM systems could intercept any and all hostile ballistic missiles regardless of deployment mode.

"There is concern both in Congress and in the Administration over moves by [a] Pentagon faction to dismember the President's ICBM modernization program."

This same type of reasoning is being employed to negate the need for measures that enhance the survivability of ICBMs, such as mobile basing or superhardening. The contention that omnipotent future Soviet ABM systems will be able to intercept US ICBM warheads in various phases of their trajectory leads by this logic to the conclusion that money spent on ICBM survivability measures is a waste. Conversely, an equivalent US ABM (or SDI) capability would make Soviet ICBM capabilities irrelevant to the point where an arms accord with the Soviet Union banning all ballistic missiles could be portrayed as being compatible with US defense requirements. The contention is that there would be no incentive for the Soviets to break out from such an agreement—an agreement that is probably way beyond this country's verification capabilities—or to maintain hidden ballistic missile reserves since US SDI capabilities would deprive them of any operational value.

In this context, there is concern both in Congress and in the Administration over moves by this Pentagon faction to dismember the President's ICBM modernization program. These moves included attempts to substitute silo-deployment of the second fifty MX Peacekeepers for the rail-garrison basing recommended in the President's defense budget request. Especially astonishing was the statement by Under Secretary of Defense for Policy Fred C. Iklé on March 10 before the Strategic and Theater Nuclear Forces Subcommittee of the Senate Armed Services Committee that it "is not necessary" to go ahead with the Small ICBM (SICBM, also known as Midgetman) program. The SICBM is one of two key components of the White House's "integrated [ICBM modernization] package."

Although he claimed under questioning that he was "not taking issue with the President's budget"—which he had been expected to advocate and defend in his testimony—the Pentagon official was perceived by the committee as urging Congress to scrap the SICBM program. The predictable results are increased congressional skepticism over both elements of the ICBM modernization program.

In an interesting development on March 13, three days after his testi-

mony before Congress, Secretary Iklé wrote to Sen. J. James Exon (D-Neb.), the chairman of the subcommittee, that the Administration "in no way" is changing the provisions in the President's budget for "both the rail-garrison deployment mode of the Peacekeeper and the mobile deployment mode of the Small ICBM."

HGVs on the Horizon?

The Air Force's latest annual report to Congress discloses plans to develop a missile-boosted, unmanned test vehicle to "demonstrate the feasibility of both strategic and air defense hypersonic glide weapons." This low-key reference raises the curtain on a coalescence of technologies that promises to revolutionize theater and global force projection.

Known as hypersonic glide vehicles (HGVs), this amalgam of aerodynamic, materials, and sensor technologies is being funneled into a technology prototype program undertaken jointly by the Air Force and the Defense Advanced Research Projects Agency (DARPA). While some of the elements—and to some extent even the underlying concept—of the project are not new, its scope and orchestration may well germinate a host of advanced weapon systems spanning

IN FOCUS...

the gamut from strategic deterrence to low-intensity conflict.

Centered on the use of Minuteman I boosters and small, Mach 20-plus, highly maneuverable unmanned flight vehicles, the HGV prototype program draws on a number of advanced guidance techniques to demonstrate the feasibility of a long-range, highly maneuverable (and hence survivable) precision strike weapon capable of attacking high-value airborne and ground-based targets with nonnuclear warheads.

The HGV program is not oriented toward any specific application, but might lead to the launch of individual weapon system programs three or four years from now, prior to the technology prototype program's own completion in the mid-1990s. In this sense, the $350 million HGV project dovetails with the recommendation of the Packard Commission to designate DARPA as the manager of technology prototype efforts that hold promise of spawning multiservice payoffs.

As presently envisioned, the HGV test phase will involve launches of a number of flight vehicles by means of modified Minuteman I boosters from Vandenberg AFB, Calif., to fly in the stratosphere over a 4,200-nautical-mile course to the Kwajalein test range in the Pacific. Helicopters would recover the HGVs after parachute deployment.

The central goal of the flight test is demonstration and validation (dem/val) of the flight vehicle itself. The challenges in this context are hypervelocity aeromechanics, structures and materials capable of withstanding temperatures in the 6,000-degree range, and integrated, highly adaptive flight controls. In addition to demonstrating the requisite speed and range capabilities, the HGV is also expected to confirm maneuverability up to the thirty-G level and a large "footprint," meaning maneuver flexibility in the terminal flight phase.

An equally important facet of the prototype program involves dem/val of advanced guidance and sensor systems. Key here are two DARPA projects, the Midcourse Integrated Inertial GPS Navigation Package and the advanced phased-array LORAINE (long-range interceptor experiment)

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radar. The latter can detect and track airborne targets and guide the HGV against them. Because of its large search area, the LORAINE sensor minimizes the need for accurate pretargeting information and can operate either with or without in-flight updates.

In addition, the HGV program will include flight testing of two potentially complementary projects, one sponsored by AFSC's Ballistic Missile Office (BMO) and the other by the Armament Division. BMO's Terminal Fix Sensor concept concentrates on ground-based targets, while the Armament Division's high-speed submunition ejection experiment seeks to demonstrate the feasibility of dispensing at hypersonic speeds conformally carried simulated munitions that incorporate "end-game guidance." The two AFSC divisions will bear all integration and development costs associated with the two projects. The Armament Division's experiment is part of ADI (for air defense initiative, a counterpart to SDI).

The flight paths of the prototype HGV as well as of potential follow-on weapon systems could be kept within the atmosphere (endoatmospheric) even over global ranges, making the vehicle, in effect, a very-high-speed

IN FOCUS...

cruise missile, albeit with many of the operational attributes of an ICBM. At the same time, future weapons versions need not be confined to ground-launched boosters, but could include space-, sea-, and air-launched variants. In the latter case, approaches similar to that of the F-15-launched ASAT appear feasible.

One of the key questions that the HGV technology prototype program is to answer involves the ability of the various sensors, such as antennas and phased arrays, to function reliably within the plasma that surrounds a vehicle traversing the upper reaches of the atmosphere at speeds of Mach 20 to Mach 25. In the past, reentering spacecraft generating a plasma sheath—meaning an ionized field that results from the external thermal heating—lost most data links while transitioning through that speed regime. New technologies suggest, however, that there are ways to get signals through plasma. The HGV flight tests are to demonstrate the efficacy of these sensors under extreme heat conditions. The ability to maintain data links while flying at high hypersonic speeds is essential for future weaponized HGVs incorporating real-time command guidance.

The prototype test program is also meant to establish the feasibility of squeezing adequate computational power into such a small vehicle in order to handle end-game intercepts. The outcome of the $350 million-plus test program will be monitored closely by such potential users as Strategic Air Command, Tactical Air Command, and US Space Command. Assuming the HGV program and key associated technologies prove feasible, a number of attractive applications suggest themselves, especially in terms of nonnuclear offensive and defensive weapon systems with a high probability of kill (P_k) ratio. This might include HGV weapons that—once launched—operate in a totally autonomous fashion and thus could neither be recalled nor spoofed.

In the strategic offensive arena, HGV weapons show great promise for coping with high-value airborne or surface targets. HGVs could potentially neutralize ground-based radars or interceptors over global ranges or

THE F-16 SET A NEW SURGE RECORD IN THE ON

While deployed at a remote air base, 18 U.S. Air Force F-16 Fighting Falcons engaged in a training exercise that set a new standard in combat fighter readiness.

Over the course of 16 flying days, the planes and their pilots flew an average of 48 sorties. Then on the last day, in one 12-hour period, they flew 144 sorties. Sortie effectiveness was 100 percent. Turnaround reliability was 97 percent.

In fact, if it weren't for regulations that limit a

t SUAWACS aircraft out of commis-
n before they could direct air inter-
ptors against US aircraft or cruise
ssiles.

At the same time, HGV weapons ap-
ar capable of major contributions
NSDD (National Security Decision
ective) No. 178, which spells out
e need for improved air defense ca-
bilities. The paramount payoff from
l HGVs might well be their ability to
ercept rapidly and reliably such
gh-value air targets as cruise mis-
e carriers *before* they launched
ir missiles. The military value of
obal-range HGVs capable of oper-
ng at speeds approaching those of
BMs would, of course, skyrocket if
e US were to commit to arms-con-
l agreements banning all ballistic
ssiles.

DARPA, under current, still tenta-
e plans, is to act as DoD's executive
ent for the HGV program until
estone I is reached. At that time,
ogram management would be
nded over to the Air Force. The
V program is expected to link up in
ch areas as materials technologies
d structures with the technically
re ambitious and far costlier NASP
ational Aerospace Plane) effort that
being carried out in concert with
SA.

X-30 to Fly in 1993

The National Aerospace Plane project is making "excellent progress," even though recent congressional funding cuts inflicted a four-month stretchout and a concomitant price hike from $3.1 billion to $3.3 billion during the current phase of this DoD/NASA program, according to DARPA's Deputy Director James A. Tegnelia.

Testifying recently before a panel of the House Armed Services Committee, Dr. Tegnelia reported that NASP's first flying hardware product, the X-30 experimental aircraft, ought to take to the air by 1993.

The purpose behind the NASP undertaking is to develop and demonstrate the seedbed technologies for a new generation of flight vehicles. One category of vehicles is meant to fly single-stage-to-orbit missions with aircraft-like takeoffs, landings, and reusability. The other element of the NASP undertaking is directed at the development of hypersonic cruise aircraft capable of long-range cruise in the atmosphere.

Following startup of NASP in October 1985, the Defense Department and NASA formed a joint program management organization headed by the Under Secretary of Defense for Acquisition and NASA's Associate Administrator for Aeronautics and Space Technology. NASA's share of NASP's RDT&E costs was boosted recently from about twenty percent to about thirty percent, the DARPA official told the congressional panel. NASP's Program Management Office in Washington, D. C., and the subordinated Joint Program Office at Wright-Patterson AFB, Ohio, are jointly staffed by personnel from DARPA, NASA, USAF, the US Navy, and SDIO, he said.

Five airframe and three engine manufacturers are engaged in an eighteen-month effort involving design studies and technical tradeoff analyses. These companies are using their own capital as well as government funds to support their competitive endeavors. At the end of this competition—toward the end of 1987—the number of airframe contractors will be reduced to no more than three and the engine contractors to two. These contractors will then develop and demonstrate major components of their proposed designs, according to the DARPA official.

This phase of the NASP undertaking will take another two years and, if successful, culminate in the government's decision to launch NASP's

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phase three, consisting of detailed design, fabrication, and test of an X-30 vehicle with first flight scheduled early in 1993, Dr. Tegnelia told Congress.

Acquisition Milestones Revamped

The restructuring of the Pentagon's acquisition approach, which was mandated by Congress as well as the White House, caused significant procedural changes, including a major revamping of the so-called milestone chronology, Richard P. Godwin, Under Secretary of Defense for Acquisition (USDA), recently told Congress. The central Pentagon instrument for cradle-to-grave oversight of weapon systems is the new Defense Acquisition Board (DAB), a streamlined and strengthened successor to the Joint Requirements and Management Board (JRMB).

DAB consists of a Research and Development Council as well as a Production and Support Council. Its express purpose is to validate acquisition requirements and to come up with design solutions that are optimal in terms of operational effectiveness, affordability, and quick availability, according to Secretary Godwin. The teeth-to-tail ratio of the Board has been improved sharply by consolidating the 126 separate committees that reported to the old JRMB into ten units that are structured along major acquisition and operational tasks. These ten bodies will provide coordination with the services, OSD, and other agencies in such areas as science and technology, production and logistics, and international affairs.

In addition to riding herd on resource allocation requirements and formulating requisite policy, the Defense Acquisition Board will review programs with an eye on pass/fail decisions at five specific milestones. Milestone "Zero" equates to a new program start and extends from confirmation of a specific requirement to a mission need statement and approval of the USDA's program decision memorandum. Milestone I, governing a program's demonstration phase, involves system concept approval, acceptance of the baseline plan, and a go-ahead decision by the Secretary of Defense for this program phase.

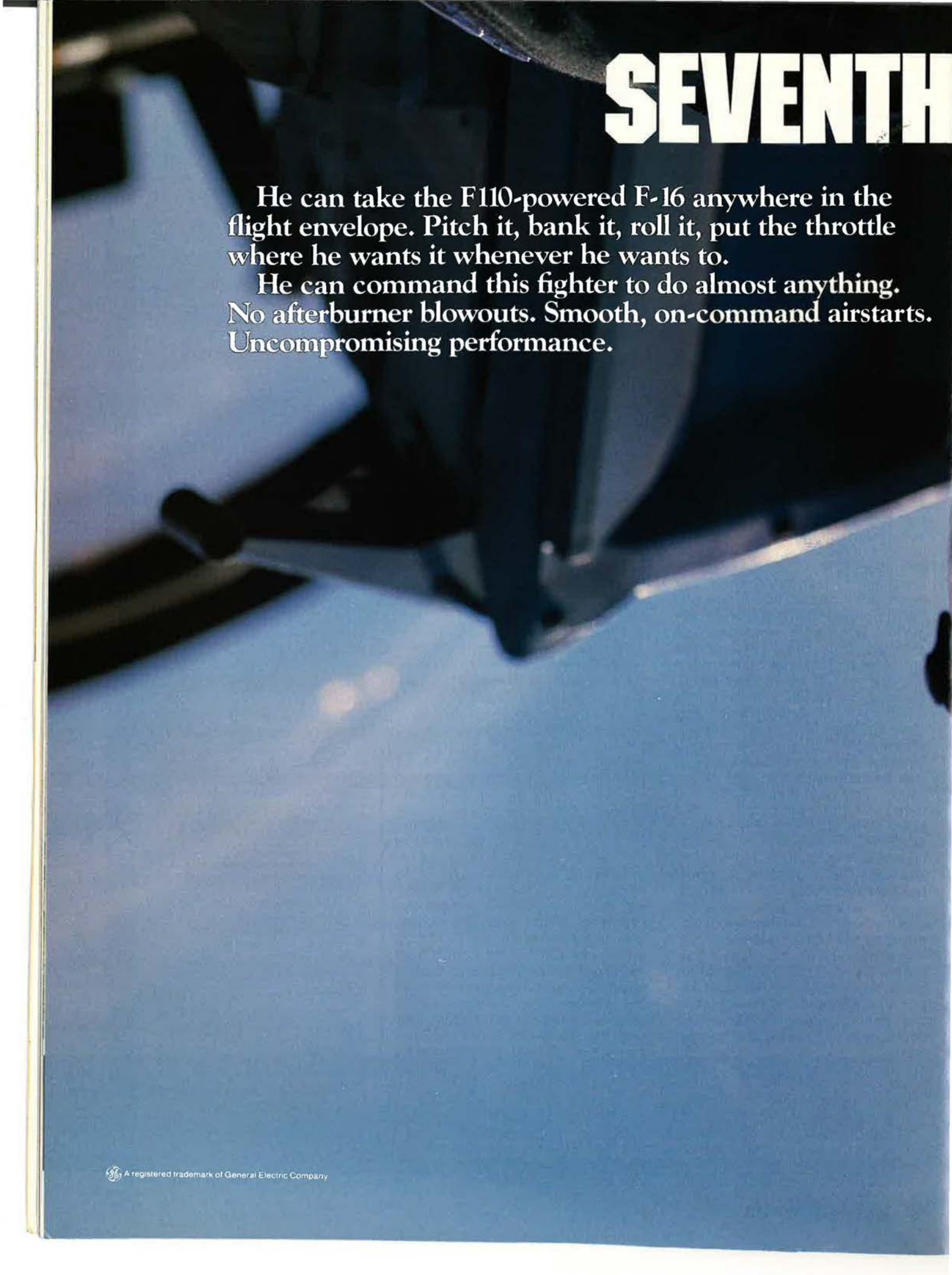
Milestone II (full-scale development) covers plans for acquisition strategy and operational testing. Milestone III defines a program's full-rate production phase. Milestone IV marks the readiness and support phase and gets under way two years after IOC (initial operational capability) has been achieved and substantial O&M (operations and maintenance) results have been analyzed. Finally, Milestone V, or the operational phase, occurs about five years after IOC and involves an assessment of the operational effectiveness of the system in question, with an eye on upgrades, possible retirement, or the need for a new start, Secretary Godwin told Congress.

In general terms, DoD's baselining procedures for acquisition programs have been tightened, with all SAR (selected acquisition report) programs now considered candidates for baselining. A new category of baseline programs, called Defense Enterprise Programs, has been added. Of the ten Defense Enterprise Program candidates enumerated by Secretary Godwin in his congressional testimony, four are under Air Force purview: the C-17 airlifter, the SRAM II short-range attack missile, the Titan IV expendable launch vehicle, and the MLV, or medium (space) launch vehicle program.

An additional nine programs, Secretary Godwin testified, are under consideration for multiyear procurement arrangements that will result in significant cost savings. Three of these programs are managed by the Air Force: the Defense Meteorological Satellite Program (DMSP), the infrared Maverick close air support weapon system, and the F-16 multimission fighter program.

Turning to the research, development, test, and evaluation sector of the FY '88–89 budget request, he explained that, at $43.7 billion for FY '88 and at $44.3 billion for FY '89, RDT&E will experience sixteen percent real growth in the first year and a two percent decline in the second. The FY '88 growth, he said, stems largely from increased funding requests for SDI and the National Aerospace Plane. Of the eleven new program starts planned for the two-year budget, only one, the Worldwide Airborne Command Post, will be managed by the Air Force, he told Congress.

Influential elements of Congress, meanwhile, are working on legislation to upgrade the Under Secretary of Defense for Acquisition position to the Deputy Secretary level and to provide him line authority over the service acquisition executives. ■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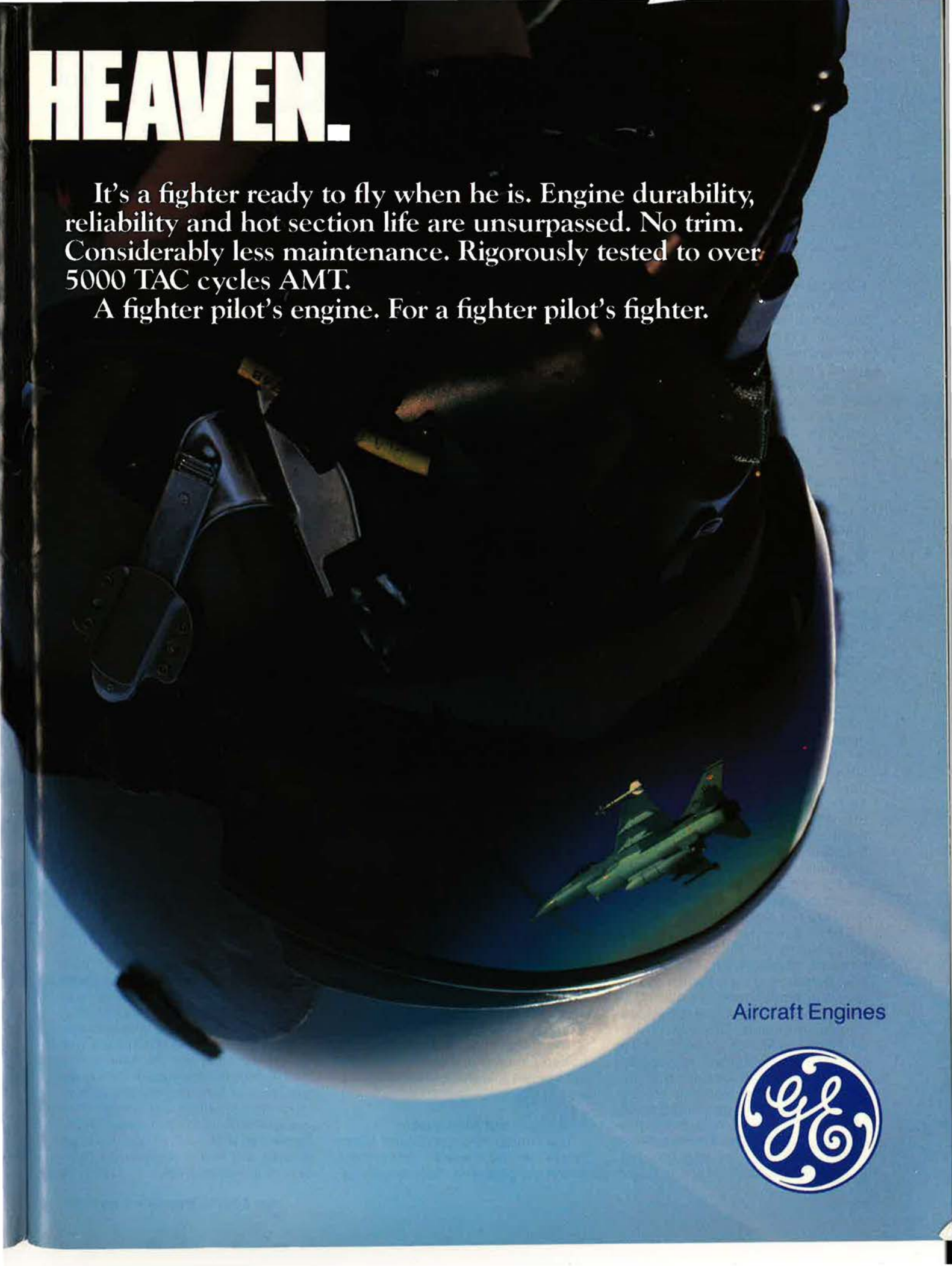
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CAPITOL HILL

By Brian Green, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., April 1

HASC B-1 Report

The House Armed Services Committee has issued a report extremely critical of the B-1B bomber and the management of the Air Force program. The report alleges many technical failings, excessive concurrency in development and production, as well as a poor showing by the Air Force as the prime contractor and systems integrator and a lack of candor when problems came to light. The Air Force counters that the B-1B is the most capable manned penetrating bomber in the world and that the plane's development difficulties are part of the maturation process that many weapon systems experience.

The report identified problems with electronic countermeasures systems as the most significant technical shortfall in the aircraft's capability. These systems are used to help the aircraft penetrate Soviet defenses.

Other technical problems identified include limited range and flight envelopes; difficulties with the terrain-following radar, vital for low-level penetration; a high false-alarm rate on the internal diagnostic set designed to pinpoint problems that need repair; a shortage of spare parts; interference between the B-1's offensive and defensive avionics; difficult refueling; and potential problems with carriage of cruise missiles and short-range attack missiles. The Air Force maintains that all the deficiencies are correctable and that most are not serious.

The Air Force was harshly criticized for pursuing too much concurrency between development and production. Concurrency is intended to save time and reduce program costs, but entails the risk of unforeseen development problems. The report also criticized the Air Force's performance as the prime contractor, responsible for day-to-day management and integration of program elements, for failing to assign enough "adequately skilled" officers to manage the program. B-1B management was also called to task for its reluctance to bring the technical problems to the attention of senior Air Force and DoD officials and Congress.

Budget Actions

The House Budget Committee has tentatively approved a plan that would cut about $16 billion from the $297.6 billion in defense outlays requested in the President's FY '88 budget. Republicans strongly objected to the proposal and refused to participate in the committee votes. The outlay cuts would entail reductions in the $312 billion budget authority request, estimated to be between $24 billion and $35 billion. In inflation-adjusted dollars, the Budget Committee proposal would reduce defense outlays by about four percent and budget authority by five percent to seven percent compared to FY '87.

Meanwhile, the Senate Armed Services Committee (SASC) notified the Senate Budget Committee that it endorsed the full $312 billion Administration request. A letter from Committee Chairman Sen. Sam Nunn (D-Ga.) to Senate Budget Committee Chairman Sen. Lawton Chiles (D-Fla.) noted, however, that the endorsement was not based on an overall view of the budget and efforts to reduce the deficit and that the committee did not endorse the details of the proposed defense budget.

In spite of the SASC endorsement, Senator Chiles released a budget proposal that includes $14 billion less in defense outlays than requested by the President. Though the proposal amounts to about a three percent inflation-adjusted decline, Senator Chiles maintains that his measure actually provides "zero real program growth" because of inflation savings, transfer of unobligated and unexpended balances, and "planned program decreases."

The huge cuts being considered portend intense pressure in the coming months to reduce defense spending.

Arms-Control Measures

The House Appropriations Committee has approved an amendment to the supplemental defense appropriations bill that would enforce US compliance with the numerical limits of the unratified, expired SALT II Treaty. President Reagan determined in late 1986 that the US—because of flaws in the treaty and repeated Soviet violations—would determine its force structure based on military need rather than SALT II constraints. The committee action, if approved by the House and Senate, could reverse that decision.

The committee also approved an amendment that mandates a one-kiloton limit on underground nuclear tests, contingent on reciprocal Soviet restraint and placement of on-site detection devices for verification. The measure is virtually identical to one passed by the House last year, defused only by bargaining prior to the Reykjavik summit. Administration officials have pointed out that nuclear testing is necessary to maintain the safety and reliability of the US nuclear arsenal.

ABM Controversy

SASC Chairman Sen. Sam Nunn (D-Ga.) has blasted the Reagan Administration's broad interpretation of the 1972 Antiballistic Missile (ABM) Treaty. The Treaty limits deployment, development, and testing of ABM systems. In December 1985, the Administration accepted a broad interpretation of the treaty that would permit development and testing of exotic ABM technologies not embodied in systems extant in 1972. Senator Nunn argued that the Administration position was characterized by "egregious misinterpretation and omission" and that the narrow interpretation, banning development and testing of exotic technology ABM systems, was clearly supported by the negotiating record and ratification proceedings.

Senator Nunn's position puts him squarely at odds with the vocal minority in Congress that supports early deployment of SDI systems. The Administration considers the broad interpretation vital to SDI progress. The Air Force has argued that SDI is a high priority, but that a deployment decision is still premature. ■

DEFENSE DIALOG

VHSIC APPLICATION. The first operational application of a Very High Speed Integrated Circuit (VHSIC)-populated board has been successfully tested on an Air Force F-111. Developed by the Autonetics Strategic Systems Division (ASSD), this pin-for-pin compatible replacement for the F-111 Digital Signal Transfer Unit (DSTU) Interface Board transfers data from digital storage to the pilot's CRT for display of navigation, armament status, and target disposition. This and similar VHSIC insertion programs are expected to play a significant role in USAF upgrades of the F-111 avionics.

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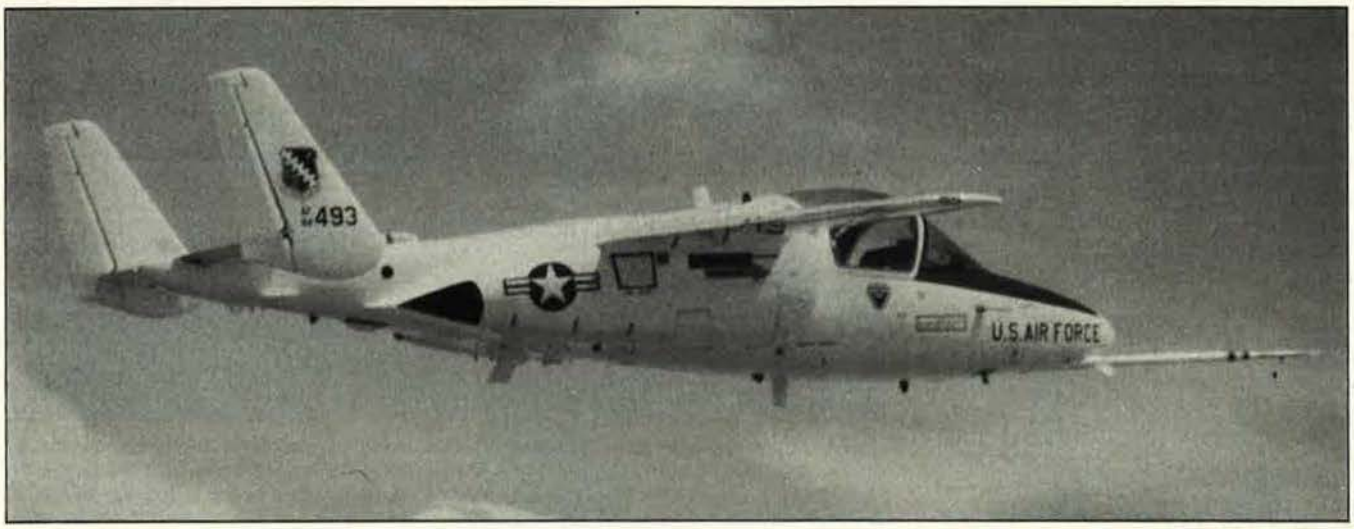
AEROSPACE WORLD

. . . PEOPLE . . . PLACES . . . EVENTS . . .

By Jeffrey P. Rhodes, AERONAUTICS EDITOR



The Air Force and Fairchild Industries reached an agreement in early March to terminate Lot 1 production of the T-46A trainer. This action officially ends the T-46 program. As a result of this cancellation, Fairchild will close its Republic plant on Long Island. Pictured is the second T-46 preproduction aircraft on a test sortie at Edwards AFB, Calif.

Washington, D. C., March 31 ★ The Air Force and Fairchild Industries, Inc., reached agreement in early March to terminate work on Lot 1 production of the T-46A trainer. This action ends the T-46 program and also effectively closes a chapter in aviation history. Fairchild has announced that it will shut down its Republic plant on Long Island, N. Y., where the T-46 was to have been built. Republic had produced such aircraft as the AT-12, the P-47, the F-84, the F-105, and the A-10 at that plant. Approximately 2,800 workers will be laid off.

Fairchild had delivered two preproduction T-46As and one production article to the Air Force, but the termination agreement immediately stopped all work on the remaining nine aircraft in the Lot 1 contract. The three completed aircraft had been undergoing testing at Edwards AFB, Calif., but neither the future of the test program nor the disposition of the airframes had been determined at this writing. The cancellation will result in $40 million in cost avoidance to the Air Force and will also allow Fairchild to cut its mounting losses.

The Air Force had originally intended to purchase 650 T-46As as its primary trainer to replace the nearly thirty-year-old T-37 fleet. But management and production deficiencies at the Republic plant (which were later corrected), along with reduced priority for the Next-Generation Trainer (NGT) program in the Air Force's budget plans, spelled the end for the T-46.

In an effort to save the T-46 program, Congress, spearheaded by the New York state delegation, ordered the Air Force to hold a competitive flyoff among the T-46, the T-37, a modified T-37, and any other suitable trainers. The Air Force has asked for relief from the flyoff, but Congress has not yet given its answer.

If the relief is granted, there would, of course, be no flyoff. But if the relief is not granted and with the T-46 now out of the picture, the Air Force is preparing to hold what has been called a Primary Trainer Evaluation in the fall. The Primary Trainer Evaluation would include foreign trainer aircraft—the Pilatus PC-9 turboprop or the British Aerospace Hawk might be candidates—but would not include the upgraded T-37. No winner will be picked, and no contract will be awarded, but a flyoff will have been held, and the congressional mandate will have been carried out.

Fairchild, which had produced such aircraft as the PT-19, C-119, and C-123 at its other plants, is now out of the military aircraft production business. It will continue to do subcontract work at its plant at Hagerstown, Md., and will establish an engineering center on Long Island to continue to support the A-10.

★ The Air Force has just about given up hope of ever flying Space Shuttles out of Vandenberg AFB, Calif.

The Shuttles evidently will be incapable of boosting operational satellites into polar orbits, the mission that USAF had in mind for them when it built Space Launch Complex-6 (SLC-6) at Vandenberg specifically for their launching.

The problem is one of weight. As rebuilt for safety purposes in the wake of the *Challenger* disaster of January 28, 1986, the Shuttles will be too heavy to do the job that the Air Force had demanded of them.

Their payload capacities will be greatly diminished by the weight to be added to their solid rocket boosters (SRBs) and to the Orbiters themselves. The weight increase came about as a result of the redesign of the joints between the segments of the SRBs.

As a consequence, the Air Force will almost certainly have to rely on its big Martin Marietta Titan IV CELVs (Complementary Expendable Launch Vehicles) to launch all large operational satellites into polar orbits and will probably have to order more Titan IVs than the twenty-three presently authorized.

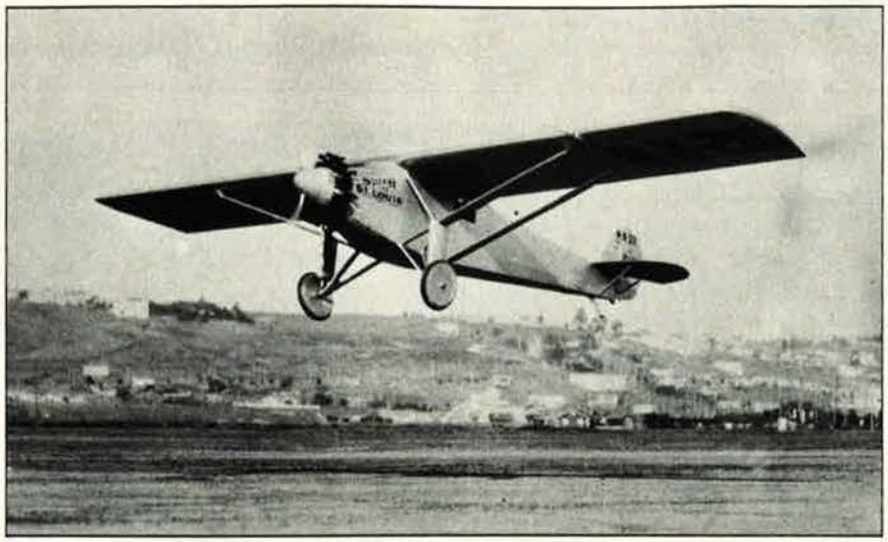
USAF's SLC-4 at Vandenberg, now used for launching payloads aboard smaller Titan 34D boosters, will be converted to handle Titan IV launches once the Titan 34D inventory has been exhausted in the coming months.

USAF is now considering building a second complex for Titan IV launches at Vandenberg as well. The first such launch is scheduled for early to mid-1989. USAF will begin taking deliveries of Titan IVs late this year and has earmarked the first of them to launch a satellite into equatorial orbit from the Kennedy Space Center in Florida in April 1988.

Prior to the *Challenger* accident, the Air Force believed it would be able to ferry up to 32,000 pounds of payload into polar orbit aboard each Shuttle launched at Vandenberg. The best it could do with the modified Shuttles is about 21,000 pounds, which is not enough to meet USAF needs.

The unlikelihood of Vandenberg Shuttle launches became apparent last March when the National Aeronautics and Space Administration abandoned its development of filament-wound cases (FWCs) to replace the much heavier steel cases that now surround the SRBs. FWCs would have cut the weight of each SRB by 4,600 pounds, and their incorporation might have made it possible for USAF to proceed with Vandenberg Shuttle launches as originally planned.

AEROSPACE WORLD



It was sixty years ago this month that Charles Lindbergh became the first person to fly across the Atlantic solo and nonstop. His trip from Roosevelt Field on Long Island, N. Y., to Le Bourget Field in Paris took thirty-three and a half hours in the Ryan NYP* Spirit of St. Louis.** ***Today, the trip from New York to Paris on the supersonic Concorde takes about thirty hours less.

★ The tests are getting more difficult, but the AIM-120A Advanced Medium-Range Air-to-Air Missile (AMRAAM) continues to do well in its full-scale development program. In two tests conducted in late February and early March, two of the three missiles fired passed within lethal range of their targets, while the other missile missed. These latest tests bring the AMRAAM scoreboard to twenty-three successes in twenty-seven attempts, or a success rate of eighty-five percent.

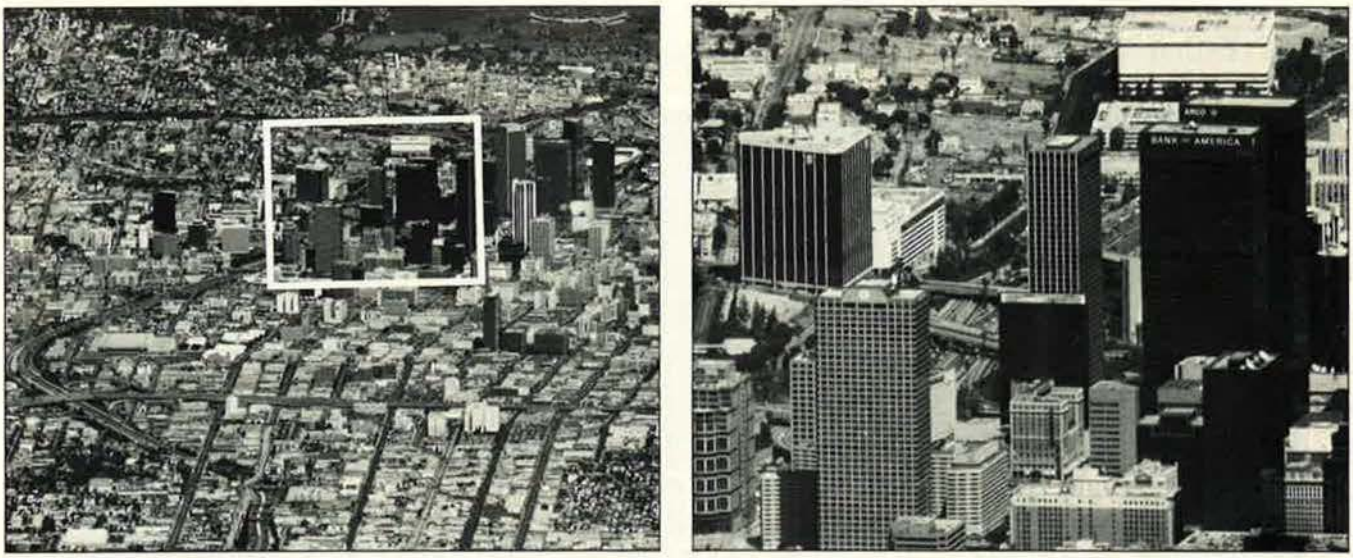
On February 20, an F-15 launched two of the nearly twelve-foot-long missiles at two QF-100 drones in a head-on attack at midrange over the Eglin AFB, Fla., range in the Gulf of Mexico. The QF-100s were flying very close together so that the F-15's radar could not distinguish them as separate targets. The F-15's APG-63 multimode radar was operating in the "track-while-scan" mode, which allows the pilot to attack more than one target in a single engagement. The drones were also dispensing chaff to confuse the radar even further.

After launch, the unarmed AIM-120s recognized the cluster as two targets, and each missile had to select and attack one of the drones. The first missile passed within lethal range of the target, but the second AMRAAM missed. The Air Force is conducting a detailed analysis of the test data to determine the reason for the miss.

Not quite two weeks later, another F-15 flying at Mach 0.90 and at an altitude of 10,000 feet above the desert at the White Sands Missile Range in New Mexico launched an unarmed AIM-120 at two QF-100s in a head-on, look-down/shoot-down engagement. The drones were flying abreast of each other at Mach 0.80 at 1,000 feet above ground level. This was the first cluster test in which the drones flew abreast. Previous tests had the drones in trail or echelon formation.

The F-15's radar was in the "single-target-track" mode. The radar acquired the clustered targets, the pilot launched the missile, and the AIM-120's on-board active radar desig-

Air Force Secretary Edward C. Aldridge, Jr., far left, and Air Force Vice Chief of Staff Gen. Monroe W. Hatch, Jr., far right, recently presented the 1986 Lance P. Sijan Leadership Awards to (with plaques from left) Col. William D. Rothe, Maj. Sharla J. Cook, SMSgt. Chalma L. Sexton, Jr., and TSgt. John M. Dulaney. The award is presented annually to two officers and two enlisted members who have demonstrated the highest qualities of leadership. (USAF photo)



CAI, a division of Recon/Optical, Inc., recently completed qualification and flight tests with its KS-147A Long-Range Oblique Photographic (LOROP) camera. These views of downtown Los Angeles, Calif., were taken from an altitude of 30,446 feet and a distance of thirty miles. The left photo has been magnified three times, while the photo on the right, which corresponds to the box in the left photo, has been magnified twenty-two times. The camera will be used on Northrop RF-5Es.

nated a single target for attack. The 335-pound missile then passed within lethal range. The AIM-120's ability to distinguish targets in a cluster is an important advantage. Other, older missiles might have picked a point midway between the two targets and missed completely.

Air Force Systems Command's Armament Division at Eglin is the program manager for the joint Air Force/Navy AMRAAM program. Hughes is the prime contractor for the AIM-120, and Raytheon is the second-source contractor.

★ The Air Force has also recorded recent successes in the test programs of its bigger missiles—the LGM-118A Peacekeeper and the AGM-86B Air-Launched Cruise Missile (ALCM).

On March 21, the seventeenth flight test of the four-stage Peacekeeper intercontinental ballistic missile was successfully carried out after launch from a modified Minuteman III silo at Vandenberg AFB, Calif. The seventy-foot-tall missile flew approximately 4,100 miles to the Western Missile Test Range near Kwajalein in the Pacific Ocean.

The missile carried six unarmed Mk 21 reentry vehicles on this test, and all of the RVs impacted in the target area. The LGM-118A is capable of carrying ten RVs, each of which can be targeted independently.

The Peacekeeper reached initial operational capability (IOC) at F. E. Warren AFB, Wyo., last December when ten of the fifty planned missiles were placed on alert. There will be three more test launches of the LGM-118 in the current test program.

Sgt. Daniel R. Lagoy recently became the first member of the 501st Tactical Missile Wing at RAF Greenham Common, UK, to be appointed to noncommissioned officer status during a field ceremony. Capt. Rick Johnson, Sergeant Lagoy's commander, commended the new NCO for his work with the ground-launched cruise missile. (USAF photo by TSgt. Jack Siebold)

This round of tests was designed to examine development, testing, and operational requirements for the missile.

On February 24 and again on March 1, an AGM-86B ALCM was launched from a B-52G, and the missile successfully flew a flight path of approximately 1,500 miles over the Canadian wilderness in each test. The routes extended from the Beaufort Sea north of the Arctic Circle to the range at CFB Cold Lake in Alberta. B-52s from the 97th Bomb Wing at Blytheville AFB, Ark., launched the missiles.

In related news, the Navy carried out the second successful test of its Trident II submarine-launched ballistic missile on March 17. The three-stage, forty-four-foot-tall missile was launched from a flat pad at Cape Canaveral AFS, Fla., and carried an instrumented payload an unspecified distance into the Eastern Missile Test Range in the Atlantic Ocean. The main objective of the test was labeled "basic missile development."

The first launch of the Trident II, or D-5 as it is known, was conducted January 15. The Navy has scheduled at least twenty pad launches of the ten-warhead D-5, with test firings from a submarine scheduled to begin in 1989.

AEROSPACE WORLD

★ With nearly $8 billion worth of prime contracts and approximately $38 million more in contracts to its divisions and subsidiaries, General Dynamics ranked number one in a recently released tally of the Department of Defense's top 100 contractors for FY '86. GD last held the top spot in FY '83 and was second in the FY '85 poll.

The biggest movers in this year's poll were McDonnell Douglas (approximately $6.6 billion in contracts), which fell to third after first-place finishes in both FY '84 and FY '85, and General Motors ($5.1 billion). Because of its acquisition of Hughes Aircraft during 1986, GM made the biggest jump, going from seventeenth place to fifth. Hughes, listed as a subsidiary of the Howard Hughes Medical Institute last year, held eighth place in the FY '85 accounting.

The top ten firms in FY '86, with dollar values of all contracts awarded to the parent company and its divisions and that firm's FY '85 rank, are shown in the box below.

The total DoD contract awards came to $145,742,058,000 in FY '86, or about four percent less than the total awarded in FY '85. Of that total, $98,621,062,000 was awarded to the top 100 firms, or about seven percent less than the $105,587,453,000 awarded to the top 100 firms of FY '85. Five companies in the top ten did less defense business volume in FY '86 than in FY '85, including Lockheed, even though that company retained sixth place. Grumman, the other concern that did not move up or down in the poll, did $200,000,000 more business with DoD in FY '86 than it did in FY '85.

In all, twenty-three firms did more than $1 billion worth of defense business in FY '86, or five fewer companies than the twenty-eight firms in the "billion dollar club" of FY '85. The 100th ranked firm, Brunswick Corp., received contracts that came to a total of $148,972,000.

The Top Ten

Firm	Contract Value (000s)	FY '85 Rank
1. General Dynamics Corp.	$8,012,975	2
2. General Electric Co.	6,847,079	4
3. McDonnell Douglas Corp.	6,586,311	1
4. Rockwell International Corp.	5,589,681	3
5. General Motors Corp.	5,069,296	17
6. Lockheed Corp.	4,896,318	6
7. Raytheon Co.	4,051,573	9
8. The Boeing Co.	3,556,026	5
9. United Technologies Corp.	3,527,014	7
10. Grumman Corp.	2,967,495	10

Following the deactivation of the 84th Fighter Interceptor Training Squadron at Castle AFB, Calif., this Lockheed T-33A Shooting Star was flown to March AFB, Calif., where it will be put on static display. The crew for the last flight was Maj. Jon T. Peters (front seat), 84th FITS Commander, and SMSgt. Lynn Pinson, the unit's first sergeant. Two other 84th FITS T-33s will go to museums, while the unit's eight other T-33s will go to the Mexican Air Force. (USAF photo by A1C Thomas J. Vitrano)

★ In an announcement that surprised absolutely no one, the National Aeronautic Association announced in early March that Jeana L. Yeager, Richard G. (Dick) Rutan, Elbert L. (Burt) Rutan, and the *Voyager* team of volunteers have been selected as the winners of the prestigious Collier Trophy for 1986.

In becoming the first pilots to fly around the world unrefueled and nonstop, Ms. Yeager and Dick Rutan proved Burt Rutan's unconventional design and use of composite materials in the *Voyager* aircraft and accomplished a feat considered by many to be impossible. The flight effectively demonstrated the capability of a radical new aerodynamic configuration and once again demonstrated the personal perseverance that has played a part in every aeronautical achievement.

AEROSPACE WORLD

The Collier Trophy has been presented annually since 1911 for the greatest achievement in aeronautics or astronautics in America demonstrated by actual use in the previous year. The trophy will be presented to the *Voyager* team at a dinner in mid-May.

The *Voyager* aircraft has recently been deeded to the Smithsonian Institution's National Air and Space Museum. Because of its large size, the plane will have to be hung in the building's South Lobby. *Voyager* will be on display at the Paris Air Show this summer and will be transferred to NASM this fall. It will not be flown under its own power again. *Voyager's* nonstop distance record was also recently certified by the Fédération Aéronautique Internationale (FAI), the international aviation authority.

★ The findings of a recently released National Science Teachers Association (NSTA) survey indicate that an alarming number of the nation's secondary schools are suffering from a serious shortfall in basic science courses.

The survey found that 7,100 of the nation's 16,000 high schools offer no physics courses, 4,200 offer no chemistry courses, and 1,900 offer no courses in biology.

Approximately 56.7 percent of the 14,638,000 students in the survey are enrolled in science courses. Since most ninth grade students take one science course anyway, the figures suggest that only one-third of the students in grades ten through twelve are enrolled in science courses.

The NSTA conducted its survey of US public and private schools during August and September 1985 for the 1985–86 school year.

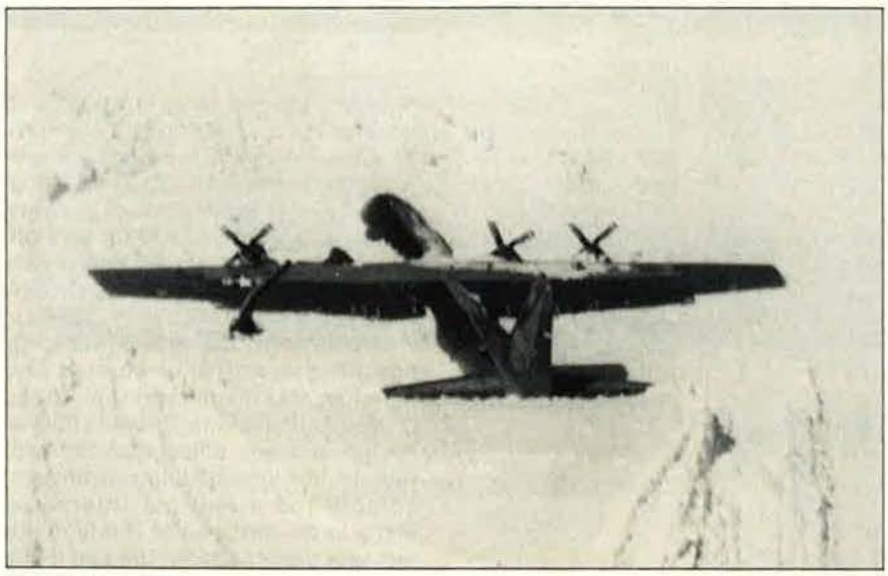
The demand for personnel with science and math skills is becoming increasingly great. The Air Force estimates that a math and science background is desirable in an overwhelming majority of its career fields.

As the school year ends, USAF gets a new crop of AFROTC-trained officers. Among them is Marissa Sasso (left), ROTC nursing student at the University of Florida, here shown with her roommate Cindy Jedlick, also an ROTC nurse. (Photo by Patrick Dyson)

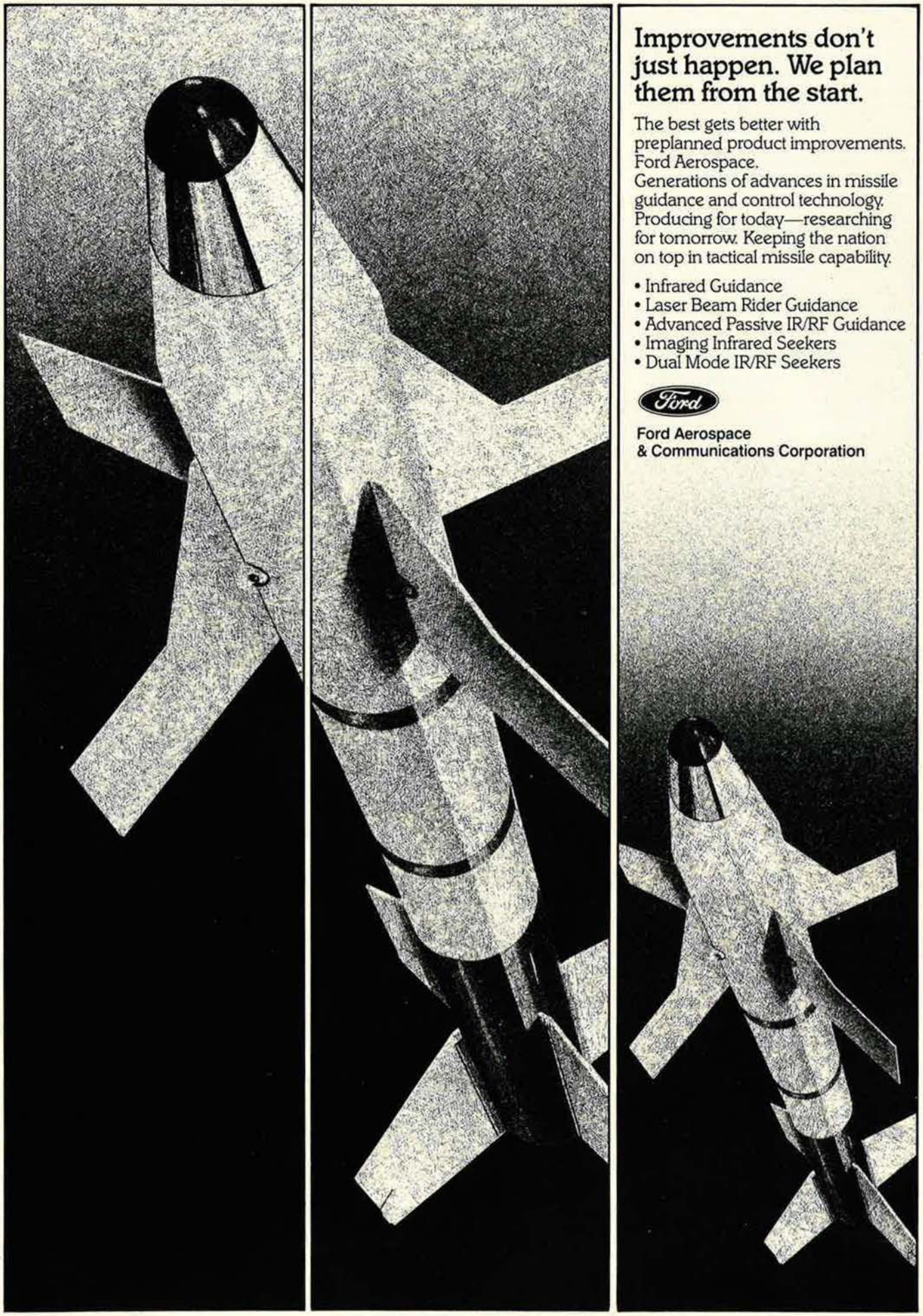
Also, according to US Education Secretary William J. Bennett, the average high school science requirement in the US is just under two years. Mr. Bennett added that the nation's students study only half to one-third as much science as students in West Germany, Japan, East Germany, and the Soviet Union.

★ For the first time, a major US experimental aircraft effort, the Enhanced Fighter Maneuverability (EFM) program, will be undertaken in cooperation with a foreign country. The EFM prototype aircraft, designated the X-31A, will be a cooperative effort between the West German firm of Messerschmitt-Bölkow-Blohm and Rockwell International's North American Aircraft Operations Division. General Electric's Aircraft Engine and Aerospace Business Group will be major subcontractors. Funding for the MBB effort is coming from the West German government, while the Defense Advanced Research Projects Agency (DARPA) and the Naval Air Systems Command are helping to fund the Rockwell and GE shares of the work.

The X-31 demonstrator will be designed to break the "stall barrier" and allow close-in aerial combat beyond normal stall angles of attack as well as transonic and supersonic engagements and ground attack. Areas to be investigated with the aircraft include vectored thrust, integrated control systems, and aircrew assistance and improved protection when dealing with high linear and angular accelerations.



This Lockheed LC-130F was recently dug out of "deep freeze" on McMurdo Sound in Antarctica. After an aborted takeoff sixteen years ago, the plane was abandoned and became covered with ice and snow, leaving exposed only the top three feet of its thirty-eight-foot-high stabilizer. The plane was found to be structurally sound and will likely be flown out after a few weeks of field repair.



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Two X-31A aircraft will be built, and the single-engine aircraft will be powered by GE F404 engines provided by the Navy. Other government-furnished equipment will likely include landing gear, canopies, and control actuators as a cost-reduction measure. First flight of the X-31 is scheduled for late 1989, and the actual flight test program, which will take place at the Naval Air Test Center at NAS Patuxent River, Md., is scheduled to last a year.

DARPA is the overall manager for the EFM program. Wind-tunnel testing will take place at NASA's Langley Research Center in Hampton, Va. A Supermaneuver Steering Group has been formed at Air Force Systems Command's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, and it will coordinate the EFM effort with the Air Force's STOL Technology and Maneuvering Demonstration program, the high-angle-of-attack work being done with the Grumman X-29 forward-swept wing prototype, and other programs.

AEROSPACE WORLD

★ **MILESTONES—McDonnell Douglas Helicopter Co. delivered the 200th AH-64A Apache** attack helicopter to the Army on March 2. The delivery was a month ahead of schedule. The Army has ordered 593 AH-64s under contracts worth more than $1.6 billion. The current delivery rate is twelve helicopters per month, and production is scheduled to be completed in 1989.

The **Community College of the Air Force** recently turned out its **50,000th graduate.** TSgt. Barbara J. Curry, an air traffic controller at Luke AFB, Ariz., was the recipient of the landmark sheepskin. She was scheduled to be honored at CCAF's fifteenth anniversary dinner in late April.

★ **NEWS NOTES—The US Coast Guard's first air interdiction squadron was recently formed** at NAS Oceana near Norfolk, Va. The squadron, which will fly two Grumman E-2C Hawkeye airborne early warning aircraft, will primarily be utilized for radar surveillance aimed at stopping drug smugglers, but will have a secondary mission of providing early warning inputs to the Atlantic maritime defense zone. The US Customs Service will also begin using E-2Cs for its drug-interdiction mission in the near future.

In February, the **Aerospace Medical Division** at Brooks AFB, Tex., was **renamed as the Human Systems Division** to describe the division's mission more clearly. HSD works in such areas as crew/system integration, force readiness, and crew and environmental protection.

The **Air Force's fleet of General Dynamics F-16 fighters achieved a 91.3 percent mission-capable rate** for calendar year 1986, according to officials at Air Force Systems Com-

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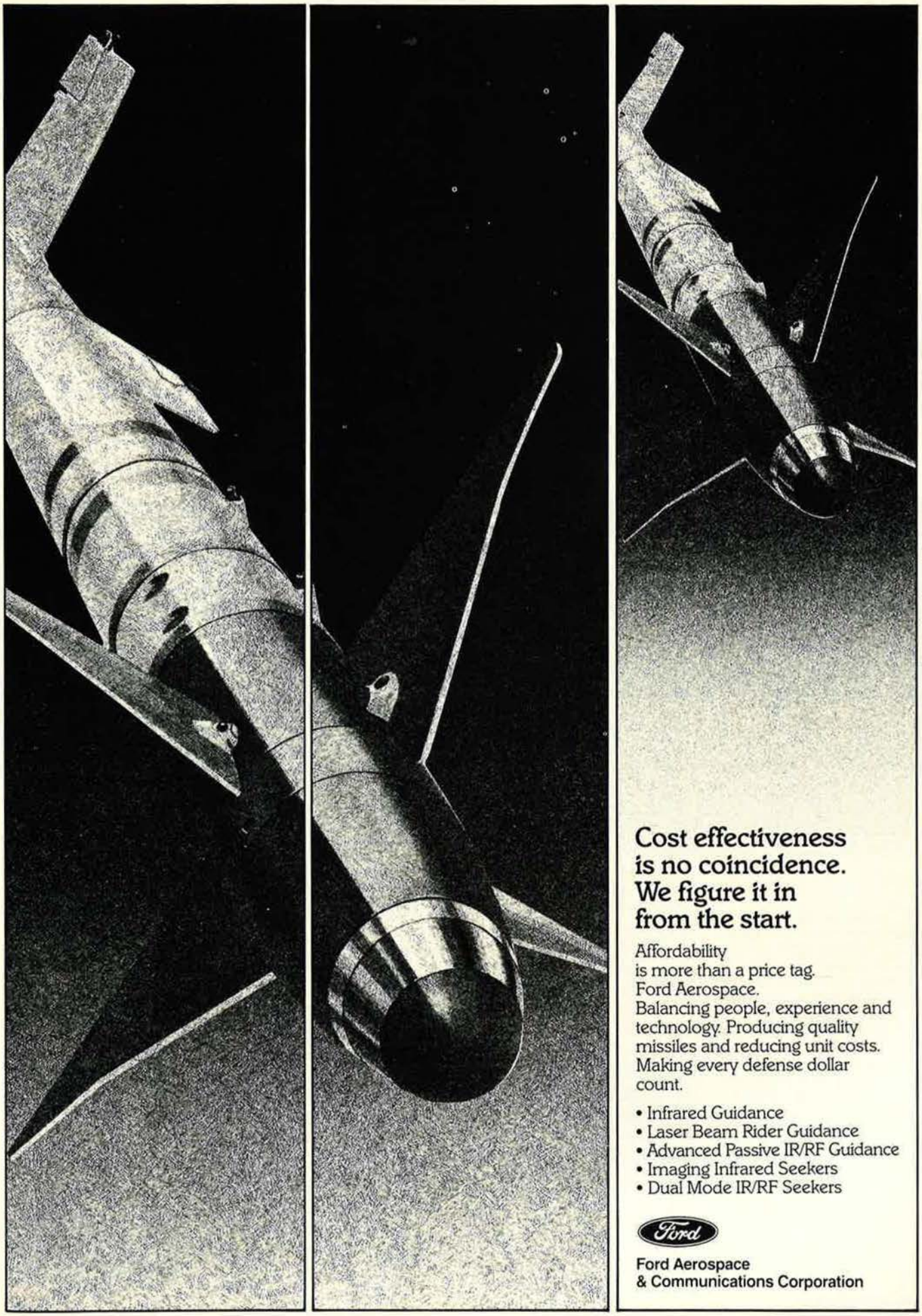

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The tests are tough. Realistic. Hardly routine.

Vital ongoing tests to see how well Hughes Aircraft Company's Advanced Medium-Range Air-to-Air Missile (AMRAAM) can pierce electronic countermeasures. Discriminate between cluster targets. Launch multiple AMRAAMs at multiple targets. Overcome evasive maneuvers. And discriminate between the target and background radar "clutter."

By March 1987, 27 tests, 23 successful missions. The other four give Hughes' engineers and scientists more data to work toward product excellence.

A Hughes Aircraft Company Advanced Medium-Range Air-to-Air Missile (AMRAAM) is launched from an F-16.

AMRAAM's uniqueness lies in its on-board guidance system. When a target is within range of AMRAAM's built-in active radar, the missile can guide itself to the designated target, giving the pilot the capability to take evasive action or pursue other enemy aircraft. "The AMRAAM will double the capability of the F-15," says Lt. Gen. Bernard P. Randolph, "and increase the effectiveness of the F-16 by a factor of six."

"AMRAAM's test program is the most successful ever for this type of missile." –U.S.A.F. Lt. Gen. Bernard P. Randolph

Compact and reliable, AMRAAM is under full-scale development for the U.S. Air Force and Navy. The latest in a long line of Hughes air-launched missile success stories that include the Phoenix, Maverick, and Falcon missiles. A story that is only beginning, according to program manager Brig. Gen. Thomas Ferguson: "AMRAAM's new capability will far exceed any missile system in the inventory today, and will continue to be an effective force multiplier well into the next century."

1. The missile's radar guides it toward the designated target. 2. AMRAAM just prior to interception. 3. Scoring a direct hit (White Sands Missile Range, New Mexico).

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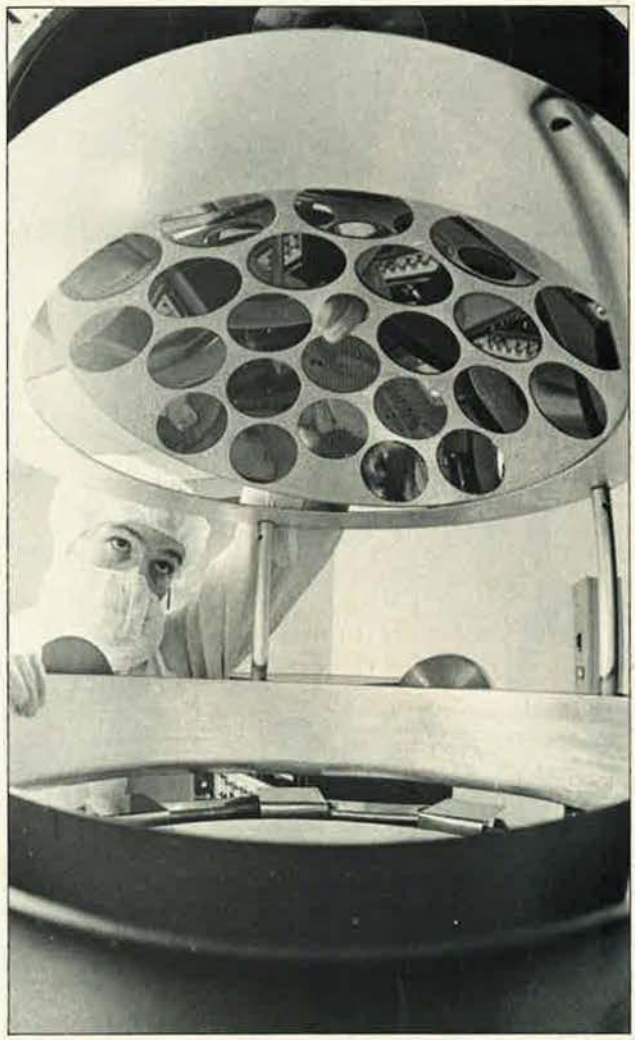
mand's Aeronautical Systems Division at Wright-Patterson AFB, Ohio. This means that approximately nine out of every ten Air Force F-16s were ready to fly at any given time. The earlier F-16A and B models achieved a mission-capable rate of 89.7 percent, while the newer F-16C and D models achieved a rate of ninety-three percent.

A **memorial to the seven astronauts killed in the January 28, 1986, explosion of the Space Shuttle *Challenger*** was dedicated March 21 **at Arlington National Cemetery.** The six-foot-tall granite marker with a bronze plaque bearing the likenesses of the crew and spacecraft was unveiled by Vice President George Bush and NASA's Administrator James C. Fletcher. The memorial was commissioned by Congress and was sculpted by employees of the Army's Institute of Heraldry. The remains of astronaut Francis R. (Dick) Scobee, mission commander of Mission 51-L, and Michael J. Smith, *Challenger's* pilot, are buried at the cemetery.

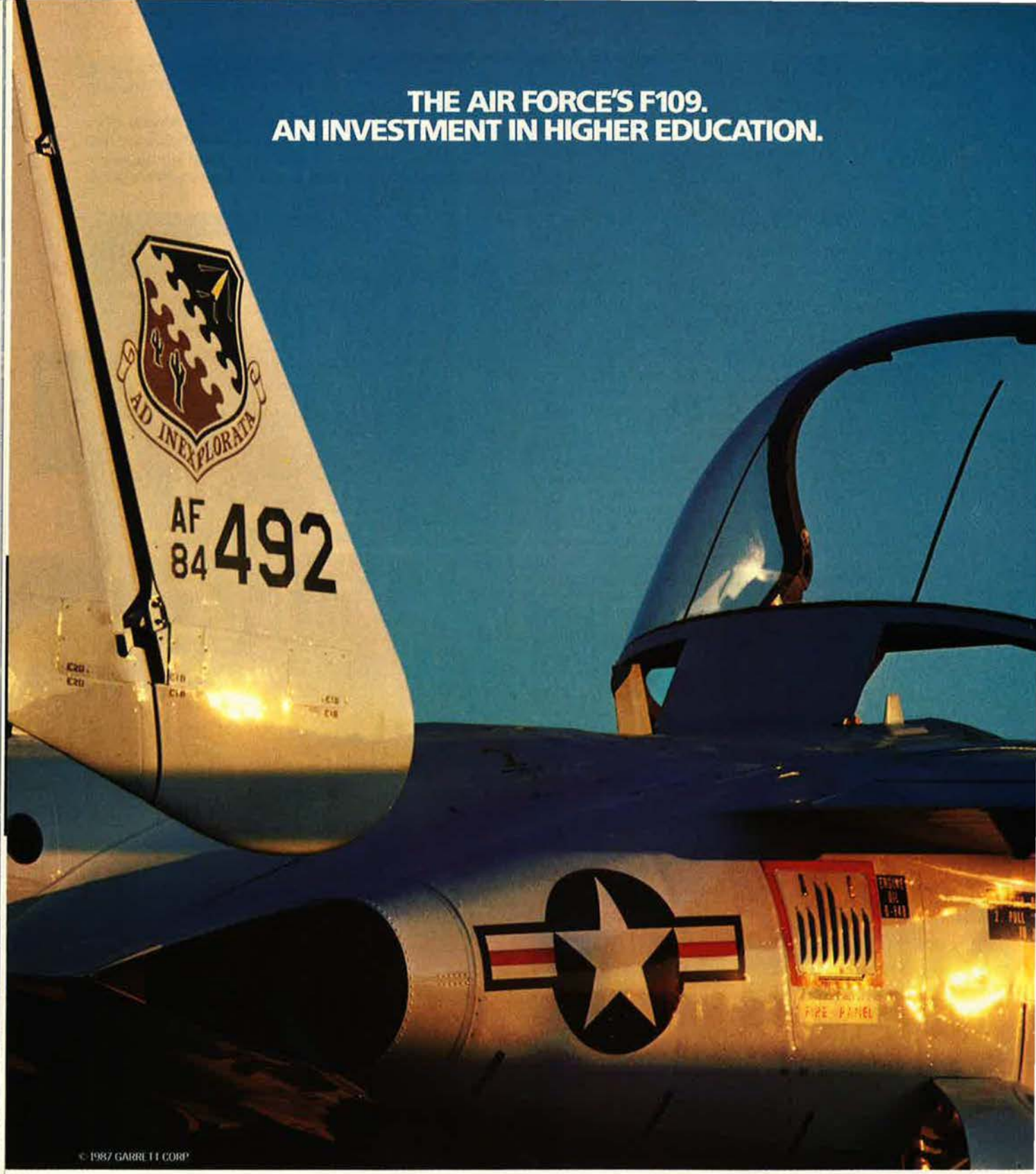
If **organic depot maintenance** in Air Force Logistics Command **could be ranked on the Fortune 500 list** of major American companies, **it would rank eighty-first in terms of employees and ninety-first in terms of sales.** The five air logistics centers and AFLC's Aerospace Guidance and Metrology Center achieved 99.87 percent of their financial goals and made a productivity savings or a cost avoidance of 6.2 percent of total revenues last year. AFLC maintenance organizations also generate 3,000,000 gallons of concentrated liquid wastes and 2,000,000 tons of solid waste per year as by-products of all the work the organizations perform. AFLC currently has three major initiatives under way to reduce, treat and dispose of, and avoid creating new problems with the waste.

General Electric and Martin Marietta announced in late February that they are teaming up to pursue contracts **to develop the electro-optical**



The team of Raytheon and Texas Instruments was recently selected to develop gallium arsenide microcircuits under the triservice Microwave/Millimeter Wave Monolithic Integrated Circuit (MIMIC) program. Patrick Hindle, a technician at Raytheon's Research Division in Lexington, Mass., is shown inspecting the twenty-five three-inch gallium arsenide wafers inside of an evaporator before they are coated with a metal film.

SSgt. Todd M. Hamilton (right), a security policeman with the 142d Security Police Flight in Portland, Ore., became the 2,000th graduate of ANG's NCO Leadership School during ceremonies in late February. Retired CMSgt. Paul H. Lankford, the first commandant of the ANG NCO Academy and Leadership School, served as the guest speaker and presented the milestone sheepskin at the graduation exercise. The Leadership School is located at the I. G. Brown ANG Professional Military Education Center in Knoxville, Tenn.



It's a 1,500 lb. class trainer engine. And it has already accumulated over 8,000 lab testing hours and over 600 operating hours in the flight test program. With the best SFC in its class and a projected 8 maintenance minutes per engine flight hour.

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sensor system (EOSS) for the Air Force's new Advanced Tactical Fighter (ATF). GE is also teamed with Hughes Aircraft to develop the ATF's radar. The two GE teams will be competing against Westinghouse and its partner, Texas Instruments. Westinghouse and TI are teamed for both the EOSS and the radar for the ATF.

The 103d Tactical Fighter Group at Bradley ANGB, Conn., passed the 25,000-sortie mark with its Fairchild A-10A Thunderbolt II aircraft on February 27. Capt. Bob Jones (right), pilot on the landmark mission, and crew chief TSgt. David Santos display a "check" for the achievement. (ConnANG photo by TSgt. Joel Dobbin)

★ **DEATH**—The **Pioneer 9 spacecraft,** which has been orbiting the sun for nearly two decades, was declared "dead" on March 3 after a last-ditch attempt to revive the spacecraft failed. Engineers at NASA's Ames Research Center in Mountain View, Calif., used a wide variety of transmitters, antennas, and receivers, but no signal from the satellite was detected.

Launched on November 8, 1968, and expected to live only six months, Pioneer 9 has circled the sun twenty-two times, covering a distance of approximately 11,000,000,000 miles during that span. The 148-pound spacecraft sent back 4,250,000,000 bits of data to earth during its operational life, mainly detailed, comprehensive measurements of solar wind, the solar magnetic field, and cosmic rays. Cause of death is believed to have been an electrical short caused by a worn-out part. Collision with a meteor is another possibility.

Pioneer 9 is survived by its sister ships, Pioneers 6, 7, and 8, which are still functioning. "We're sorry to lose Pioneer 9, but it had its day in the sun," quipped Pioneer engineer Robert Jackson. The Pioneer satellites were made by TRW Inc.

Senior Staff Changes

RETIREMENT: Gen. Charles L. **Donnelly,** Jr.

CHANGES: B/G (M/G selectee) Joseph W. Ashy, from C/S, Hq. TAC, Langley AFB, Va., to DCS/Plans, Hq. TAC, Langley AFB, Va., replacing M/G (L/G selectee) Charles A. Horner . . . **M/G Thomas P. Ball, Jr.,** from Cmdr., Wilford Hall USAF Medical Center, AFSC, Lackland AFB, Tex., to Cmdr., Joint Military Medical Command, San Antonio, Tex. . . . **B/G Harald G. Hermes,** from Ass't DCS/Ops., Hq. TAC, Langley AFB, Va., to C/S, Hq. TAC, Langley AFB, Va., replacing B/G (M/G selectee) Joseph W. Ashy . . . **Col. (B/G selectee) James L. Jamerson,** from Cmdr., 23d TFW, TAC, England AFB, La., to Cmdr., 56th TTW, TAC, MacDill AFB, Fla., replacing Col. (B/G selectee) Joseph W. Ralston . . . **Col. (B/G selectee) Joseph W. Ralston,** from Cmdr., 56th TTW, TAC, MacDill AFB, Fla., to Ass't DCS/Ops., Hq. TAC, Langley AFB, Va., replacing B/G Harald G. Hermes.

SENIOR ENLISTED ADVISOR CHANGE: CMSgt. Jimmie D. Hedgpeth, to SEA, Hq. USAFE, Ramstein AB, Germany, replacing retiring CMSgt. John R. McCauslin. ■

The White House draws up a formal strategy that integrates US foreign, defense, and economic policies.

The New National Strategy

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

As stipulated by Congress and the Packard Commission, the Administration has drawn up the country's first formal national security strategy that fully interweaves and integrates foreign, arms-control, and defense policies. The forty-one-page document, titled "National Security Strategy of the United States," specifies the broad aims that undergird "America's leadership role in the world today"—as well as some specific policies and requirements that ensue from these objectives.

In addition to coalescing traditional military, geopolitical, and economic aims into a central policy, the document plows new ground, at times with considerable élan. For instance, there is the bold pledge to "defend and advance the cause of democracy, freedom, and human rights throughout the world" coupled to the assertion that to do any less "would be a betrayal of our national heritage." The means for achieving broad goals of this type must be the "coordinated use of national power," the document suggests, albeit without providing specific guidance on when and how that power should be brought to bear.

As a part of the commitment to advance the cause of freedom, the US needs "to encourage liberalizing tendencies within the Soviet Union and its client states." Elsewhere, the new umbrella policy seeks to "force the Soviet Union to bear the brunt of its domestic economic shortcomings in order to discourage excessive Soviet military expenditures and global adventurism." At the same time, the US will "foster closer relations with the People's Republic of China."

The overall formula for dealing with the USSR is stated with laudable candor. The US seeks:

- To maintain stable global and regional military balances vis-à-vis the USSR and states aligned with it;
- To aid threatened states in resisting Soviet and Soviet-sponsored subversion or aggression;
- To eliminate, where possible, the root causes of regional instabilities that create the risk of major war; and
- To neutralize the efforts of the Soviet Union to increase its influence in the world and to weaken the links between the USSR and its client states in the Third World.

The relationship with the USSR involves a balancing act of sorts. On the one hand, "fundamental differences in economic, social, and political beliefs and objectives lead to an essentially adversarial relationship between the US and the Soviet Union." At the same time, there is the presumption that the Soviet Union shares "the common goal of avoiding direct confrontation and reducing the threat of nuclear war." The primary challenge for American statecraft is therefore to capitalize on "this commonality of interests so as to preserve peace without jeopardizing our national security or abandoning our commitment to the cause of freedom and justice."

"Peaceful Coexistence"

Achieving détente with the USSR is not portrayed as an easy task, however. For one, the "unprecedented military buildup [launched by Moscow] poses a continuing threat to the US and our allies. The Soviet Union persists in allocating a disproportionate percentage of its resources—between fifteen percent and seventeen per-

cent of the total GNP—to the buildup of its military forces," which now number more than 5,000,000 uniformed personnel, not counting more than 1,000,000 border guards and other security forces.

The White House document also finds that "the evidence of the relationship between the Soviet Union and the growth of worldwide terrorism is now conclusive." Even though the Soviet Union does not have direct control over most of the terrorist groups, it is the US assessment that the USSR "supplies massive amounts of arms, money, and advisory assistance to revolutionary forces engaged in terrorist activities." The White House document contends further that the Soviets attempt "to disguise such support by using [surrogates]—radical governments, such as Cuba, North Korea, Nicaragua, Syria, and Libya, which deal directly with radical terrorists and insurgents."

In manipulating go-betweens as well as in the broad context of wielding the instruments of power, the Soviet Union in recent years has become much more sophisticated. "Despite significant weaknesses in the Soviet economy, the Politburo actively employs economic instruments in its global strategy. It uses trade with the West to obtain economic leverage, technology, and foreign exchange. The acquisition of military-related advanced technology through legal and illegal means is especially important to the Soviets to shorten weapon development times, reduce costs, and compensate for the weakness of the Soviet economy." As part of its global ambitions, the USSR is promoting long-term economic agreements that make their partners unilaterally dependent on such necessities as Soviet energy resources.

In addition to the aggressive use of surrogates and economic inducements, Moscow, according to the White House document, is extending its already massive political influence apparatus. "This apparatus includes the world's largest propaganda machine, incorporating overt and clandestine activities in all types of media, funding and support of foreign Communist parties and front organizations, [and] political and ideological indoctrination of foreign students, government officials, terrorists, and military personnel."

Soviet efforts to expand political influence center on the so-called "active measures," which include disinformation, forgeries, the use of political agents of influence, and other deceptive operations. Overarching Soviet political and economic expansionism, the new US document charges, is the precept of "peaceful coexistence" with the US and the West, defined as a continuing contest in which all forms of struggle short of war are permissible.

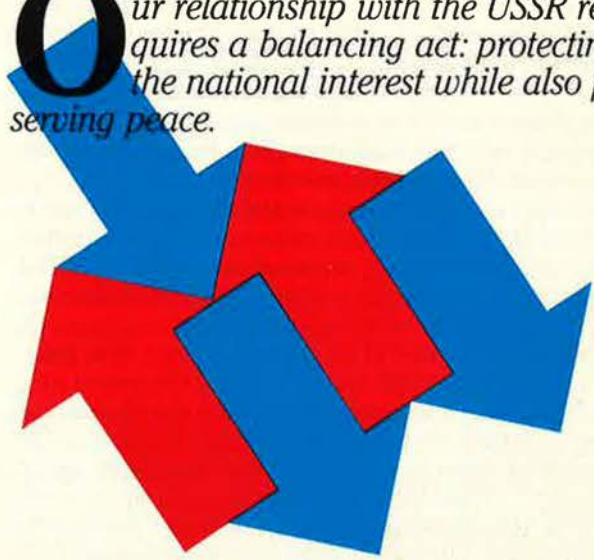
US Foreign Policy

US foreign policy, the White House argues, must be mobilized to counter the geopolitical struggle that is being waged by Moscow. The tools available to US diplomacy range from security and economic assistance and trade policy and cooperation in the field of science and technology to the support of freedom fighters. "The tools of [US] foreign policy must encompass the special needs of those who resist Soviet-style regimes implanted in Third World countries in the 1970s and 1980s."

The phrasing of this pledge seems to suggest that there is no intent to support resistance forces in the Iron Curtain countries that were absorbed in the Soviet orbit immediately after World War II. Without explicitly differentiating between earlier and more recent Soviet satellites, the US document sets the goal of demonstrating "to the Soviets that their actions aimed at spreading Marxist-Leninist totalitarianism will bring them no enduring gain."

In terms of this nation's economic policies vis-à-vis the Soviet bloc, the new national security guideline emphasizes that, as recognized in the Helsinki Accords, "government-to-government cooperation in the economic sphere should be dependent on progress in other areas, including Eastern observance of human rights."

Our relationship with the USSR requires a balancing act: protecting the national interest while also preserving peace.



America's ability to fight the war of ideas and support politically her allies and friends is curtailed by a mundane fact of life, the new national security document complains. "Public opinion polls consistently find that two-thirds of the American electorate normally take no interest in foreign policy." Worse yet, "only a bare majority today believes that this country needs to play an active part in world affairs—and that majority is eroding." The national interest requires a commitment "to the maintenance of our political defense as [well as] to our military defense."

Because there is no natural domestic constituency for foreign policy, the White House document asserts that "we must build one." Bolstering public concerns over foreign policy issues, the Administration believes, entails energizing the private sector "as a key element in the projection of US foreign policy goals." Private voluntary organizations concerned about world affairs "are doing an indispensable job of public education."

Three Principles

In terms of communications strategy, the US must reach out to the USSR and Eastern Europe "to encour-

age hope for change and to educate [the people of those countries] on the benefits of free institutions." This strategy is coupled to the assumption that "the process of gradual change will take place inside, but the stimulant and the vision of 'how things could be' must come from outside in a closed society."

Overall, US policy for dealing with the USSR rests on three principles, according to the just completed national security policy document:

- Realism, "which means that we must recognize the nature of the Soviet regime and deal frankly and forthrightly with problems in our relationship."
- Strength, "which is more than military power. [It] includes political determination, the strength of alliances, and economic health as well. The Soviet Union respects strength and takes advantage of weakness."
- Dialogue, "which means that we are prepared to discuss all the issues that divide us and are ready to work for practical and fair solutions on a basis compatible with our own fundamental interests."

Consistent with this approach, the dialogue proceeds, albeit "slowly," in four areas: human rights, the reduction of regional conflicts, areas of mutually beneficial cooperation, and arms control, the White House document pointed out.

Seemingly with more of an eye on ideology than pragmatism, the US national security policy document proclaims that "we have never recognized the division of Europe as either lawful or permanent. There was no agreement at Yalta to divide Europe into 'spheres of influence.' " East-West tensions remain in part the product of Moscow's annexation of Eastern Europe. In practical terms, US policy must deal with Eastern Europe on a country-by-country basis, with the basic objectives of encouraging "domestic liberalization and more autonomous foreign policies, [promoting] security through enhanced economic and political cooperation, and [fostering] genuine and long-lasting improvements in human rights."

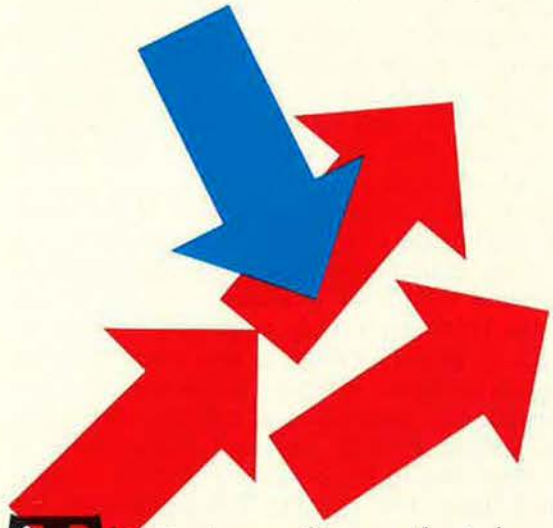
US Defense Policy

The Administration's national security strategy pivots on one central imperative: US military forces must be able to deter and, if necessary, defeat aggression across the gamut of potential conflict. In the Administration's view, the specific nature of the military threat, along with other factors, mandates that "we be prepared to defend our interests as far from North America as possible."

US military strategy "relies heavily on forward deployment of combat-ready forces, reinforced by strong alliance relationships." These relationships, in turn, necessitate that the US "continue to maintain in peacetime major forward deployments of land, naval, and air forces in Europe, the Atlantic, and the Pacific" as well as in the Western Hemisphere and the Indian Ocean area. The resultant challenges, the White House acknowledged, are dynamic and complex, especially in light of the "significant imbalance of forces favoring the Soviets in several important contingencies."

The White House document weighs in heavily against treating nuclear forces as a lower-cost alternative to adequate conventional warfare capabilities and forces. In addition to stepping up integration of the reserve forces into the standing force, the White House promises to enhance the nation's capabilities to surge or mobilize manpower and key industrial resources as well as to maximize the operational benefits that can be obtained from timely strategic warning in the event of crisis or war.

One of the central tenets of the Administration's defense policy is that the US should not seek to beat the Soviets in the numbers game. "Rather, we will work to overcome Soviet numerical superiority by taking advantage of the inherent strengths" of a free, technologically innovative society. Central here is the Administration's commitment to the concept of "competitive strategies, [meaning] exploiting our technological advantages in thoughtful and systematic ways to cause the Soviets to compete less efficiently or less effectively in areas of military application."



The strategy relies on the inherent strength of a technologically innovative society to overcome the Soviet military advantage in numbers.

The underlying aim is to make key portions of the Soviet military arsenal obsolete as well as to force the USSR to divert large resources from missions that most threaten the US to such tasks as defense that are less threatening and destabilizing. These criteria will be applied vigorously in future systems acquisition decisions, the White House reported.

In its drive to maximize US military effectiveness, the Administration is placing major emphasis on an "intangible but important asset"—the innovative, enterprising traits of a free people. In terms of both doctrine and training, US defense policy needs to capitalize on these qualities, which the "Soviets cannot match."

Deterrence of Nuclear War

The deterrence of nuclear war remains the overriding military objective of the US. "Our strategic forces and the associated targeting policy must, by any calculation, be perceived as making nuclear warfare a totally unacceptable and unrewarding proposition for the Soviet leadership." This requires the US to maintain diversified

strategic forces to hedge against a disarming first strike, complicate Soviet attack plans, and guard against technological surprise that might neutralize a given element of the strategic triad on a temporary basis.

Several key requirements ensue from this strategic precept. US strategic forces must be able to demonstrate convincingly their ability to hold at risk crucial Soviet warmaking capabilities, including military forces as well as the supporting industry. Equally critical is Soviet recognition that US strategic nuclear forces can terminate the "mechanism for ensuring survival of the Communist Party and its leadership cadres and for retention of the Party's control over the Soviet and Soviet-bloc peoples." In implementing this strategy, the White House reiterated, "the US does not target population as an objective in itself and seeks to minimize collateral damage through more accurate, lower yield weapons."

The makeup of US strategic nuclear forces is shaped by two divergent factors—America's conviction that a nuclear war cannot be won and hence must never be fought and the realization that "we seek to deter an adversary with a very different strategic outlook from our own." The Soviet Union, the White House document asserts, "places great stress on nuclear warfighting capability." By extension, the White House document argues, US strategic forces need to be structured flexibly to provide response options to a "broad range of plausible situations."

At the same time, the strategic forces must offer sufficient residual capability to provide leverage for early war termination and to avoid coercion thereafter. "For this reason, we maintain a nuclear reserve force as an integral element of our strategic forces." Augmenting these reserve forces are programs to maintain the "continuity" of the US government. These programs are aimed at convincing the Soviets that they could not escape retaliation by launching a "decapitating" attack against this country's central political and military leadership structure.

In reiterating the urgency of the Administration's strategic modernization program—which includes MX, the Small ICBM, the Trident II SLBM, the B-1B, the "Stealth" bomber, the Advanced Cruise Missile, and the Strategic Defense Initiative—the White House pointed out that these requirements would not be obviated by arms-control accords. Even if this country achieved the agreements sought by the Administration, "the US will continue to require modernized, mission-effective, and survivable nuclear forces to provide deterrence, promote stability, and hedge against Soviet cheating or abrogation during the transition to new, lower force levels."

A Revised Policy for Space

The Defense Department recently revamped its five-year-old space policy to place greater emphasis on the potential role of military personnel in space, the creation of a "robust and comprehensive antisatellite capability," and space control functions in general. Specifically, under this new policy, the Pentagon "will develop and acquire operational space control capabilities to deter or, during conflict, protect against hostile space-based threats to the US and its allies." Space systems, henceforth, will be tailored for survivability and endurance to ensure that they can perform reliably and on a sustained basis at "designated levels of conflict."

Among the developments that led to revision of the 1982 Department of Defense Space Policy are SDI (Strategic Defense Initiative), changes in the national spacelaunch policy, formation of a unified space command, NASA's Manned Space Station program, greater exploitation by other nations, and the "emergence of commercial space enterprises and the hesitancy of the private sector to invest in large space ventures."

In announcing the policy revisions, Secretary of Defense Caspar W. Weinberger stressed that military space systems contribute primarily to three national security objectives: providing deterrence of or, if necessary, defense against enemy attacks; ensuring that "forces of hostile nations cannot prevent our own use of space"; and serving as a force multiplier of US and allied combat forces.

Surprisingly, the unclassified version of the new space policy does not deal with one of the most pesky and vexing aspects in the relationship between commercial space activities and national security concerns: rapidly increasing and essentially uncontrollable remote sensing capabilities. Space-based commercial sensors—such as the French Spot satellite—may soon be able to transmit real-time pictures of any region of the globe with resolutions approaching one meter. This material could be made available to commercial television anywhere in the world. The US, in the past, has attempted to confine space-based sensing data used commercially to resolutions in the twenty-meter range in order to reduce its military utility. As both the sophistication of sensors and the number of countries operating them increase, keeping the lid on militarily usable real-time data becomes next to impossible. The unchecked availability of this type of data in wartime or during crises is probably intolerable.

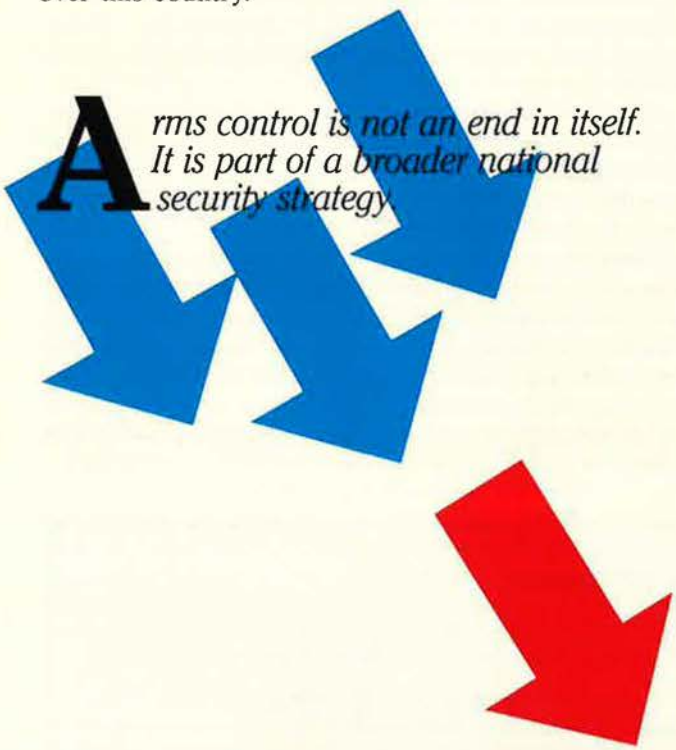
In step with the revision of the Pentagon's space policy, Secretary Weinberger also announced a restructuring of the US antisatellite (ASAT) program. The new three-pronged approach includes measures to double the altitude capability of the system now under test to make its range comparable to that of the operational Soviet ASAT. Two basic avenues will be explored: extending the range of existing F-15-launched weapons by increasing the thrust of their lower-stage boosters and developing a ground-launched system using such existing boost vehicles as the Pershing II missile. In either case, the upper-stage booster and the actual kill mechanism, the MV (miniature vehicle), of the current ASAT system would be retained.

Development of an "enhanced altitude MV-ASAT" could be initiated in 1988, leading to deployment "before the mid-1990s, providing concurrent tests against objects in space can resume in FY '88," according to Secretary Weinberger. At the same time, the Pentagon will continue work on the existing F-15-launched, low-altitude ASAT with an eye on achieving initial operational capability (IOC) "by very early in the 1990s." The Defense Department, he added, will continue its efforts "to seek relief from the moratorium which prohibits tests against objects in space" that Congress has imposed for two years running.

The third element of the revised ASAT program centers on funding "cooperatively with the Strategic Defense Initiative a ground laser technology demonstration effort." A future ground-based laser system (probably of the excimer or rare-gases variety) will "complement the MV-ASAT and significantly complicate the ability of any adversary to defend [his] satellites," according to Secretary Weinberger. The Air Force has requested about $100 million in the FY '88–89 budgets to develop hardware and conduct testing for this purpose. SDIO, which originally evinced interest in the excimer laser, has since shifted its focus to free-electron lasers that apparently can attain greater "brightness," meaning thermal power, levels.

Arms Control in Perspective

Arms control, the new policy document points out, is "only one of several tools to enhance our national security." It is "not an end in itself, but an integral part of our national security strategy." Arms-control accords make sense only if they back up US defense and foreign policies by "[enhancing] deterrence, [reducing] risk, [supporting] alliance relationships, and [ensuring] the Soviets do not gain significant unilateral advantage" over this country.



Specifically, "within the category of offensive nuclear arms, the US gives priority to reducing the most destabilizing weapons: fast-flying, nonrecallable ballistic missiles," the White House document points out. The US also "seeks agreements that reduce arms, not simply codify their increase." A central US tenet is that "arms-control agreements without effective verification measures are worse than no agreement at all, [since] they create the possibility of Soviet unilateral advantage and can affect US and allied planning with a false sense of security."

The goals associated with this country's arms-control efforts, the Administration cautioned, "contrast sharply with the Soviet arms-control approach," which is oriented toward unilateral advantage that is achieved in part "by failing to comply with important provisions of existing arms-control agreements."

The White House document reiterated US willingness to negotiate on a wide range of arms-reduction issues, including several that were broached at the Reykjavik summit meeting in October 1986. Key here is the objective of reducing strategic offensive forces by fifty percent over a five-year period and "elimination of all US and Soviet offensive ballistic missiles of whatever range or armament during the second five years." The US proposal would also let either side "deploy advanced strategic defenses after the ten-year period, unless both agreed not to." During the initial ten-year period, neither side would have the option to withdraw from the ABM Treaty, but both sides during that period are permitted to carry out ABM research, development, and testing.

The US is interested in the complete elimination of all land-based, longer-range INF (LRINF) missiles. As an interim step, the US seeks a "global agreement limiting the US and USSR to 100 LRINF missile warheads each, to be deployed in Soviet Asia and the US, with none of either side in Europe."

The new White House document cites several other key objectives in the field of arms control that include a fully verifiable, global ban of chemical weapons and agreements with the USSR "for an orderly transition to a more defense-reliant world." In the nonnuclear sector, the US pledges to seek alliance-to-alliance negotiations toward cuts in conventional forces that are both verifiable and recognize the geographic asymmetries affecting the two sides.

The new Administration policy seeks "essential improvements" in the verification of nuclear testing, with an eye on eventual ratification of the interrelated Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty. "Once our verification concerns have been satisfied and the ratification process completed, we would be prepared immediately to engage in negotiations with the Soviets on ways to implement a step-by-step program to limit and ultimately end nuclear testing in association with a program to reduce and ultimately end all nuclear weapons."

(This long-term commitment to consider halting all nuclear testing seems at odds with hints elsewhere in the document that the need for some nuclear weapons is open-ended. The utility of small numbers of nuclear weapons that may not work because they can't be tested is problematic.)

Countervailing the somewhat optimistic tone of the document in the area of potential arms-control topics is its somewhat hardnosed approach to verification. The Administration considers "effective verification to be equally as important as specific negotiated limits; they should be negotiated concurrently."

A Chance for Freedom

Pointing out that the US over the past seven years held defense spending to an average of about six percent of GNP—compared to between seven and nine percent in the 1950s and 1960s—the national security policy document underscores that the "inherent size and strength of the US economy [act] as our ultimate line of defense." Central here is the ability to surge the industrial base during conflict. The industrial base's health has clear military and strategic significance, which makes improvements in industrial productivity mandatory. As a consequence, government must provide "incentives for increased productivity, improved manufacturing technologies, and increased US competitiveness in the international marketplace."

In reaching for the moral high ground, the new White House document points out that with freedom never being really free and never being paid for in a lump sum, "installations come due in every generation. All any of us can do is offer the next generations that follow a *chance for freedom.*" ■

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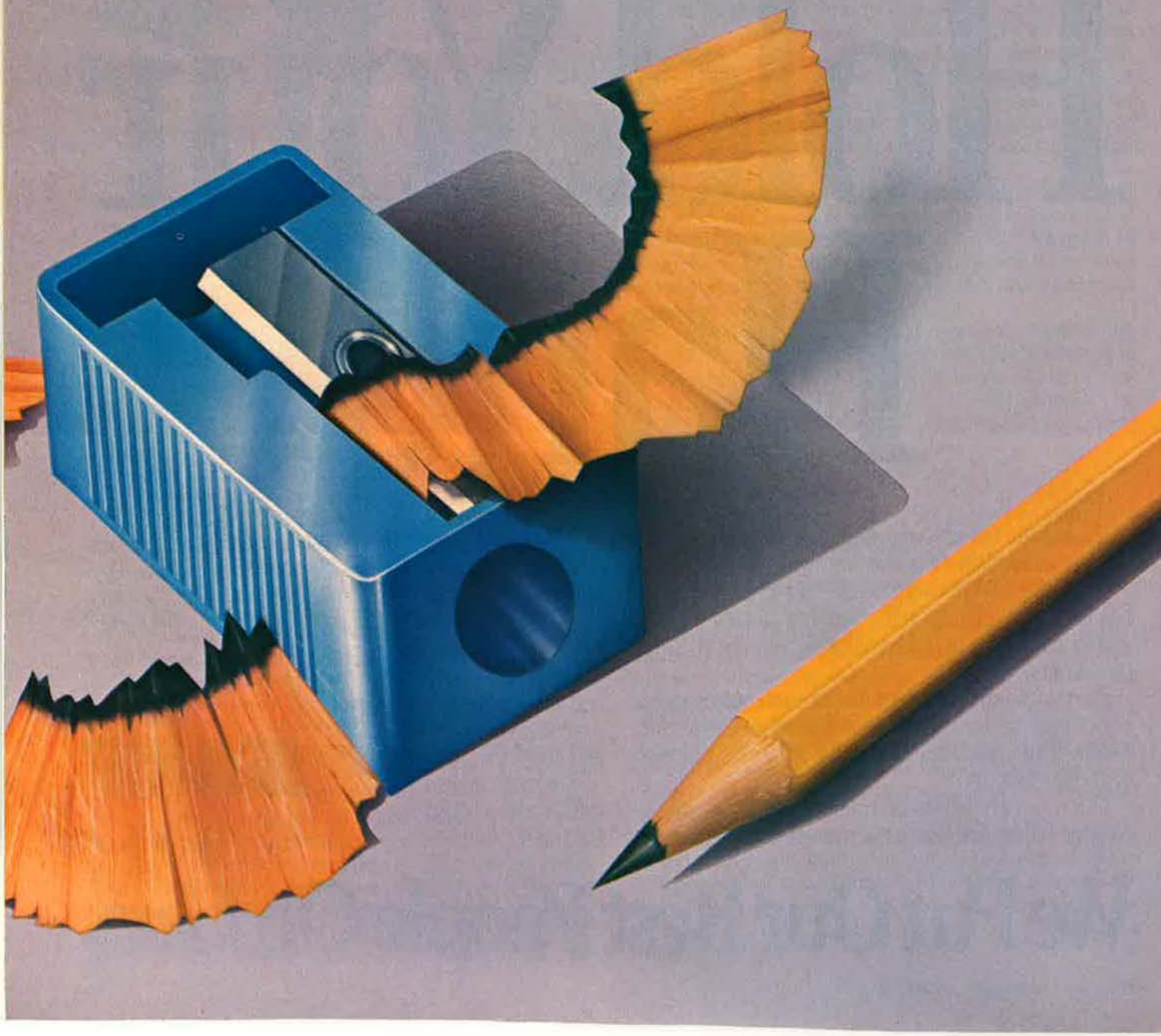

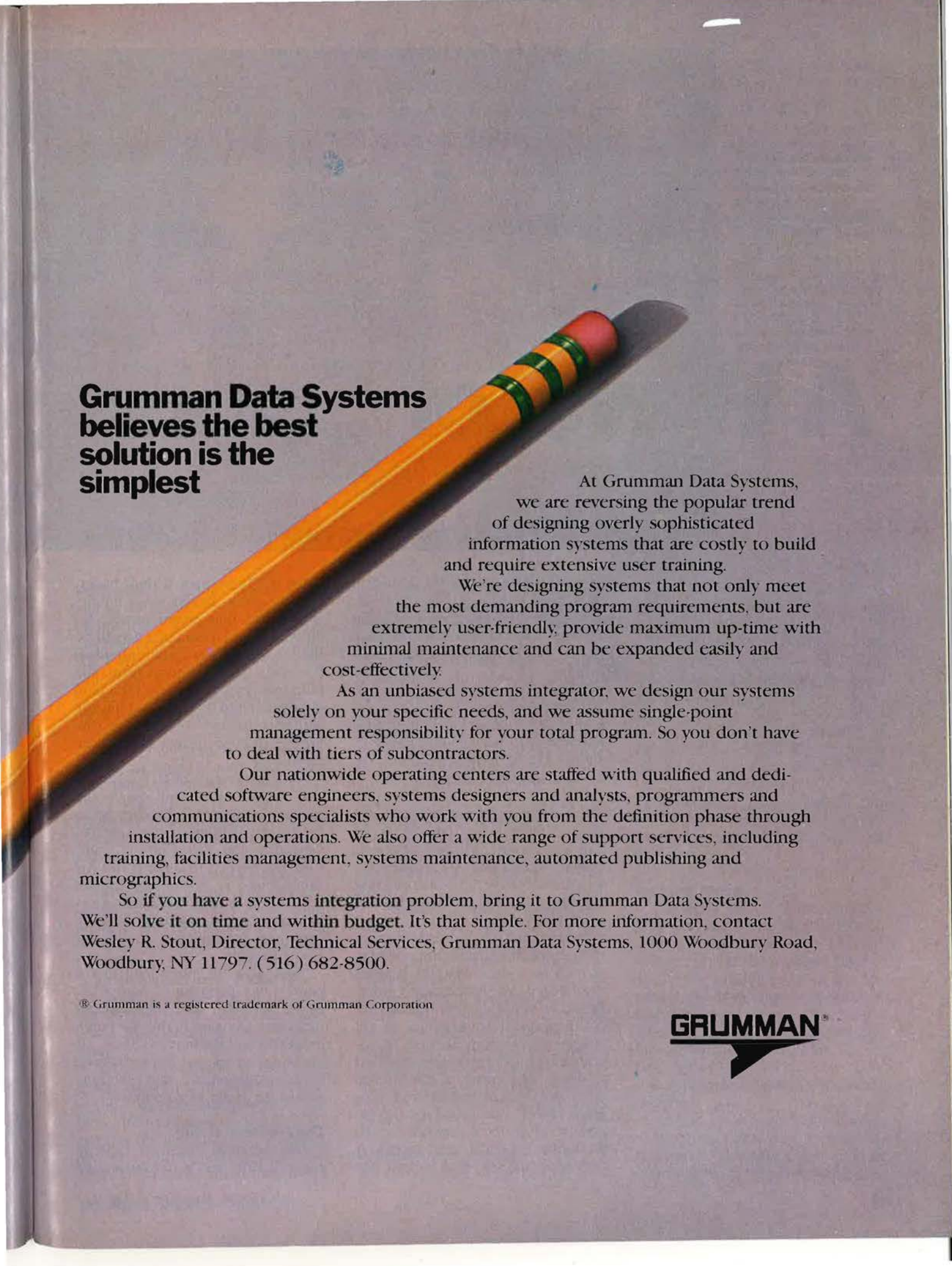

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The Air Force is waiving regulations right and left to let people do things that make sense in local situations, and naysayers must explain their nays.

A Wave of Sanity

BY CAPT. NAPOLEON B. BYARS, USAF

IT USED to be part of the daily drill in base supply at Moody AFB, Ga.—airmen snaking yards of chain through rows of spare tires to lock them, simply because a regulation required it.

It used to be a requirement for all Air Force personnel to stop in at the education office for briefings in conjunction with permanent change of station (PCS) moves, whether the member needed briefing or not.

It also used to be that if you wanted to drive a general-purpose Air Force vehicle, you first had to obtain a government driver's license. Forget the fact that you already had a valid state driver's license and that you drove an identical model car to work every day.

Now, thanks to a wave of common sense that is spreading rapidly, airmen no longer chain-lock spare tires stored in a secure supply warehouse at Moody, or sit through repetitive education briefings, or get special government licenses to operate cars they are already qualified to drive. The means of change has been the Model Installation Program (MIP), which waives regulations to allow local commanders to do things that make sense locally. If they save money, they get to use some of the savings at their bases.

The process begins when a blue-suiter or civilian employee sees inefficiency and thinks of a way to do the job better. After the individual fills out a MIP proposal form, the initiative is forwarded up the chain of command to the level that has the authority to say "yes." Often, the idea is okayed in less than three days.

A unique feature of MIP is that all "no" answers proceed on up the chain of command and, if they get as far as the Pentagon, they are reviewed by the Vice Chief of Staff. Consequently, throughout the Air Force there is strong bias toward approving model installation requests quickly—so long as they are legal and not injurious to the Air Force mission.

"MIP is a lot more than just a good-news program," said Col. Bryan Bennett, Chief of the Special Activities Division in the Air Force Programs and Resources Office. "It motivates people to try something better, is responsive, and functions within the chain of command."

The Genesis of MIP

The program began in 1984 as part of a DoD test to use innovative

Through the Model Installation Program, where local commanders are given the authority to waive regulations in order to do things that make sense, the "tiring" problem of having to chain up spare tires in an already secure area of Moody AFB, Ga., was solved. Here A1C Michael Francis and Mr. Tom Neely show the new method approved through MIP. (USAF photo by Sgt. Darrell Reedy)

management to improve working and living conditions for personnel on military installations. Local commanders at fifteen Army, Navy, Air Force, and Marine Corps installations were given the authority to cut through red tape and experiment with new ways to accomplish their missions.

The original Air Force test sites for MIP included Moody AFB, Ga., Kirtland AFB, N. M., Reese AFB, Tex., Whiteman AFB, Mo., and Hickam AFB, Hawaii. Participating installations were allowed to retain the money they saved and to reinvest it elsewhere on the base.

For example, Reese AFB hired an obstetrician so that obstetric care could be provided at the base hospital rather than downtown under the CHAMPUS program. This resulted in an annual savings of $200,000 to the government. Some of the savings helped build a new recreation center that opened at Reese in February.

"That's the beauty of this program," said Lt. Col. Marv Voskuhl of the Programs and Resources Office. "Reinvestment is a strong incentive for commanders to get at and eliminate inefficiency. Too often in the past, when they did—before the ink was dry—we cut their budgets and took away the savings. In short, we made losers out of winners."

Installation commanders from throughout DoD spend approximately $100 billion annually in addition to supervising a work force costing another $70 billion. A few percentage points of improvement in installation management can add up to substantial savings in a hurry. More important, by cutting through volumes of Air Force and DoD regulations, a sense of trust is being restored to local commanders and the people who actually do the work.

"The MIP mindset fosters unique and innovative approaches and achieves results," said Col. (Brig. Gen. selectee) Buster Glosson, Commander of TAC's 1st Tactical Fighter Wing at Langley AFB, Va. More than 750 waivers to regulations and directives have been approved since MIP began at Langley.

"We must continue linking authority with responsibility and pushing both as far down the organization as possible," said Air Force Chief of Staff Gen. Larry D. Welch at a MIP conference last year. "You [commanders] have to try new ideas, take risks, and strive for excellence." That message is not being lost on commanders.

"Commanders are out here on the cutting edge of what is the single most important advance in DoD that I've seen in twenty-five years," said Col. (Brig. Gen. selectee) Jim Meier, former wing commander at Fairchild AFB, Wash. He explained that MIP is dependent on the kind of leadership that wants to make things happen. Colonel Meier is currently the Assistant Deputy of Staff for Operations at Hq. Strategic Air Command.

Instant Success

The early phase of the program was so successful that in March 1986, Deputy Secretary of Defense William H. Taft IV directed DoD to apply the model installation approach to all military installations. A DoD report to the President's Blue Ribbon Commission on Defense Management outlines Secretary Taft's four-point model installation approach called the "Graduate" program.

Among other things, the Graduate program allows installation commanders to purchase goods and services wherever they can get the best

combination of quality, responsiveness, and cost. It also strengthens incentives for commanders to save money by letting them keep and use locally a share of what they save. Finally, the Graduate program is testing the unified budget concept at two bases.

Since the Model Installation Program began, it has generated more than 9,000 Air Force proposals. Many of these initiatives have had the direct effect of improving readiness.

For example, an airman at Whiteman AFB, Mo., got approval to fix Minuteman missile test equipment himself instead of sending it to the depot for repair. As a result, Whiteman hasn't had a Minuteman missile out of commission for more than three hours because of broken test equipment. Before, when test equipment was sent to the depot for repair, missiles were routinely off alert for more than a week.

At Moody AFB, where the primary wartime mission is air-to-ground attack, the commander got permission from Tactical Air Command headquarters to try shifting 300 training flights from air-to-air to air-to-ground. Now pilots spend more hours training the way they will fight. Without the experimentation encouraged by MIP, the test most likely would not have been allowed.

Reevaluating Regulations

"I think there's a pendulum swinging," said one Air Force official. "We're moving away from overregulating to creating an environment where people can tackle problems and arrive at the best solution for their locale."

Still, MIP officials insist that the program's purpose is not "reg busting."

"We're not reg busters," Colonel Voskuhl said. "We only try to remove overly restrictive regulations that handcuff local commanders. In doing that, regulations are being challenged for applicability, value, and worth."

One of the more sweeping MIP initiatives affecting Air Force commanders involves the frequency of mandatory monthly meetings. What began many years ago as a well-intentioned effort to keep local commanders involved through mandatory meetings simply got out of hand. Over the years, the list of meetings required by regulations grew and grew. Eventually, commanders lost control of their calendars. Now, as a result of MIP, commanders determine how many and what kind of meetings they should hold monthly.

Releasing commanders from the enforced meeting schedule allows them to direct their energies to running their wings, MIP monitors insist. They also stress that so long as environments and situations change, regulations need to be continually reevaluated.

Barring a miracle, Congress is not likely to approve any big increases in defense spending for the next few years. In fact, the two-year DoD budget now before Congress proposes only a modest three percent real growth for defense programs in FYs '88 and '89. Nonetheless, as Congress struggles to implement the Gramm-Rudman-Hollings deficit reduction law, not even this modest increase is likely to go unquestioned.

Consequently, it should come as no surprise that a program that can potentially ease some of the pains of budget cuts will enjoy strong support among Air Force leaders and among others throughout the Pentagon.

Air Force Secretary Edward C. Aldridge, Jr., describes MIP as a revolutionary approach to making the greatest use of the more than 860,000 men and women who make up the force. "The Air Force has led the Department of Defense in implementing the Model Installation Program," Secretary Aldridge said. "What we found is that we can get more defense for the dollar by giving our installation commanders more management authority and flexibility."

Another successful MIP initiative at Moody was the shifting of 300 training sorties from being air-to-air missions to being air-to-ground flights. Because the primary mission of Moody's F-4s is ground attack, it made much more sense for the men and machines of the 347th TFW to train like they would have to fight.

By hiring an obstetrician so care could be provided at the base hospital rather than elsewhere, officials at Reese AFB, Tex., saved $200,000 a year. Some of those savings helped build the new recreation center where Col. Donald J. McCullough (left), the MIP project officer, and Mitzie Hallgarth, the family housing manager at Reese, are sitting. (USAF photo by Roger Wilkins)

Now that MIP has graduated from the test phase, programs are being established at Air Force bases throughout the commands. General Welch appealed to commanders for help in spreading the MIP "can-do" attitude.

"The Air Staff cannot dictate that the Model Installation Program work," he stressed. "It cannot be a top-down-directed and -implemented program. It can only work by giving commanders the responsibility to run their installations the way they see fit. The fundamental philosophy behind MIP is decentralized decision-making."

What separates MIP from the Air Force Suggestion Program is motivation. The suggestion program, which processed more than 83,000 ideas in 1986 and saved $246 million, is sustained by cash incentives. On the other hand, the reward for MIP suggestions is more often the satisfaction of changing the system to get the job done smarter. Program officials note, however, that MIP initiatives can also qualify for cash awards. "What we're seeing is a quiet revolution, not anarchy," Colonel Bennett said. "We are experiencing a flood of ideas for better ways to perform the mission."

Despite the widespread acceptance of MIP within DoD, there remain formidable obstacles to the model installations approach. Laws and congressional directions often restrict the freedom of installation commanders to operate. The appropriations structure also limits commanders' authority to transfer money between accounts. A conspicuous result of this limitation is the perennial repair and renovation of old buildings. Because construction funds are scarcer than operations and maintenance funds, commanders must continually repair facilities that should be replaced. Along the same lines—because they have more leasing money than purchasing money—bases routinely must lease equipment that it would be cheaper to buy.

Another monumental obstacle to MIP is the sea of regulations put out by other federal agencies, such as the Small Business Administration, the Department of Labor, and the Department of the Treasury. To place the problem in perspective, consider that the Office of Personnel Management's personnel manual is 8,800 pages. Additionally, the response to MIP waivers by agencies outside of DoD has been less than enthusiastic.

Finally, there is what program officials call the "rice bowl" syndrome. Many of the people being asked to approve waivers to regulations are the same ones who wrote them. Coupled with the natural tendency of headquarters to overregulate, the review process will be hard-pressed to minimize delays in approving suggestions.

Help on the Way

Aware that obstacles to MIP will have to be tackled head on, Air Force officials are quick to point out that help is already on the way.

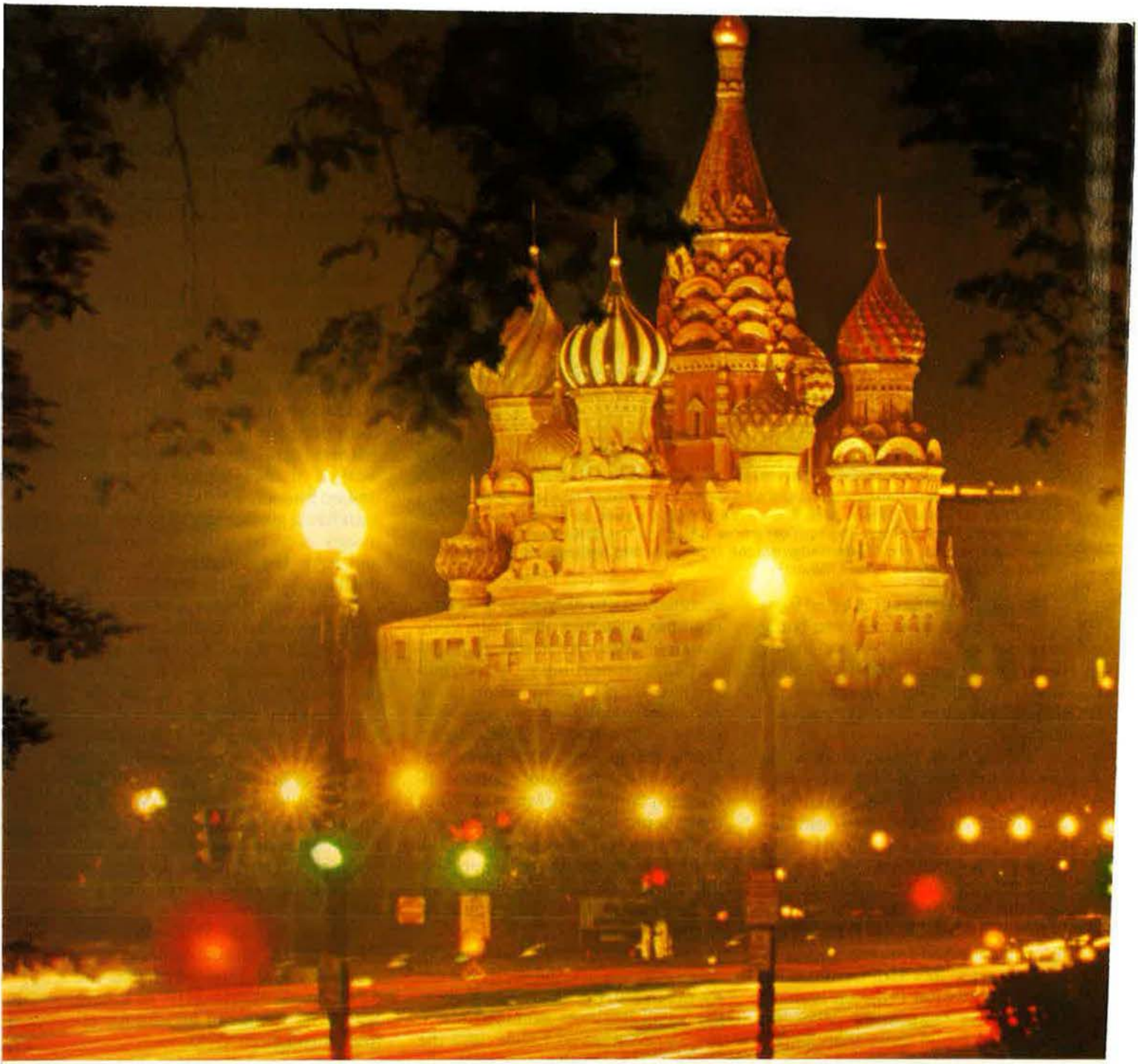
In the budget arena, Tidal W. McCoy, Assistant Secretary of the Air Force for Manpower, Reserve Affairs, and Installations, has worked to allow testing of a partial unified budget. This test gives commanders a greater say as to how the money is to be spent. Reese AFB and RAF Lakenheath, UK, began the budget test at the start of FY '87. Overall, the MIP Graduate program includes six DoD installations in the test. Should the unified budget test score a big success, look for DoD to push to expand the use of this concept at other installations.

As for the rice bowl syndrome, anyone looking to put roadblocks in the way of MIP suggestions will find the going tough. General Welch is on record as pushing for a seventy-two-hour review process at the Air Staff level. There is also pressure on major commands to expedite the MIP review process.

Across the Air Staff—from the Office of the Inspector General to Logistics and Engineering to the Surgeon General—MIP is taking hold. The same can be said for offices throughout DoD.

"Our most successful management initiative is the Model Installation Program," Secretary of Defense Caspar Weinberger said in his annual report to Congress. "Under this program, installation commanders have waived over 20,000 regulations and devised numerous ways to improve or streamline their operations." ■

Capt. (Maj. selectee) Napoleon B. Byars, USAF, is currently assigned to the Secretary of the Air Force Office of Public Affairs. He holds a bachelor's degree in journalism from the University of North Carolina and a master's in communications from the University of Northern Colorado. He was a Contributing Editor to AIR FORCE *Magazine in 1984–85 under the Air Force's Education With Industry program and continues to write regularly for this magazine. His most recent offerings have been "Manpower, Missions, and Muscle" in the September '86 issue and "Up Against the Elements" in December '86.*



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Since deregulation, fare wars have cut the cost of air travel. But passengers aren't sure it's a bargain in view of delays, hassles, and high prices on less-popular routes.

BY C. V. GLINES
PHOTOS COURTESY OF *AIR LINE PILOT* MAGAZINE

What Has Happened to the Airlines?

Two of the biggest winners since airlines were deregulated in 1978 are Texas International, which bought Continental (left), Eastern, and several other carriers, and USAir (above), which bought out PSA and is close to getting approval for its takeover bid of Piedmont.

FLOWN on the airlines recently? If you tried to get a reservation and asked about fares, you know that things have changed in the last couple of years. Air travel guides list more than 800,000 different fares, and there are more than 55,000 fare changes put into airline computers each month—including all those "supersaver" fares you read about, ready to be plucked out and quoted, albeit not fully understood by the reservation clerks or travel agents.

And if you had a favorite airline, it may no longer exist, or it has so changed its former route structure that it doesn't go where it formerly did, or it takes a strange, roundabout route to where it previously went nonstop.

Take Pan American World Airways, for example. It had previously bought out National Airlines in order to obtain Stateside routes that would feed traffic to its international network. But the fuel shortage and huge debts caught Pan Am in a crunch that caused it to spin off its hotel chain and even its headquarters building in New York City. In November 1985, it celebrated the fiftieth anniversary of its first flights across the Pacific. A few weeks later, it sold the Pacific routes and assets to United Airlines, a development that shocked and saddened those who thought America's original flag carrier would survive and keep "World" in its name forever. Pan Am is heavily in debt, but is managing to stay afloat by restructuring its routes, starting a shuttle service between Washington, New York, and Boston, and buying a commuter airline (Ransome Airlines) to feed traffic to its longer routes.

And what happened to some of the smaller airlines that had a loyal following along their regional routes, such as Frontier, Ozark, Southern, PBA, Texas International, Pacific Southwest, Wien, and Western (the latter being the nation's oldest continually operating airline)? All have lost or are about to lose their identity through merger, bankruptcy, or buyout.

Turmoil and Transition

The answer is that the airline industry has been in turmoil and transition since the Airline Deregulation Act of 1978 took down the bars with regard to fares, routes, and mergers. There are now few rules, and the airlines are free to operate in the marketplace without restraint.

Theoretically, under the capitalist system of free enterprise, consumers will benefit, and the weakly managed, overdebted carriers will cease to exist or be swallowed up by stronger companies. After nearly nine years, that theory is still being tested. However, there seems to be no doubt that many passengers are benefiting from the fare wars still raging—that is, if the few seats allotted at a low fare on each flight are still available when a passenger wants to go.

What has happened in recent months is typical of what has happened since airline deregulation began. In the fiscal year ending last September 30, there were seven major airline mergers and ten buyouts

of regional airlines by major carriers; seventeen air carriers filed for bankruptcy, ceased operations, or both. The shakeout is continuing. Whether or not this has been good for consumers depends on whom you ask.

William Bolger, President of the Air Transport Association, says that more people are now flying and shipping by air than ever before and doing it in greater safety, at lower fares, and with a wider variety of services than offered previously. "Released from strict government economic controls," he said, "the airlines have made it possible for nearly ninety percent of domestic passengers to take advantage of discount fares that average about sixty percent. In the years since 1978, the fares paid by an airline passenger per mile, adjusted for inflation, have declined twenty percent."

"It's true that many consumers have benefited," Arthur M. Horst, President of Suburban Airlines, a Pennsylvania commuter now owned and operated by USAir, said recently, "but only those who live near large cities, because they can take advantage of the fare wars. Those not getting a fair shake are those who travel between small cities. They are paying higher fares to go short distances. It does not matter how close cities are but which cities a passenger wants to travel to. I have always believed passengers should pay their fair share on a mileage basis."

Examples of fare disparities abound. A discount round-trip fare on a certain airline from Washington to Boston in February was $79. On that same day, a passenger traveling from Washington to Winston-Salem, N. C., had to pay $252 for his round-trip ticket.

But the fare war is far from over so long as the large surviving airlines battle it out for passengers. Continental Airlines, intent on grabbing the lion's share of passengers as it solidifies its mergers, buyouts, or joint marketing agreements with Frontier, New York Air, Eastern, People Express, Presidential, and Texas International, recently offered "Max-Saver" fares forty percent below any of its competitors. The other major airlines matched them.

But the fine print shows that the fares are all or partly nonrefundable, and there are different limitations on how far ahead tickets must be purchased. The restrictions usually do not remain in being long, but under deregulation, nothing is certain.

The average passenger debarking from an airline flight might agree that he believes he received a nice discounted fare, but may not agree that his flight had more services and that safety has improved, especially when he hears the complaints voiced by overstressed air traffic controllers and flight crew members, the latter having to take severe pay cuts in order for their companies to stay alive.

What are the facts?

Flying More, Enjoying It Less?

From an airline industry bottom-line point of view, the nation's airlines had an operating profit of $1.4 billion in 1986, about the same as 1985. Expenses were up about three percent, but savings of $3.5 billion in reduced fuel costs provided a big boost to the year-end tally of operating profits. The number of passengers boarded increased from 362,000,000 in 1985 to 398,000,000 last year. More than 400,000,000 are expected this year. In 1971, forty-nine percent of US adults had made a trip by air; by last year, that percentage had risen to an estimated seventy-two percent.

Although there may be more people flying these days, there is evidence they may be enjoying it less. The Department of Transportation (DOT), the repository for passenger complaints, reports that more valid gripes (12,741) were received last year than the year before (11,142). The greatest percentage derives from flight delays and cancellations, with smashed or lost baggage and refund problems following close behind. (To make it easier for air travelers to register their complaints, DOT established a telephone hot line [202-366-2220], and the Federal Aviation Administration has instituted a toll-free number [800-FAA-SURE]. These lines may account for some of the increase.)

Although complaints increased, the air safety record of the airlines for 1986 belies any accusation that it is less safe today to fly commercially than before. US airlines had no fatal accidents in 1986 on more than 6,000,000 flights. However, in 1985, there were 526 airline fatalities on US air carriers.

Airline pilots believe the turnabout is just blind luck. There were an estimated 812 near midair collisions in 1986, continuing a yearly increase over the last five years from 311 in 1982. Runway incursions (near collisions on the ground) have increased from 102 in 1985 to

Smaller planes, such as this de Havilland Dash-7 in the livery of Air Wisconsin, have been a boon to commuter airlines that now seem to be the only air link to smaller communities. Air Wisconsin recently merged with another carrier.

112 last year. As these words were written, there had been three midair collisions in the first three weeks of 1987, in which seventeen people died.

Much of the blame is put on the shortage of controllers as the result of President Reagan's firing 11,400 of them in 1981 for breaking federal law by striking. The number of controllers is down from 16,300 in 1981 to 14,700 now, of whom only about sixty-five percent are qualified at "full performance level."

It takes several years for a new-hire to become fully proficient as a controller. The Federal Aviation Administration is trying desperately to bring the work force up to speed. Five hundred additional new-hires are being trained this fiscal year and another 500 next year. Regardless, those flying the airspace system daily believe there is trouble ahead. Capt. Mel Hoagland of United Airlines said publicly, "The air traffic control system is on the ragged edge

of coming unraveled for lack of fully qualified controllers."

The Delay Dilemma

While a passenger is probably totally unaware of the near-misses and other dangerous situations that may face the flight deck crew while he is on board, he knows when his flight is delayed. Delays are caused mostly by traffic saturation, weather, and aircraft mechanical difficulties that can cause backups thousands of miles away. Delays in 1986 increased by twenty-two percent over 1985 to a record high of 367,000, or an average of something more than a thousand a day, with weather accounting for about two-thirds of the total. A record number of delays occurred last December 9 at the nation's twenty-two "pacing" airports when 3,684 flights were delayed, mostly because of bad weather but also by air traffic control equipment malfunctions.

Deregulation hasn't helped everyone. After obtaining domestic routes, Pan American got caught in the fuel shortage and went into heavy debt. Two weeks after celebrating fifty years of transpacific flights, Pan Am sold its Pacific routes to United. Pan Am is on the road to recovery, though, and is one of several US carriers to operate the European Airbus A310.

Equipment malfunctions have become all too common as the 1960s-era computers used by air traffic control (ATC) centers become obsolete. FAA's long-range plan to modernize the system has been delayed because of budget difficulties and equipment compatibility problems. However, an extensive test and evaluation program is under way now on a new generation of ATC computers that is "ten times faster and [has] four times the capacity" of the older computers, according to FAA Administrator Donald D. Engen. "This will allow the ATC system to keep pace with projected traffic growth over the next decade and accommodate the introduction of new automation functions that will both enhance safety and increase controller productivity." The first installation is now being tested at the Seattle air route traffic control center.

In another attempt to solve the delay problem, the Department of Transportation has granted antitrust immunity to the airlines and permitted them to negotiate voluntary schedule adjustments to avoid schedule "bunching"—a situation in which many airlines schedule departures from the major airports at the same time, especially in the mornings and afternoons. At Atlanta, for example, DOT found seventy-three weekday operations scheduled between 4:00 p.m. and 4:15 p.m. More than 100 operations were scheduled at Newark between 8:00 a.m. and 9:00 a.m.

When these self-inflicted delays are compounded by bad weather, the result is a domino effect that reaches across the country to airports that would otherwise not have any takeoff delays. The passenger who misses his connecting flight can usually see no reason why his flight was delayed or why the airline couldn't hold the next flight for him.

The airlines are resisting this attempt by the federal government to let them iron out the problem among themselves. Meanwhile, the FAA has proposed that its controllers hold aircraft aloft, rather than at the gates, a traffic control technique instigated during the fuel crisis.

Proficiency and Maintenance Concerns

There are other serious concerns. "There is a lessening of pilot proficiency levels," according to Jim Burnett, Chairman of the National Transportation Safety Board (NTSB). "The number of hours the average airline pilot has spent in a jet cockpit has declined from 2,234 in 1983 to 818 in 1985." What has helped cause this, according to Dr. John Lauber, NTSB member, is that "the demand for pilots is high, but the supply of qualified pilots is going down."

Hundreds of pilots are getting into airline flying after short stints flying piston-powered private aircraft, building up time as instructors, then advancing to small air taxis or corporate planes. When they have the minimum time required for airline hiring, they apply for copilot slots on the commuters to get turboprop time and then progress to the larger airlines to fly jets.

The supply of jet-qualified military pilots is dwindling as more young officers opt for the incentives now being offered and stay for longer careers. According to the Future Aviation Professionals of America (FAPA), the percentage of new hires by the regional airlines with military experience has decreased from nearly sixteen percent in 1985 to less than twelve percent now.

With cut-rate fares and reduced income, isn't it possible that airline aircraft maintenance will suffer? "Yes, definitely," according to a member of the Air Line Pilots Association, the largest airline pilots' union. "Not only are mechanics under pressure to cut corners and skip or defer required maintenance, they know that there are fewer FAA inspectors around to catch the deliberate compromises with safety."

These compromises become all too clear after the fact when the NTSB carefully sifts through the wreckage and the records of a passenger plane involved in a fatal

crash. Several airlines have been fined severely in recent months for inadequate records and outright dereliction on the part of mechanics and ground crew supervisors.

In mid-February, the FAA agreed to accept a fine of $9.5 million from Eastern Air Lines as a result of an in-depth inspection last year that uncovered 78,372 safety violations. Each violation could have cost the airline $1,000, but the company persuaded the government to settle out of court for the reduced amount. It was the largest fine yet levied against an airline. Some other record-breaking fines were leveled against large airlines last year: American Airlines ($2 million), Pan American ($1.95 million), Western Airlines ($700,000), Continental ($402,000), and Alaska Airlines ($300,000).

Braniff International went bankrupt in May 1982, but the carrier reorganized, got a new owner, and started operations on a much smaller scale in 1984. The airline also went with a more "corporate" look, and the days of the garish "Flying Colors" ended.

Newcomers and New Alliances

One phenomenon that was spawned by deregulation was the emergence of such airlines as People Express and New York Air, which came onto the scene in the early half of this decade like precocious children at a dinner party. They upset the comfortable, orderly prederegulation world of the older airlines by hiring nonunion workers, paying less-than-average wages, and flying head-to-head against the older airlines at greatly discounted fares. Without regulation, any airline can invade another airline's territory at will, charge any fare it chooses, and run its aircraft on any schedule.

Heavily in debt because of the purchase of new aircraft and paying ever-escalating high wages to a heavily unionized work force, the older airlines had to file for bankruptcy, seek merger partners, sell off assets, or, if they could, refinance their debt. Many companies don't own their aircraft, but instead lease them from banks or leasing companies, thus reducing their long-term debt and incurring only lease charges and thereby enabling them to stay in business, at least temporarily.

Another phenomenon that came into full flower with deregulation (although it started before) is the development of alliances between the larger airlines and the regional and commuter airlines that feed passengers to the larger airlines through a hub-and-spoke system. In the mid-1960s, USAir (then Allegheny Airlines) pioneered the idea, which has since been copied throughout the country.

At that time, USAir was receiving substantial federal subsidies to serve a number of small communities that did not generate much traffic and thus were unprofitable. The aircraft used then were Convair 580s and Fairchild F27s, which had to be operated into the small airports a certain minimum number of times per day. There was little incentive to operate on an efficient basis with the large aircraft, so USAir conceived the concept of replacing its regular service with locally based commuter airlines that would offer frequent flights with smaller aircraft to and from a connecting hub. The flight schedule would be so tailored that the small aircraft would schedule early morning departures from and late evening returns to the hub city.

USAir, with its large terminal facilities in Pittsburgh, was one of the innovators of the "hub-and-spoke" type of operation.

USAir's bold idea was inaugurated in November 1967 when Henson Airlines based at Hagerstown, Md., began four daily "Allegheny Commuter" flights between Hagerstown, Md., and Baltimore with an eight-passenger Beech Queenair, soon replaced with seventeen-seat Beech 99s. The Allegheny Commuter concept was immediately successful. Three months after it started, Henson produced a 105 percent increase in passenger traffic between the two points. More commuter operators got on the Allegheny Commuter bandwagon, and today, there are six commuters feeding hundreds of passengers to USAir's still-growing network through such hubs as its ones at Philadelphia and Pittsburgh.

In the early days before deregulation, airlines flocked to USAir to see if such an operation could be applied to their route networks. None of them thought it was worth the effort at the time. But the reality of deregulation and the wisdom of the hub-and-spoke concept finally grabbed hold of airline managements. Today, no major airline is without its commuter affiliates, which they either own or support

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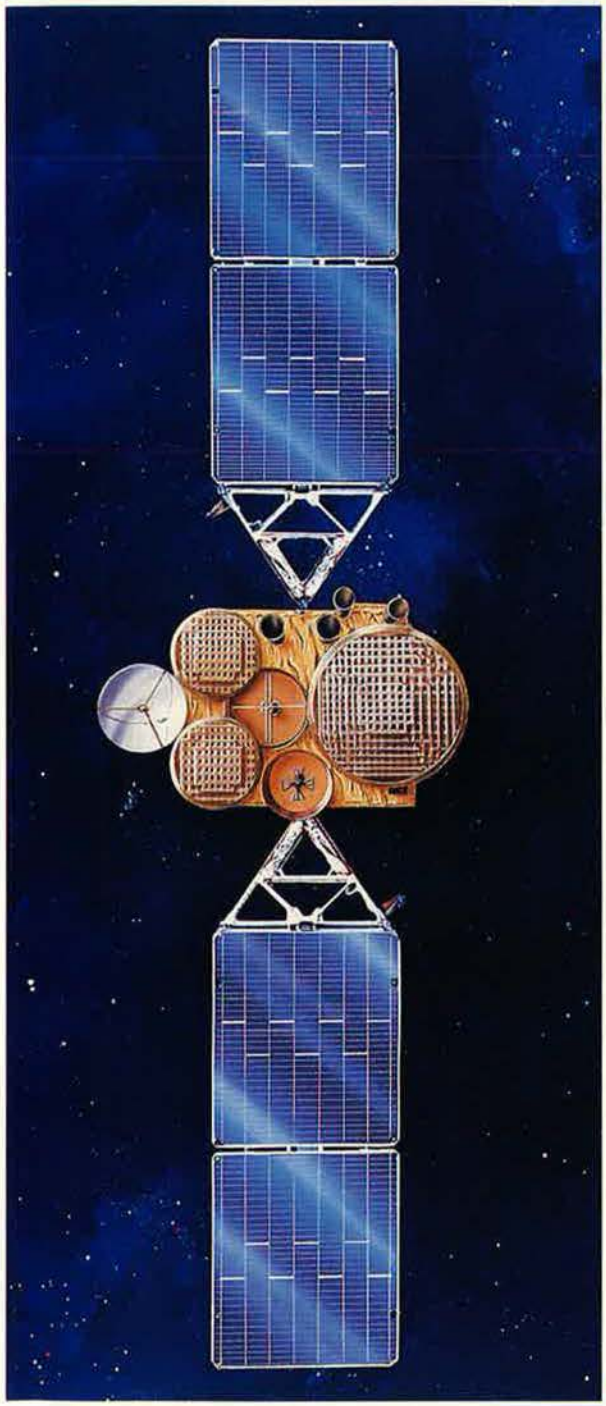

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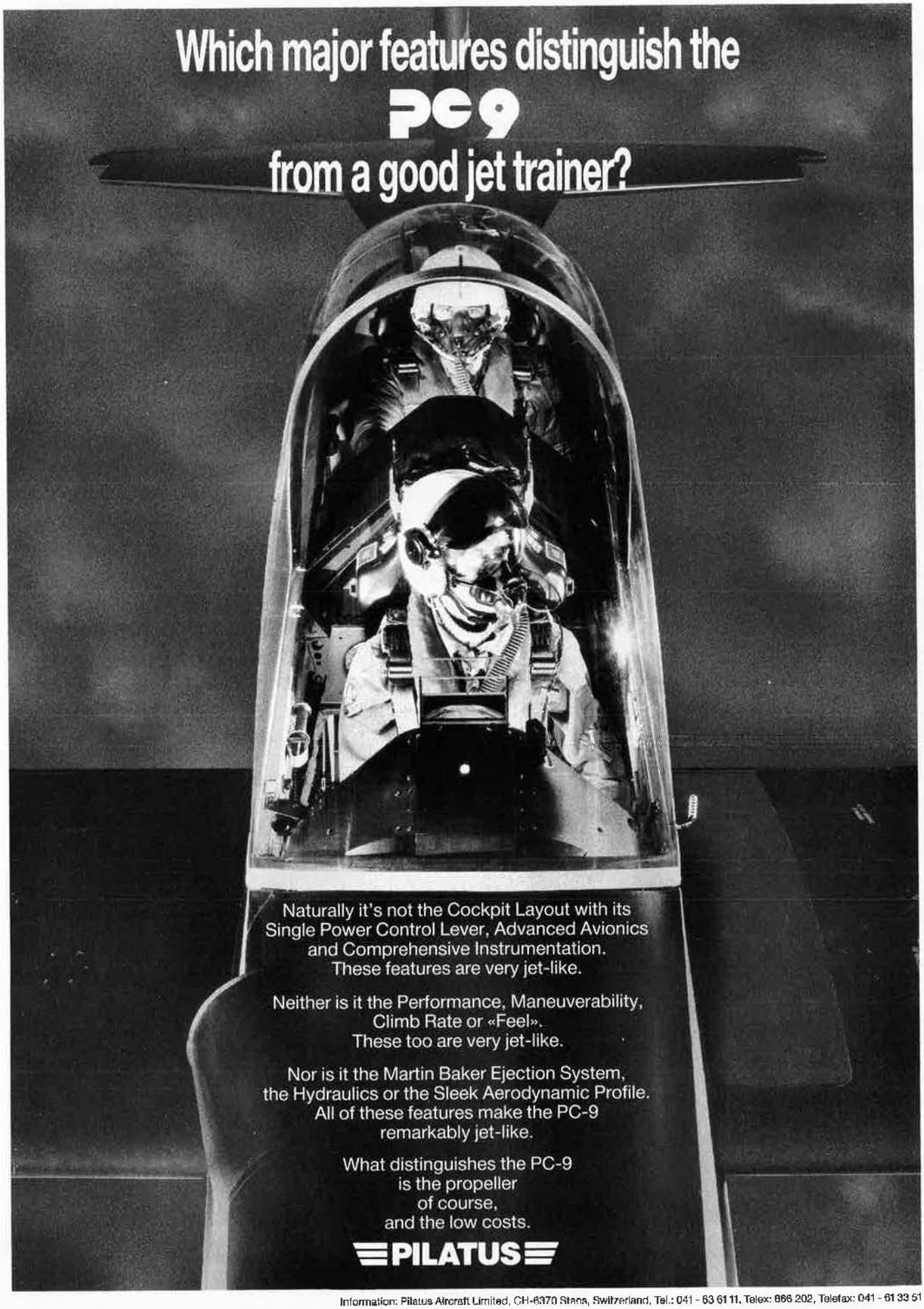
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Meanwhile, deregulation has been taking its toll of the small, weakly financed airlines. The number of regional and commuter carriers has decreased from a high of about 235 when deregulation began to about seventy-five today. Only about twenty-six of them are "truly independent" now, according to Dr. George James, President of Airline Economics, Inc., an airline analysis firm.

William Bolger of ATA believes that "the hub-and-spoke system of airline operation under deregulation has given residents of more small and medium-size communities better links with the entire national and international air transport network and has opened many communities to the benefits of air commerce." As noted previously, these "better links" may often penalize the passenger farewise.

Clear Skies or Rough Weather?

What does the future hold for the airlines?

Operating profits are expected to be higher this year—ranging from $2.5 billion to $3.5 billion, compared to $1.4 billion in 1986, according to John Pincavage, airline analyst for Paine Webber—with a seven percent increase in traffic. However, expenses are expected to inch up about seven percent, and fuel price increases already being experienced this year may wipe out savings of about $800 million realized during the first quarter. Jet fuel costs declined from an average $1.04 per gallon in 1981 to fifty-five cents in 1986.

Dr. George James predicts that airline labor costs will continue to decline this year from an average of $43,200 in 1985 to about $42,600 in 1986. Airline employment last year reached its highest level ever with 380,000 employees. The previous high was 371,000 in 1980.

"For the years 1983–86, air travelers are estimated to have saved an average of $750 million a year from air fare reductions," according to Dr. James. "This trend may have bottomed out. In 1987, we anticipate that in lieu of a saving, air travelers will pay an additional $400 million because of moderate average fare increases. However, the average fare increase will be less than the forecast rate of overall inflation, so the consumer will still save $900 million in inflation-adjusted dollars in 1987."

Through mergers or acquisitions, Mr. Pincavage and Dr. James believe, there will be further consolidation of the airline industry to about six to eight major airlines that together will control about ninety percent of all airline traffic. According to Mr. Pincavage, the consolidations that have already taken place have resulted in "larger, more financially stable competitors that are less likely to initiate crazy fare wars, such as we have seen in the past." As these words were being written, USAir had apparently succeeded in its bid against Norfolk and Southern Railroad to take over Piedmont Airlines. Meanwhile, USAir had already agreed to buy out Pacific Southern Airlines (PSA) to increase its presence on the West Coast.

The end result of this merger mania may eventually have a down side for the passenger. Competition might be eliminated at some cities, and the industry may end up by the decade as an oligopoly, with only four or five carriers controlling the lion's share of the total market. That could mean the end of bargain fares, with the survivors dictating what fares shall be charged in their respective market areas. Because of the consolidations, newcomers will be hard put to enter the airline game. "Megacarriers," with their gigantic market clout, will try to undercut any low fares a new carrier may offer and freeze out any new kid on the block.

There are some "ifs" that the analysts say may change the picture for the airlines this year. If the nation's economy slows down, passenger demand declines, fuel prices escalate, interest rates rise appreciably, or terrorism gets drastically out of hand, their moderately rosy predictions will not come true.

A Wait-and-See Year

Whatever the outcome of the continuing dog-eat-dog fare wars currently being waged, the experts believe they will continue at least for the balance of this year. The name of the game for passengers is to plan any flight as far ahead as possible and shop around for the best fares.

But be cautious. There are restrictions on almost any bargain fare you are cited, not only on making the reservations and purchasing your ticket up to thirty days ahead of time but also on getting refunds if you cancel. You can lose all you put down if you cancel out on some of the "maxi-saver" flights. A good rule of thumb: "The greater the discount, the more you lose if you don't go."

There's no doubt that the fares are tempting. In February, Pan American offered $29 one-way fares from New York to Washington or Pittsburgh and $89 for a one-way flight from New York to Los Angeles or San Francisco. Continental and its new partner, Eastern, reduced their former supersaver fares by as much as forty percent and regular fares by about eighty percent to attract riders. The other large airlines—American and United—followed suit. The restrictions were that the fares applied only to round trips and were not refundable. By the time these words are printed, however, the fare situation will have probably changed when the accountants take a look at their bottom lines.

After nearly a decade, the aftershocks of deregulation of the airline industry are still being felt, but the shakeout or realignment of the major airlines is nearing completion. However, there is still the possibility of one or two more major changes, which may see the end of former giants like Pan American or TWA.

If the consumer of airline service, the passenger, is not generally happy with what he experiences in the form of high fares, bad service, and interminable delays, there may be a public demand for reregulation one of these days. This year is a wait-and-see year.

Meanwhile, the forecasting experts predict a profitable 1987 for the smart survivors. ■

C. V. Glines, a retired Air Force colonel, is a free-lance writer, a magazine editor, and the author of numerous books. A frequent contributor to this magazine, his most recent offerings have included "Brain Buckets" (August '86 issue) and "A Bolt from the Blue" (May '86).

Three factors—a short budget, rising costs overseas, and unusually high retention in 1986—leave the Air Force with a $478 million hole in its Military Personnel account.

The Manpower-Money Mismatch

BY LT. GEN. THOMAS J. HICKEY, USAF
DEPUTY CHIEF OF STAFF FOR PERSONNEL

No single resource has a greater impact on Air Force readiness and the capability to support national security objectives than our people.

Secretary of the Air Force Edward C. Aldridge, Jr., and Chief of Staff Gen. Larry D. Welch have both noted this fact in many public statements. They have also said that despite a recent history of success in recruiting and retention, the Air Force faces a considerable challenge in the future because of demographic trends in the recruiting population, attractions of employment opportunities outside the service, and dynamic changes in the number and types of Air Force missions.

In 1987, however, there is a more immediate concern—a problem with the potential to diminish our near-term capabilities. It will have an effect on recruiting patterns and retention. It has implications for the morale of our force. And it constitutes one of the most significant challenges to face Air Force leaders since the poor retention period of the late 1970s and early 1980s.

The current difficulty hinges on funding issues. For FY '87, Congress funded the Military Personnel Appropriation (MPA) below programmed requirements and also reduced appropriated funding support for morale, welfare, and recreation (MWR) programs. These actions and their implications will have long-term impact.

The MPA provides funding for officer and enlisted pay and allowances, which, in addition to the basic pay and allowances, includes subsistence, clothing, incentive pays, and bonuses. It also includes funding for PCS-related costs. Although Congress appropriated nearly $19.6 billion, that amount was some $478 million short of Air Force requirements. The impact of these cuts, driven by concern over the growing federal deficit, has been compounded by better-than-anticipated retention (which produced an end-of-the-year "overstrength") and the decline of the US dollar overseas, which has raised the cost of overseas station allowances.

In response, the Air Force has had to implement a variety of budget-cutting actions that, taken together, should help reduce the MPA requirement. These steps include reducing accessions and accelerating separations across both the officer and enlisted force. At the same time, we are aggressively seeking alternatives to preserve the quality-of-life programs in MWR without dramatically increasing individual costs to participate in those programs.

Three Factors

To appreciate fully the need and effect of each of these actions, it is important to begin with an understanding of the fiscal context created by the FY '87 appropriation. The deficit of more than $478 million in the Air Force's MPA for FY '87 is the result of three major influences: increasing overseas station allowance requirements, declining congressional funding of the President's budget, and the FY '86 overstrength carried into 1987.

As the dollar has declined, primarily against the German mark and the Japanese yen, overseas entitlements—cost of living allowances, overseas housing allow-

Although this scene of Officer Training School graduates celebrating their commissions will still happen, the graduating classes of the future will be much smaller. OTS is the Air Force's most flexible commissioning source, but the number of OTS candidates will be reduced to alleviate some of the current officer overstrength.

ances, and temporary lodging allowances—have increased. In February, our estimate was that overseas stations allowances would cost nearly $158 million more than programmed for this fiscal year.

The second part of the equation involves congressional decisions that reduced or denied funding for various programs. For example:

- Congress directed the services to absorb approximately seven percent of the cost of the three percent pay raise that went into effect this past January. The Air Force share is $26.6 million. With pay and allowances based on legislated entitlements that constitute more than ninety-five percent of the MPA, we have little flexibility in absorbing the cost. We must pay our people.
- Transferring funds from the permanent change of station account (approximately four percent of the MPA) offers no relief. Congressional cuts and Gramm-Rudman-Hollings reductions carried over into this year created a $95 million deficit that we've been working hard to resolve.
- Funds requested to support new programs or increase program levels, such as an increase of 398 in officer end strength, were denied.

The final contributing factor over which USAF has limited control is force attrition. In FY '86, officer and noncommissioned officer retirements and first-term airmen separations fell short of what historical trends and force-projection models had predicted. Consequently, even with an early separation program, the Air Force finished FY '86 above authorization by 459 officers and 1,202 enlisted personnel. Concurrently, Congress held the FY '87 end strength levels essentially at last year's levels. This overstrength must be reduced in order to stay within the budget appropriated.

Minimizing Impact on People

The actions we've initiated are designed to have the least possible impact on active-duty people. To this end, we concentrated our force-management efforts on reducing both officer and enlisted accessions.

For officers, we have reduced the number of OTS and Air Force ROTC accessions for this year. OTS is our most flexible commissioning source, and we can increase or decrease the number of officer candidates we put into the school, depending on our needs. This year, we will commission approximately 1,700, or about 800 fewer than last year.

To reduce Air Force ROTC production, we have offered cadets scheduled to graduate this year the opportunity to leave the program voluntarily. Specifically:

- Nonscholarship cadets were allowed to disenroll voluntarily, with no further obligation.
- Scholarship cadets were also allowed to disenroll, but only after agreeing to repay any scholarship money received for tuition, books, and fees.
- Cadets were allowed to apply for active Reserve or National Guard slots in any military service.
- Even with reduced production, graduating ROTC cadets can expect delays of up to a year before entering active duty.

We are currently developing legislation that would allow the Air Force (and other services) to absorb

its ROTC graduate surplus in the civilian work force. This would provide a welcome source of talent for hard-to-fill civilian positions in engineering and the sciences as well as in some business occupations. While we can and do offer jobs now to surplus cadets, the legislation would allow Secretaries of the military departments to employ these cadets, who would then fulfill their service obligation through federal civilian service.

On the enlisted side, Air Force Recruiting Service is reducing FY '87 prior-service accessions from 1,500 to 1,000 and nonprior-service accessions from 62,000 to 57,000. Unfortunately, our force-management actions cannot be limited to accessions. Early separation of officers and enlisted members is also required.

Officer reduction is a difficult problem. The FY '87 National Defense Authorization Act requires the Defense Department to reduce its commissioned officer strength by one percent this year, an additional two percent in FY '88, and finally another three percent in FY '89, for a total of six percent. This congressionally directed reduction requires the Secretary of Defense to apportion the reduction among the services from the officer strength levels at the end of FY '86.

Early Outs Encouraged

This year's reduction requires the Air Force to cut its programmed commissioned officer strength by 1,698—in effect, no officer growth for FY '87, plus a reduction of 1,300 officers. This is the equivalent of deactivating a bomber/tanker wing, an airlift wing, a fighter wing, and two GLCM sites. While we will not take any action as severe as deactivation, we must recognize that reducing the number of officers affects our ability to perform such tasks as intelligence, security, maintenance, and space operations.

To meet this reduction target, we modified the voluntary release program. Based on historical data and the current level of disapprovals of voluntary separation requests, we believe an extra 500 voluntary losses will result from easing restrictions on applications. For example:

- The six-month lead time required to establish a date of separation for officers who have completed their active-duty service commitments or who apply under the miscellaneous rule will be waived in most cases.
- Officers with an active-duty service commitment based on tuition assistance for off-duty education or acceptance of an engineer bonus may separate on repayment of the unamortized portion of the costs.
- Officers can be released from as much as twelve months of the active-duty service commitment incurred by permanent change of station, training, or formal education.

It is crucial to realize, however, that if Congress holds to the FY '88–89 reductions and if the methodology used is the same as this year's, the Air Force's share would be approximately 2,700 in FY '88 and about 4,500 in FY '89. Such drastic reductions could jeopardize our ability to meet projected threats and to support the basic national objectives of deterring nuclear and conventional war. By FY '89, the total effect would be equivalent to deactivating three bomber/tanker wings, three airlift wings, two fighter wings, and three missile wings.

To minimize the operational im-

Shaping Up to Ship Them Out

The Pentagon is still struggling with the PCS funding problem.

Last year, the Air Force had to delay the return from overseas of 27,000 people completing long tours, putting them into their new Stateside locations well after school had begun. Other permanent change of station (PCS) moves were also held up until the start of the new fiscal year in October. The main reason was budget cuts, driven by a need to reduce the federal deficit. A compounding factor, however, was the cost of increased travel and per diem benefits that Congress had authorized, but that it had not funded.

Despite its best efforts to juggle the budget and the reassignment of people from place to place, the Air Force went into this year facing a $95.8 million shortfall in PCS funds. It has taken numerous actions to reduce PCS moves. For example, it reimplemented the "career bachelor" program, which requires single career people to serve the same length of long tour overseas that people accompanied by dependents do. The base-of-preference program has been cut back, and Stateside PCS moves are being subjected to greater scrutiny. There is a limited benefit to Stateside cutbacks, though, because it is the overseas moves that tap the budget most heavily.

"We approved new assignment policies that made overseas duty more attractive," says Lt. Gen. Thomas J. Hickey, DCS/Personnel. "The changes involve overseas rotation dates and were implemented this year. By changing the method used to rotate people from overseas, we provided people with greater flexibility for their next assignment."

Air Force members had the following options: return to the CONUS after completing the current prescribed tour; request another full tour at the same location; request a tour extension of less than a full tour, but at least twelve months; enter a contract (nonspecific or to be determined) return date with the understanding that a fixed date can be obtained upon request; or request a contract return date and at the same time be considered for a consecutive overseas tour to a specific base, country of preference, or overseas theater.

"These changes to longstanding overseas tenure policies did not force anyone to remain overseas beyond the normal tour length," General Hickey says. "Commanders retained the option to return certain members who have finished their prescribed tour and who should not remain overseas. In addition to changing overseas tour rotations, we also looked at maximum and two-year tour requirements within the CONUS. We felt a two-year tour should be preceded or followed by an assignment at the same location when possible. We can no longer view any assignment as only a two-year PCS. In many cases, people will also be able to remain longer than the currently prescribed maximum tour length at a Stateside site."

The Air Force will further try to reduce Stateside moves by assigning "pipeline" people—whose PCS is unavoidable—to any vacancies they can fill. "We look first at filling a CONUS requirement with a training-course graduate or overseas returnee and do not normally make a CONUS-to-CONUS move unless manning is below ninety percent," General Hickey says.

As of this writing, a final decision had not been made on what will be necessary for the remainder of FY '87. The response to the voluntary actions taken so far has been very positive, although it may still be necessary to reduce the number of replacements sent overseas late in the fiscal year.

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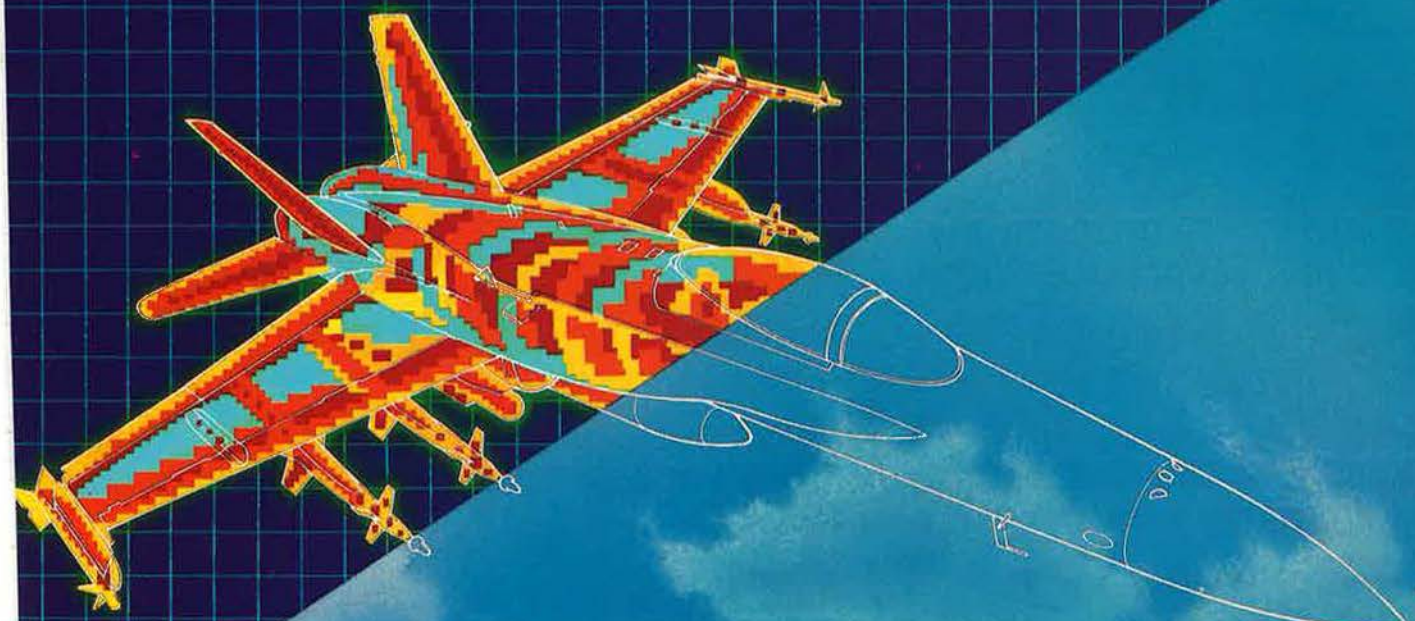

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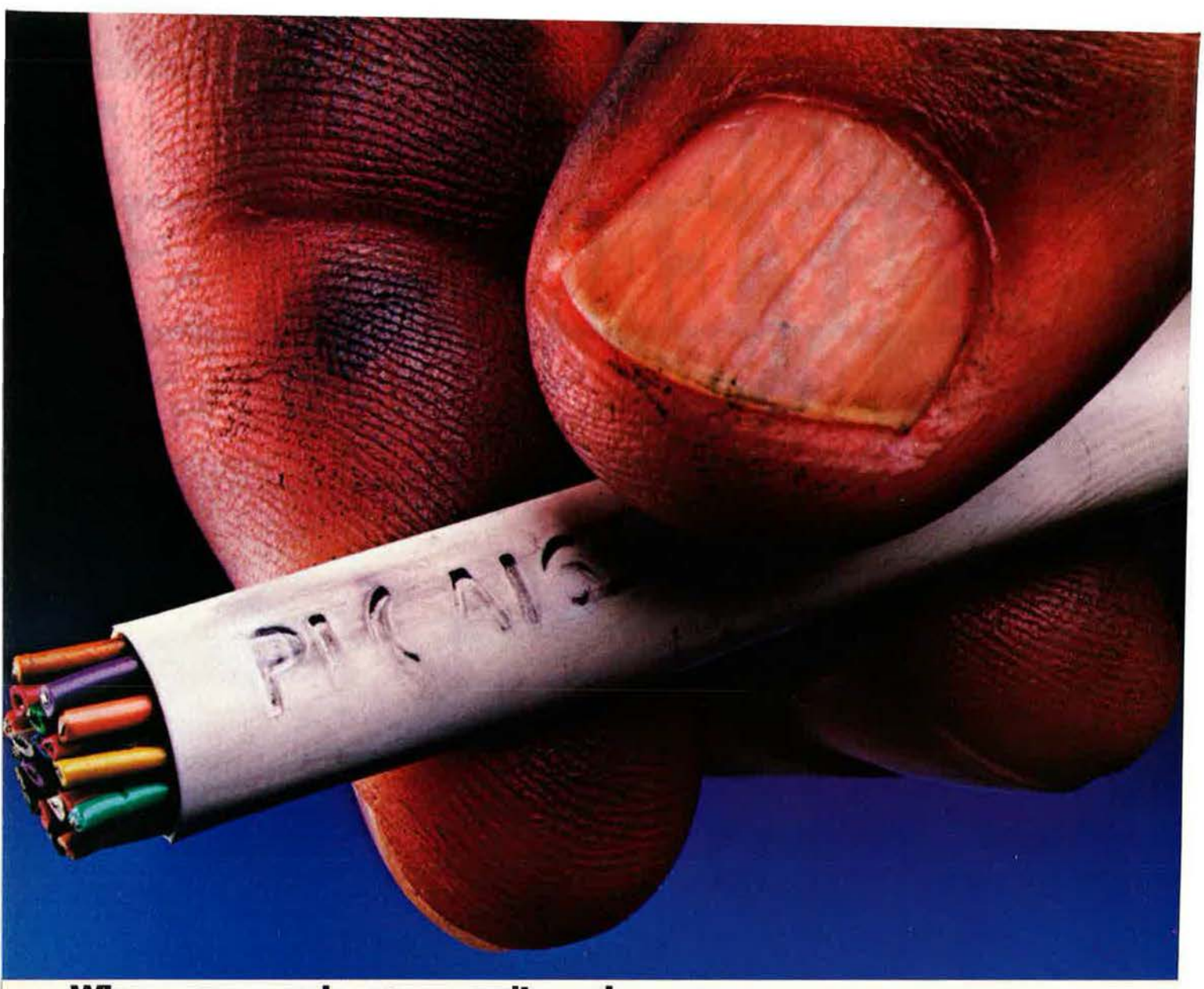

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pact, we will have to reduce support forces, and that will have a direct impact on readiness. The Air Force will be required to reduce ROTC and OTS accessions further and encourage more voluntary separations. We will also have to implement an involuntary release program for reserve officers and selective early retirement of twice-deferred lieutenant colonels or colonels with at least four years in grade.

We implemented an early-out and early-reenlistment program to reduce the enlisted force. The early-out and early-reenlistment programs were for first-term airmen assigned within the CONUS and overseas. Those airmen eligible to reenlist who had a date of separation between April (May if overseas) and September 1987 were required to reenlist or separate in April and May. Also required to separate early were first-term and career airmen with fewer than sixteen years of service who were ineligible to reenlist.

Setting Priorities in MWR

These actions have had a marked impact on our FY '87 force-structure planning and personnel management. There could be continued substantial impact in FY '88–89. If we are to keep a ready force, it is essential to maintain the quality of life for the active-duty force. Unfortunately, while we were making decisions that affected the size and shape of the force, we were also wrestling with a reduction in MWR funding.

Congress reduced the FY '87 appropriated funding for the MWR programs by $21.5 million. Congress further eliminated appropriated fund support beginning in FY '88 for such revenue-generating activities as golf courses, bowling alleys, and clubs in major metropolitan areas in the fifty states. The

Replacing USAF's Civilians

Losses could be heavy between now and 1990.

In 1984, the Air Force identified potential high losses in civilian professional, scientific, and technical occupations. Twenty-five percent of the civilian work force is eligible for retirement by 1990. Historical trends predict an eight percent loss per year, but there could be additional losses because of the pay gap and benefits issues. To counter this, USAF has instituted three recruiting and retention programs.

Congress passed a new public law providing military spouses with employment hiring preference. Frequent military moves make it difficult for spouses of members to pursue careers. The new law provides employment preference for military spouses for both nonappropriated funds positions (UA-8 and below) and Civil Service positions (GS-5 and above). The provisions apply to jobs both overseas and in CONUS.

Second, the Air Force recognized a need to replenish the civilian scientific, technical, and managerial work force systematically. Consequently, a centrally funded and managed intern program called "Palace Acquire" began in FY '85. It provides for recruitment of high-quality college graduates, and the Air Force says it regards it as a source of accessions for civilians comparable to the Air Force Academy and ROTC for military people.

Finally, USAF has introduced a program for coordinated officer and civilian procurement, designed to respond with equity to expansion or contraction of the total force. The Coordinated Officer and Civilian Equivalent Procurement program provides an improved assessment of total force needs and a coordinated effort for marketing and advertising Air Force opportunities.

Overseas tour lengths for many people have been extended as a result of a huge shortfall in Air Force permanent change of station funds. The decline of the US dollar abroad has also raised the cost of overseas station allowances. This photograph, which illustrates the US commitment overseas, shows a MAC C-130 and a West German C-160 Transall at a recent Reforger exercise.

Promotions Are Slowing Down

Congressional actions to hold end strength to FY '86 levels, reduce the number of officers, and restrict growth in NCO grades—along with unusually high retention—have led to a slowdown in both officer and NCO promotions.

The mandated officer reduction resulted in lower grade ceilings for colonels, lieutenant colonels, and majors in 1987. That, combined with fewer retirements than expected, decreased the monthly increments of those promoted from new selection lists. For example, promotions to colonel declined from seventy-eight in December 1986 to forty-one in January 1987, when the new list began. Promotions to major dropped from 334 in March 1987 to approximately 200 in April 1987. Lieutenant colonel increments are also projected to decline in June when promotions from the new list begin. This phasing allows the Air Force to exhaust selection lists it is currently promoting from on schedule and to finish the year within Defense Officer Personnel Management Act (DOPMA) grade ceilings. Promotion increments for FY '88 will be adjusted to reflect any changes in authorized grade levels and projected losses. Despite promotion slowdowns, USAF is maintaining the 1987 officer promotion schedule that it announced last year.

NCO promotions were also affected by grade ceiling limits and low attrition. The Air Force requested an increase of 6,500 staff, technical, and master sergeants in FY '87. An earlier increment of 6,000 had been funded in FY '86. Congress, however, attempted to limit end strength and grades to FY '86 levels and declined to fund the requested increase. But the Air Force, anticipating approval, had already selected people for promotion based on the expected increase.

Average Years of Service at Promotion

	FY '82	FY '83	FY '84	FY '85	FY '86
E-9	23.0	22.5	22.4	22.0	21.5
E-8	19.6	19.7	19.2	19.2	18.3
E-7	16.4	16.2	16.2	16.5	15.0
E-6	11.8	12.1	11.9	11.4	10.7
E-5	5.2	5.9	5.5	5.9	5.3

Held to FY '86 NCO grade levels and experiencing fewer retirements, USAF is taking longer to exhaust its selection lists. And the grade ceilings, lower than programmed, will mean decreased selection rates in the following promotion cycles: FY '87B staff sergeant, FY '88A staff sergeant, FY '88 technical sergeant, and FY '88 master sergeant. After that, selection rates should return to a more normal pace. Even with the slowdown, promotion phase points in 1987 should be as good as they were in 1985 for most grades. They will not match 1986, but that was an extraordinarily good year.

Chief of Staff directed a task force to review our complete MWR funding profile and determine how we can provide those essential programs within this framework. We believe the task force's recommendations will increase the efficiency of the MWR activities, increase the local commanders' flexibility, and ensure that these traditional programs continue to support the Air Force way of life.

The task force recommended a new sliding-scale funding policy to ensure clear support of appropriate programs. To do this, we organized base MWR activities into four categories, prioritized by value to the Air Force.

Certain mission-sustaining activities, such as gyms, parks, libraries, and motion pictures for isolated or deployed people, should have total appropriated fund support. Some basic community activities, such as swimming pools, recreation centers, youth activities, and child-development centers, require heavy support. Such desirable community activities as officer's, noncommissioned officer's, and airmen clubs, bowling alleys with fewer than twelve lanes, and base restaurants require a lower level of support. However, such business activities as Class VI stores, pay phones, slot machines, rod and gun clubs, aero clubs, snack bars, golf courses, bowling alleys, and marinas should receive only indirect operating appropriated fund support.

Eliminating appropriated fund support to the business activities means increasing fees, dues, and some prices. For example, officer's and enlisted clubs will increase dues. Golf courses will raise fees to within seventy-five percent of off-base fees. Additionally, the task force suggested a comprehensive business approach to MWR, with emphasis on marketing, training, and incentive programs for the employees.

Additional management actions are recommended: using Air Force central procurement offices if they are less expensive to operate than local sources; using central contracts for liquor, food, furniture, and equipment procurement; developing generic liquor brands for Class VI stores and clubs; and consolidating financial services from the 126 nonappropriated funds financial management functions into fifteen regional ones. These actions are expected to save our scarce nonappropriated funds resources and permit us to make the adjustments sought by Congress without a wholesale disruption of the MWR program.

A lot of hard work remains. We have requested $140 million as a supplement to the FY '87 MPA. That amount, plus an estimated savings of $275 million achieved by changes to PCS policies, reduced accessions, enlisted early outs, and voluntary officer separations, will help offset the MPA shortfalls.

However, even if all the actions taken were to achieve anticipated savings and assuming approval of the supplemental appropriation, the Air Force still faces a shortfall of $63 million. Reprogramming of other Air Force dollars into the MPA will be required to avoid actions with drastic mission and personnel implications. We have a significant funding problem that poses a challenge to Air Force leadership at every level. ■

Lt. Gen. Thomas J. Hickey became Deputy Chief of Staff for Personnel at Hq. USAF last year. He had previously been Commander of Air Training Command's Keesler Technical Training Center and before that served in various personnel and training assignments. He entered the Air Force in 1957, received his wings in 1958, and flew F-4s in 200 combat missions in Southeast Asia, sixty-three of them over North Vietnam. He is a graduate of the Air Command and Staff College and the Industrial College of the Armed Forces.

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AN AIR FORCE ALMANAC

On the following pages appears a variety of information and statistical material about the US Air Force—its people, organization, equipment, funding, activities, bases, and heroes. This "Almanac" section was compiled by the staff of AIR FORCE Magazine. We especially acknowledge the help of the Secretary of the Air Force Office of Public Affairs in its role as liaison with Air Staff agencies in bringing up to date the comparable data from last year's "Almanac." A word of caution: Personnel figures that appear in this section in different forms will not agree (nor will they always agree with figures in command and separate operating agency reports or in the "Guide to Bases") because of different cutoff dates, rounding off, differing methods of reporting, or categories of personnel that are excluded in some cases. These figures do illustrate trends, however, and may be helpful in placing force fluctuations in perspective.

—THE EDITORS

USAF—EVOLUTION OF THE NAME AND THE SERVICE'S LEADERS THROUGH THE YEARS*

DESIGNATION	FROM	TO	COMMANDER (at highest rank)	TITLE	FROM	TO
Aeronautical Div., US Signal Corps	Aug. 1, 1907	July 18, 1914	Brig. Gen. James Allen	Chief Signal Officer	Aug. 1, 1907	Feb. 13, 1913
			Brig. Gen. George P. Scriven	Chief Signal Officer	Feb. 13, 1913	July 18, 1914
Aviation Section, US Signal Corps	July 18, 1914	May 24, 1918	Brig. Gen. George P. Scriven	Chief Signal Officer	July 18, 1914	Feb. 13, 1917
			Maj. Gen. George O. Squier	Chief Signal Officer	Feb. 14, 1917	May 20, 1918
Army Air Service (AAS)	May 24, 1918	July 2, 1926	Maj. Gen. William L. Kenly	Chief, Div. of Military Aeronautics	May 20, 1918	Dec. 22, 1918
			Maj. Gen. Charles T. Menoher	Chief of the Air Service	Dec. 23, 1918	Oct. 4, 1921
			Maj. Gen. Mason M. Patrick	Chief of the Air Service	Oct. 5, 1921	July 1, 1926
Army Air Corps (AAC)	July 2, 1926	June 20, 1941	Maj. Gen. Mason M. Patrick	Chief of the Air Corps	July 2, 1926	Dec. 12, 1927
			Maj. Gen. James E. Fechet	Chief of the Air Corps	Dec. 13, 1927	Dec. 18, 1931
			Maj. Gen. Benjamin D. Foulois	Chief of the Air Corps	Dec. 19, 1931	Dec. 21, 1935
			Maj. Gen. Oscar Westover	Chief of the Air Corps	Dec. 22, 1935	Sept. 21, 1938
			Gen. H. H. Arnold	Chief of the Air Corps	Sept. 29, 1938	June 29, 1941
Army Air Forces (AAF)	June 20, 1941	Sept. 18, 1947	Gen. H. H. Arnold	Chief of the AAF	June 30, 1941	Mar. 8, 1942
			Gen. of the Army H. H. Arnold	Commanding General, AAF	Mar. 9, 1942	Feb. 9, 1946
			Gen. Carl A. Spaatz	Commanding General, AAF	Feb. 10, 1946	Sept. 25, 1947
United States Air Force (USAF)*	Sept. 18, 1947		Gen. Carl A. Spaatz	Chief of Staff, USAF	Sept. 26, 1947	Apr. 29, 1948

*For USAF leaders since 1948, see pp. 92 and 93.

UNITED STATES AIR FORCE PERSONNEL STRENGTH—1907 THROUGH 1988

YEAR	STRENGTH	YEAR	STRENGTH
1907	3	1948	387,730
1908	13	1949	419,347
1909	27	1950	411,277
1910	11	1951	788,381
1911	23	1952	973,474
1912	51	1953	977,593
1913	114	1954	947,918
1914	122	1955	959,946
1915	208	1956	909,958
1916	311	1957	919,835
1917	1,218	1958	871,156
1918	195,023	1959	840,028
1919	25,603	1960	814,213
1920	9,050	1961	820,490
1921	11,649	1962	883,330
1922	9,642	1963	868,644
1923	9,441	1964	855,802
1924	10,547	1965	823,633
1925	9,670	1966	886,350
1926	9,674	1967	897,426
1927	10,078	1968	904,759
1928	10,549	1969	862,062
1929	12,131	1970	791,078
1930	13,531	1971	755,107
1931	14,780	1972	725,635
1932	15,028	1973	690,999
1933	15,099	1974	643,795
1934	15,861	1975	612,551
1935	16,247	1976	585,207
1936	17,233	1977	570,479
1937	19,147	1978	569,491
1938	21,089	1979	559,450
1939	23,455	1980	557,969
1940	51,165	1981	570,302
1941	152,125	1982	582,845
1942	764,415	1983	592,044
1943	2,197,114	1984	597,125
1944	2,372,292	1985	601,515
1945	2,282,259	1986	608,199
1946	455,515	1987	606,850*
1947	305,827	1988	597,753*

*Programmed

USAF TOTAL ACTIVE-DUTY STRENGTH BY GRADE

(As of September 30, 1986)

OFFICERS

GRADE	NUMBER
GENERAL	12
LIEUTENANT GENERAL	39
MAJOR GENERAL	117
BRIGADIER GENERAL	171
COLONEL	5,622
LIEUTENANT COLONEL	12,544
MAJOR	20,033
CAPTAIN	42,070
FIRST LIEUTENANT	15,002
SECOND LIEUTENANT	13,438
TOTAL	**109,048**

AIRMEN

GRADE	NUMBER
CHIEF MASTER SERGEANT	4,946
SENIOR MASTER SERGEANT	9,854
MASTER SERGEANT	39,210
TECHNICAL SERGEANT	59,197
STAFF SERGEANT	114,046
SERGEANT/SENIOR AIRMAN	114,954
AIRMAN FIRST CLASS	91,604
AIRMAN	38,265
AIRMAN BASIC	22,590
TOTAL	**494,666**

OFFICERS	109,048
CADETS	4,485
AIRMEN	494,666
TOTAL STRENGTH	**608,199**

USAF AND AIR RESERVE FORCES PERSONNEL BY CATEGORIES

CATEGORY	FY '83	FY '84	FY '85	FY '86	FY '87	FY '88[1]
AIR FORCE MILITARY						
Officers	104,600	106,200	108,400	109,400	109,400	109,000
Airmen	483,000	486,400	488,600	494,700	493,000	484,400
Cadets	4,500	4,500	4,500	4,500	4,400	4,400
TOTAL, AIR FORCE MILITARY	**592,100**	**597,100**	**601,500**	**608,200**	**606,800**	**597,800**
Career Reenlistments (Second Term)	43,500	38,000	36,000	38,900	43,000	37,000
Rate	92%	90%	89%	88%	88%	88%
First-Term Reenlistments	31,100	24,700	25,700	23,500	22,100	21,700
Rate	66%	62%	54%	58%	58%	58%
CIVILIAN PERSONNEL						
Direct Hire (Including Technicians)	230,000	239,800	250,400	249,604	250,266	251,674
Indirect Hire—Foreign Nationals	13,000	13,000	13,468	13,644	13,496	13,443
TOTAL, CIVILIAN PERSONNEL	**243,000**	**252,800**	**263,868**	**263,248**	**263,762**	**265,117**
TOTAL, MILITARY AND CIVILIAN[2]	**835,100**	**849,900**	**865,368**	**871,448**	**870,562**	**862,917**
Technicians (Included above as Direct Hire Civilians)						
AFRES Technicians	8,013	7,973	8,064	8,866	9,178	9,830
ANG Technicians	21,949	22,160	22,671	22,497	23,221	23,252
AIR RESERVE FORCES						
Air National Guard, Selected Reserve	102,170	105,012	109,398	112,592	113,767	116,700
Air Force Reserve, Paid	67,227	70,318	75,214	78,519	79,562	83,300
Air Force Reserve, Nonpaid[3]	40,692	38,938	44,069	47,153	49,941	48,291
TOTAL, READY RESERVE[3]	**210,089**	**214,268**	**228,681**	**238,264**	**243,270**	**248,291**
Standby	28,939	29,543	27,198	25,823	28,325	28,325
TOTAL, AIR RESERVE FORCES[4]	**239,028**	**243,811**	**255,879**	**264,087**	**271,595**	**276,616**

[1]President's Budget Request.
[2]FY '83–86 are actual figures; FY '87–88 are estimates; excludes nonchargeable personnel.
[3]Excludes training/pay categories J, K, and L.
[4]Excludes Retired Air Force Reserve.

NOTE: Totals may not add because of rounding.

NUMBER OF OFFICERS IN EACH MAJOR CAREER FIELD*

CODE	UTILIZATION FIELD TITLE	ASSIGNED
00**	Commanders and Directors	1,206
02	International-Politico-Military Affairs	190
05	Disaster Preparedness	184
09	Special Duty	1,386
10–14	Pilot	22,283
15 & 22	Navigator	9,291
16	Air Traffic Control	373
17	Air Weapons Director	1,902
18	Missile Operations	2,949
20	Space Systems	1,411
23	Audiovisual	106
25	Weather	1,171
26	Scientific	1,366
27	Acquisition Program Management	2,455
28	Development Engineer	5,691
29	Program Management	74
31	Missile Maintenance	444
40	Aircraft Maintenance & Munitions	3,535
49	Information Systems	6,123
55	Civil Engineering	2,143
57	Cartography/Geodesy	86
60	Transportation	936
62	Supply Service	418
64	Supply Management	1,275
65	Procurement/Manufacturing Management	1,488
66	Logistics Plans & Programs	1,092
67	Financial	1,505
70	Administration	2,436
73	Personnel	1,921
74	Manpower Management	557
75	Education & Training	633
79	Public Affairs	514
80	Intelligence	3,001
81	Security Police	1,061
82	Special Investigations & Counterintelligence	514
87	Band	31
88	Legal	1,400
89	Chaplain	870
90	Health Services Management	1,252
91 & 92	Biomedical Sciences	2,366
93–96	Physician	3,952
97	Nurse	5,123
98	Dental	1,613
99	Veterinary	27

*These figures do not include general officers or UPT/UNT/medical/law students.
**Commanders and director specialties in various career fields, e.g., operations, logistics, programming, etc.

NUMBER OF ENLISTED IN EACH MAJOR CAREER FIELD

CODE	CAREER FIELD TITLE	ASSIGNED
10	First Sergeant	1,745
11	Aircrew Operations	9,255
12	Aircrew Protection	3,210
20	Intelligence	13,010
22	Photomapping	116
23	Audiovisual	3,132
24	Safety	1,379
25	Weather	3,205
27	Command Control Systems Operations	16,648
30	Communications-Electronics Systems	25,579
31	Missile Electronic Maintenance	732
32	Avionics Systems	28,630
34	Training Devices	1,618
36	Wire Communications Systems Maintenance	4,435
39	Maintenance Management Systems	3,400
40	Intricate Equipment Maintenance	799
41	Missile Systems Maintenance	5,312
42	Aircraft Systems Maintenance	46,080
43	Aircraft Maintenance	46,456
46	Munitions & Weapons Maintenance	23,889
47	Vehicle Maintenance	5,973
49	Information Systems	19,944
54	Mechanical/Electrical	10,951
55	Structural/Pavements	12,896
56	Sanitation	1,787
57	Fire Protection	6,233
59	Marine	87
60	Transportation	15,007
61	Supply Services	3,138
62	Food Services	4,680
63	Fuels	6,898
64	Supply	26,447
65	Procurement	1,711
66	Logistics Plans	1,069
67	Accounting & Finance and Auditing	6,084
69	Management Analysis	446
70	Administration	29,367
73	Personnel	11,677
74	Morale, Welfare & Recreation	1,914
75	Education & Training	3,868
79	Public Affairs	1,321
81	Security Police	39,273
82	Special Investigations & Counterintelligence	927
87	Band	1,116
90–92	Medical	25,856
98	Dental	3,729
99	Miscellaneous (Special Duty, Patients, Unclassified, etc.)	13,635

AIR FORCE MILITARY PERSONNEL DISTRIBUTION BY GEOGRAPHIC AREA

(As of September 30, 1986)

TOTAL MILITARY PERSONNEL	**608,199**
US TERRITORY AND SPECIAL LOCATIONS	**476,051**
TOTAL IN FOREIGN COUNTRIES	**132,148**

Western and Southern Europe (Major concentrations in Germany—40,325, UK—26,708, Spain—5,151, Italy—5,874, Turkey—3,855)	91,372	Africa, Near East, S. Asia (Major concentrations in Egypt—49, Saudi Arabia—209)	373
East Asia and Pacific (Major concentrations in Japan/Okinawa—16,671, Philippines—9,424, South Korea—11,205)	37,650	Western Hemisphere (Major concentrations in Canada—113, Panama [Republic]—2,520)	2,735
		Eastern Europe	18

USAF PERSONNEL STRENGTH BY COMMANDS, SOAs, AND DRUs

MAJOR COMMANDS	**MILITARY**	**CIVILIAN**	**TOTAL**
Air Force Communications Command (AFCC)	49,686	8,711	58,397
Air Force Logistics Command (AFLC)	11,879	90,466	102,345
Air Force Space Command (AFSPACECOM)	5,680	1,185	6,865
Air Force Systems Command (AFSC)	28,753	27,918	56,671
Air Training Command (ATC)	73,654	14,193	87,847
Air University (AU)	6,526	1,549	8,075
Alaskan Air Command (AAC)	7,649	1,276	8,925
Electronic Security Command (ESC)	12,627	1,136	13,763
Military Airlift Command (MAC)	77,850	15,528	93,378
Pacific Air Forces (PACAF)	28,989	9,649	38,638
Strategic Air Command (SAC)	106,630	12,041	118,671
Tactical Air Command (TAC)	101,999	11,371	113,370
United States Air Forces in Europe (USAFE)	64,133	11,216	75,349
TOTALS	**576,055**	**206,239**	**782,294**

SEPARATE OPERATING AGENCIES (SOAs)	**MILITARY**	**CIVILIAN**	**TOTAL**
Air Force Accounting and Finance Center (AFAFC)	219	2,212	2,431
Air Force Audit Agency (AFAA)	226	719	945
Air Force Commissary Service (AFCOMS)	1,112	8,153	9,265
Air Force Engineering and Services Center (AFESC)	392	545	937
Air Force Inspection and Safety Center (AFISC)	338	115	453
Air Force Intelligence Service (AFIS)	632	200	832
Air Force Legal Services Center (AFLSC)	442	146	588
Air Force Management Engineering Agency (AFMEA)	196	90	286
Air Force Military Personnel Center (AFMPC)	1,526	600	2,126
Air Force Office of Medical Support (AFOMS)	94	175	269
Air Force Office of Security Police (AFOSP)	65	62	127
Air Force Office of Special Investigations (AFOSI)	1,927	488	2,415
Air Force Operational Test and Evaluation Center (AFOTEC)	525	143	668
Air Force Reserve (AFRES)	306	12,541	12,847
Air Force Service Information and News Center (AFSINC)	740	171	911
Air Reserve Personnel Center (ARPC)	122	584	706
DIRECT REPORTING UNITS (DRUs)			
Air Force Civilian Personnel Management Center (AFCPMC)	4	692	696
Air Force District of Washington (AFDW)	1,437	991	2,428
Air Force Technical Applications Center (AFTAC)	1,258	86	1,344
Office of the Secretary of the Air Force/Air Staff/Air National Guard Support Center	1,992	411	2,403
United States Air Force Academy (USAFA)*	2,685	1,630	4,315
USAF Historical Research Center (USAFHRC)	22	79	101
Other Reporting Units			
Air Force Center for Studies and Analyses (AFCSA)**	106	41	147
Air Force Combat Operations Staff (AFCOS)	239	17	256
Air Force Review Boards Office (AFRBO)	16	65	81
Air Force Space Elements USSPACECOM/NORAD (AFESP)***	396	82	478
Other	10,642	25,968	36,610
TOTALS, SOAs and DRUs	**27,659**	**57,006**	**84,665**
TOTALS, COMMANDS, SOAs, and DRUs	**603,714**	**263,245**	**866,959**

*4,485 cadets not included.
**Effective February 20, 1985.
***Effective March 5, 1986.

USAF PERSONNEL BY GRADE, RACE, AND SEX

(As of September 30, 1986)

OFFICERS

GRADE	FORCE	BLACK	OTHER	WOMEN
GENERAL	339	6	1	2
COLONEL	5,622	129	75	92
LIEUTENANT COLONEL	12,544	238	205	408
MAJOR	20,033	709	274	1,334
CAPTAIN	42,070	3,165	831	5,702
FIRST LIEUTENANT	15,002	940	369	2,386
SECOND LIEUTENANT	13,438	672	428	2,453
TOTALS	**109,048**	**5,859**	**2,183**	**12,377**

AIRMEN

GRADE	FORCE	BLACK	OTHER	WOMEN
CHIEF MASTER SERGEANT	4,946	578	70	22
SENIOR MASTER SERGEANT	9,854	1,420	141	86
MASTER SERGEANT	39,210	6,337	810	945
TECHNICAL SERGEANT	59,197	11,093	1,679	3,992
STAFF SERGEANT	114,046	21,284	4,141	15,509
SERGEANT/SENIOR AIRMAN	114,954	21,375	4,567	15,742
AIRMAN FIRST CLASS	92,604	14,474	4,469	13,730
AIRMAN	38,265	6,160	1,816	6,719
AIRMAN BASIC	22,590	3,212	975	3,949
TOTALS	**494,666**	**85,933**	**18,668**	**60,694**
TOTALS, INCLUDING OFFICERS	**603,714**	**91,792***	**20,851****	**73,071*****

*Includes 15,473 women.
**Includes 2,695 women.
***Includes women from black and other categories.

AVERAGE AGES OF MILITARY PERSONNEL

(As of September 30, 1986)

Officers	Average 34 years of age
Airmen	Average 26 years of age

MONTHLY MILITARY BASIC RATES OF PAY

(Effective January 1, 1987)

PAY GRADE	UNDER 2	2	3	4	6	8	10	12	14	16	18	20	22	26
						YEARS OF SERVICE								
COMMISSIONED OFFICERS*														
O-10	$5,378	$5,567	$5,567	$5,567	$5,567	$5,781	$5,781	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900
O-9	4,766	4,891	4,995	4,995	4,995	5,122	5,122	5,335	5,335	5,781	5,781	5,900	5,900	5,900
O-8	4,317	4,446	4,552	4,552	4,552	4,891	4,891	5,122	5,122	5,335	5,567	5,781	5,900	5,900
O-7	3,587	3,831	3,831	3,831	4,002	4,002	4,235	4,235	4,446	4,891	5,227	5,227	5,227	5,227
O-6	2,658	2,921	3,112	3,112	3,112	3,112	3,112	3,112	3,218	3,727	3,917	4,002	4,235	4,593
O-5	2,126	2,497	2,669	2,669	2,669	2,669	2,750	2,898	3,092	3,324	3,514	3,621	3,747	3,747
O-4	1,792	2,182	2,328	2,328	2,371	2,476	2,645	2,793	2,921	3,049	3,133	3,133	3,133	3,133
O-3	1,665	1,862	1,990	2,202	2,308	2,391	2,520	2,645	2,710	2,710	2,710	2,710	2,710	2,710
O-2	1,452	1,586	1,905	1,969	2,011	2,011	2,011	2,011	2,011	2,011	2,011	2,011	2,011	2,011
O-1	1,260	1,312	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586
COMMISSIONED OFFICERS WITH MORE THAN 4 YEARS OF ACTIVE ENLISTED OR WARRANT OFFICER SERVICE														
O-3E	—	—	—	2,202	2,308	2,391	2,520	2,645	2,750	2,750	2,750	2,750	2,750	2,750
O-2E	—	—	—	1,969	2,011	2,074	2,182	2,266	2,328	2,328	2,328	2,328	2,328	2,328
O-1E	—	—	—	1,586	1,694	1,757	1,820	1,884	1,969	1,969	1,969	1,969	1,969	1,969
ENLISTED MEMBERS														
E-9	—	—	—	—	—	—	1,974	2,018	2,064	2,111	2,158	2,200	2,316	2,541
E-8	—	—	—	—	—	1,655	1,702	1,747	1,793	1,840	1,882	1,929	2,042	2,270
E-7	1,155	1,247	1,294	1,339	1,385	1,429	1,474	1,520	1,589	1,634	1,680	1,702	1,816	2,042
E-6	994	1,083	1,129	1,177	1,221	1,265	1,311	1,379	1,422	1,468	1,491	1,491	1,491	1,491
E-5	872	950	996	1,039	1,107	1,152	1,198	1,242	1,265	1,265	1,265	1,265	1,265	1,265
E-4	814	859	909	980	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019
E-3	766	808	841	874	874	874	874	874	874	874	874	874	874	874
E-2	738	738	738	738	738	738	738	738	738	738	738	738	738	738
E-1**	658	658	658	658	658	658	658	658	658	658	658	658	658	658

NOTE: Amounts less than $1 have been omitted.
*Basic pay is limited to $5,900.10, regardless of cumulative years of service.
**Basic pay for E-1s with less than four months of service is $608.40.
Basic pay while serving as Chairman of the Joint Chiefs of Staff or as Chief of Staff of the Air Force is $5,900.10, regardless of cumulative years of service.
Basic pay while serving as Chief Master Sergeant of the Air Force is $3,089.40, regardless of cumulative years of service.

MONTHLY BASIC ALLOWANCE FOR QUARTERS (BAQ)

(Effective January 1, 1987)

Pay Grade	Without Dependents		With Dependents
	Full [1]	Partial [2]	
O-10	$570.00	$50.70	$701.10
O-9	570.00	50.70	701.10
O-8	570.00	50.70	701.10
O-7	570.00	40.70	701.10
O-6	523.20	39.60	636.00
O-5	493.80	33.00	585.90
O-4	452.70	26.70	535.50
O-3	366.60	22.20	446.40
O-2	295.20	17.70	382.80
O-1	253.20	13.20	343.20
E-9	334.50	18.60	456.00
E-8	309.90	15.30	424.80
E-7	264.60	12.00	395.10
E-6	234.90	9.90	358.50
E-5	217.20	8.70	318.60
E-4	188.40	8.10	275.40
E-3	183.00	7.80	253.20
E-2	155.40	7.20	253.20
E-1	141.60	6.90	253.20

[1]Payment of the full rate of basic allowance for quarters at these rates to members of the uniformed services without dependents is authorized by 37 U.S.C. 403 and Part IV of Executive Order 11157, as amended.

[2]Payment of the partial rate of basic allowance for quarters at these rates to members of the uniformed services without dependents who, under 37 U.S.C. 403(b) or 403(c), are not entitled to the full rate of basic allowance for quarters is authorized by 37 U.S.C. 1009(c)(2) and Part IV of Executive Order 11157, as amended.

AVIATION CAREER INCENTIVE PAY RATES*

PHASE I

Monthly Rate	Years of Aviation Service as an Officer *(including flight training)*
$125	2 or less
$156	more than 2
$188	more than 3
$206	more than 4
$400	more than 6

PHASE II

Monthly Rate	Years of Service as an Officer
$370	more than 18
$340	more than 20
$310	more than 22
$280	more than 24
$250	more than 25 (O-6 and below)

Nonrated Flight Pay

	Monthly Rate
Officer	$110
Enlisted Non-Crew Member	$110

*For rated officers, flight surgeons, and other designated medical officers except as noted.

NOTE: An officer in pay grade O-7 may not be paid at a rate greater than $200 a month. An officer in pay grade O-8 or above may not be paid at a rate greater than $206 a month. Officers with more than 18 years of commissioned service and less than 6 years of aviation service are entitled to Phase I rates.

BASIC ALLOWANCE FOR SUBSISTENCE (BAS)

Officers (Monthly)	Enlisted (Daily)		
	Separate Rations	Rations in Kind Not Available	Emergency Rations
$112.65	$5.37 $4.96*	$6.07 $5.61*	$8.03 $7.43*

*Applies to E-1s with less than four months of active-duty service.

EDUCATIONAL LEVELS—USAF LINE OFFICERS

Level	End of September 1986	
	Number	Percent
Below baccalaureate/unknown	122	0.13
Baccalaureate, no master's degree	52,987	58.24
Master's degree, no doctorate	36,501	40.12
Doctoral and professional degrees	1,375	1.51
TOTALS	**90,985**	**100.00**

HAZARDOUS DUTY INCENTIVE PAY (HDIP)*

Pay Grade	Monthly Rate	Pay Grade	Monthly Rate
O-10	$110	E-9	$200
O-9	$110	E-8	$200
O-8	$110	E-7	$200
O-7	$110	E-6	$175
O-6	$250	E-5	$150
O-5	$250	E-4	$125
O-4	$225	E-3	$110
O-3	$175	E-2	$110
O-2	$150	E-1	$110
O-1	$125		

*Excepting AWACS crew members.

EDUCATIONAL LEVELS—USAF ENLISTED FORCE

Level	End of September 1986	
	Number	Percent
Below high school	718	0.14
High school	267,170	54.01
Some college (less than two years)	148,236	29.97
AA/AS degree	25,365	5.13
Two to three years of college	38,695	7.82
Baccalaureate, no master's	13,302	2.69
Master's or higher	1,180	0.24
TOTALS	**494,666**	**100.00**

FEDERAL CIVILIAN PAY SCALE

General Schedule

(Effective January 1, 1987)

GRADE	1	2	3	4	5	6	7	8	9	10
GS-1	$ 9,619	$9,940	$10,260	$10,579	$10,899	$11,087	$11,403	$11,721	$11,735	$12,036
GS-2	10,816	11,073	11,430	11,735	11,866	12,215	12,564	12,913	13,262	13,611
GS-3	11,802	12,195	12,588	12,981	13,374	13,767	14,160	14,553	14,946	15,339
GS-4	13,248	13,690	14,132	14,574	15,016	15,458	15,900	16,342	16,784	17,226
GS-5	14,822	15,316	15,810	16,304	16,798	17,292	17,786	18,280	18,744	19,268
GS-6	16,521	17,072	17,623	18,174	18,725	19,276	19,827	20,378	20,929	21,480
GS-7	18,358	18,970	19,582	20,194	20,806	21,418	22,030	22,642	23,254	23,866
GS-8	20,333	21,011	21,689	22,367	23,045	23,723	24,401	25,079	25,757	26,435
GS-9	22,458	23,207	23,956	24,705	25,454	26,203	26,952	27,701	28,450	29,199
GS-10	24,732	25,556	26,380	27,204	28,028	28,852	29,676	30,500	31,324	32,148
GS-11	27,172	28,078	28,984	29,890	30,796	31,702	32,608	33,514	34,420	35,326
GS-12	32,567	33,653	34,739	35,825	36,911	37,997	39,083	40,169	41,255	42,341
GS-13	38,727	40,018	41,309	42,600	43,891	45,182	46,473	47,764	49,055	50,346
GS-14	45,763	47,288	48,813	50,338	51,863	53,388	54,913	56,438	57,963	59,488
GS-15	53,830	55,624	57,418	59,212	61,006	62,800	64,594	66,388	68,182	69,976
GS-16	63,135	65,240	67,345	69,450	71,555*	73,660*	75,765*	77,870*	79,975*	
GS-17	73,958*	76,423*	78,888*	81,353*	83,818*					
GS-18	86,682*									

Senior Executive Service**

LEVEL	1	2	3	4	5	6
	$63,135	$65,690	$68,245	$70,800	$72,650	$74,500

*Pay limited to Level V of the Executive Schedule, $70,800.
**Basic pay for employees at these rates is limited to $74,500, in accordance with Public Law 97-377.

AIR FORCE FULL-TIME CIVILIAN EMPLOYMENT BY GRADE

(As of September 30, 1986)

GS/OTHER		WG		WL		WS	
GR	POP	GR	POP	GR	POP	GR	POP
1	300	1	220	1	0	1	33
2	772	2	1,498	2	34	2	32
3	8,028	3	1,041	3	8	3	118
4	17,115	4	2,494	4	41	4	210
5	24,392	5	5,432	5	66	5	361
6	9,353	6	4,199	6	44	6	493
7	15,172	7	6,682	7	56	7	825
8	2,215	8	9,388	8	161	8	1,002
9	19,212	9	7,187	9	247	9	1,394
10	911	10	20,594	10	1,015	10	1,849
11	18,972	11	5,757	11	127	11	616
12	19,326	12	2,021	12	16	12	358
13	9,283	13	349	13	0	13	249
14	3,590	14	130	14	1	14	327
15	1,145	15	2	15	0	15	208
16	1					16	122
17	0					17	58
18	1					18	10
ST	5					19	0
SES	204						
TOTALS	**149,997**		**66,994**		**1,816**		**8,265**

GR = Grade
GS = General Schedule
ST = Scientific and Professional
SES = Senior Executive Service

POP = Population
WG = Wage Grade Positions
WL = Wage Grade Leader Positions
WS = Wage Grade Supervisory Positions

NOTE: Table does not include ANG technicians, local national employees, or non-appropriated fund employees.

AIR FORCE CIVILIAN PERSONNEL AVERAGE AGE AND LENGTH OF SERVICE

(As of October 31, 1986)

Average age	43 years
Average length of service	14 years

DoD BUDGET AUTHORITY BY COMPONENT FOR FY 1987–89*

(Billions of Current Dollars)

Component	FY 1987 Dollars	FY 1987 Share	FY 1988 Dollars	FY 1988 Share	FY 1989 Dollars	FY 1989 Share
Army	$ 74.5	26.4%	$ 80.1	26.4%	$ 84.8	26.2%
Navy/Marine Corps	95.3	33.8%	102.3	33.7%	108.7	33.6%
Air Force	93.8	33.3%	100.4	33.1%	107.2	33.2%
Defense Agencies/Defense-wide	18.1	6.4%	20.5	6.8%	22.6	7.0%
TOTALS	**$281.7**		**$303.3**		**$323.3**	

*Totals may not add because of rounding.

DoD BUDGET BY MISSION CATEGORIES FOR FY 1986–90

(Billions of Dollars)

Military Program	Total Budget Authority in Current Dollars (1986 figures actual; 1987–90 estimates) 1986	1987	1988	1989	1990	Change FY 1987–88
Strategic Forces[1]	$ 24.2	$ 21.5	$ 23.7	$ 27.7	$ 32.9	+ 2.2
General-Purpose Forces	116.2	117.2	118.8	126.8	135.6	+ 1.6
Intelligence and Communications	26.4	28.2	30.2	31.5	33.5	+ 2.0
Airlift and Sealift	7.6	7.2	6.0	6.6	7.1	− 1.2
Guard and Reserve Forces	15.6	16.0	17.5	18.6	19.5	+ 1.5
Research and Development[2]	25.7	28.0	35.1	36.5	35.8	+ 7.1
Central Supply and Maintenance	24.4	23.1	26.0	27.0	29.7	+ 2.9
Training, Medical, and Other General Personnel Activities	33.6	36.3	38.8	41.0	42.0	+ 2.5
Administrative and Associated Activities	7.1	6.7	6.3	6.7	6.9	− 0.4
Support of Other Nations	0.5	0.7	0.9	0.9	0.9	+ 0.2
TOTAL BUDGET AUTHORITY	**$281.4**	**$284.9**	**$303.3**	**$323.3**	**$343.9**	**+18.4**
(Prior-year funds and other financial adjustments)	−0.9	1.4	0.8	0.8	0.8	− 0.6
TOTAL OBLIGATIONAL AUTHORITY	**$280.5**	**$286.3**	**$304.1**	**$324.1**	**$344.7**	**+17.8**

NOTE: Totals may not add because of rounding.

[1]Excludes strategic systems development included in the research and development category.
[2]Excludes research and development in other program areas on systems approved for production.

INSTALLATIONS OF THE US AIR FORCE

During 1986, the Air Force undertook a major project to redefine and categorize all Air Force properties and activities to reflect more accurately actual installation posture. The new definitions reclassify all Air Force activities into one of four categories: major installations, minor installations, support sites, and other activities. For an installation to be categorized as "major," it must be operated by an active, Guard, or Reserve unit of group size or larger and have all the organic support to accomplish the unit's mission. Minor installations are facilities operated by active, Guard, or Reserve units of at least squadron size that do not satisfy all of the criteria for a major installation. Examples of minor installations are Guard and Reserve flying operations that are located at civilian-owned airports. A support site is a detached piece of real property that provides general support to the Air Force mission as opposed to supporting a particular installation. Examples of support sites are missile tracking sites, radar bomb-scoring sites, and radio relay sites. The fourth classification category, other activities, includes Air Force units that have little or no real-property accountability over the real estate that they occupy. Examples include units that are located on installations belonging to other services or leased office space that supports recruiting detachments. Civil Air Patrol, etc. The new Air Force classification system is designed to describe accurately the Air Force installation posture. Previously, the Air Force reported more than 2,800 installations worldwide. In reality, the number of independent installations totals only 262: 138 major and 124 minor.

Before Reclassification		After Reclassification	
Major Installations		**Major Installations**	
US and Possessions*	104	US and Possessions*	101
Foreign	35	Foreign	37
Worldwide	**139**	**Worldwide**	**138**
Minor Installations		**Minor Installations**	
US and Possessions*	2,007	US and Possessions*	108
Foreign	704	Foreign	16
Worldwide	**2,711**	**Worldwide**	**124**
Minor Installations Included:		**Support Sites**	
Missiles Sites	1,158	US and Possessions*	132
Air National Guard	144	Foreign	123
Electronic Station or Site	453	**Worldwide**	**255**
General Support Annex	939		
Auxiliary Airfield	17	**Other Activities**	
		US and Possessions**	301
		Foreign	386
		Worldwide	**687**

*Includes Air Force Reserve and Air National Guard.
**Includes USAF presence at non-USAF installations and other sites.

AIR FORCE BUDGET AND FINANCE—FISCAL YEARS 1984–89

(Figures in millions of dollars)

	FY '84	FY '85	FY '86	FY '87	FY '88	FY '89
Gross National Product	$3,695,000	$3,998,000	$4,218,000	$4,493,000	$4,816,000	$5,165,000
Federal Budget, Outlays (Current $)	852,000	946,000	990,000	1,016,000	1,024,000	1,069,000
DoD Budget, Outlays (Current $)	220,806	245,370	265,636	274,200	289,300	303,700
DoD Percent of: GNP	6.0%	6.1%	6.3%	6.1%	6.0%	5.9%
Federal Budget	25.9%	25.9%	26.8%	27.0%	28.2%	28.4%
Air Force Budget Outlays						
Current Dollars	68,620	81,988	91,188	92,806	96,991	99,344
Constant FY '88 Dollars	76,700	89,023	97,350	96,973	96,991	95,719
AF Percent of: GNP	1.9%	2.1%	2.2%	2.1%	2.0%	1.9%
Federal Budget	8.1%	8.7%	9.2%	9.1%	9.5%	9.3%
Total Obligational Authority						
DoD—Current Dollars	258,151	282,213	280,520	286,285	304,080	324,726
Constant FY '88 Dollars	293,184	309,752	301,131	299,179	304,080	313,127
AF—Current Dollars	85,419	97,302	95,188	95,505	99,968	105,701
Constant FY '88 Dollars	95,752	105,707	100,906	98,828	99,968	103,115
Current Dollars						
Aircraft Procurement	20,695	24,589	21,418	17,356	14,191	17,221
Missile Procurement	7,439	6,708	7,676	8,051	9,773	11,036
Other Procurement	7,088	8,431	8,007	9,487	8,570	9,820
Procurement Subtotal	35,222	39,728	37,101	34,894	32,534	38,077
Military Construction—USAF	1,534	1,548	1,557	1,240	1,501	1,739
Military Construction—AFRES	41	66	60	59	79	59
Military Construction—ANG	108	109	115	149	161	137
Military Construction Subtotal	1,683	1,723	1,732	1,448	1,741	1,935
RDT&E	12,230	13,108	13,161	15,417	18,623	17,729
Stock Fund	1,289	549	396	140	326	225
TOTAL, INVESTMENT	**50,424**	**55,106**	**52,390**	**51,899**	**53,224**	**57,966**
Military Personnel—USAF	12,825	17,962	18,863	19,598	19,908	19,871
Reserve Personnel—USAF	388	568	603	565	615	617
National Guard Personnel—USAF	578	885	974	949	980	980
Military Personnel Subtotal	13,791	19,415	20,440	21,112	21,503	21,468
Operation & Maintenance—USAF	17,824	19,227	18,988	18,957	21,325	22,208
Operation & Maintenance—AFRES	783	878	857	932	1,018	1,070
Operation & Maintenance—ANG	1,801	1,825	1,723	1,796	1,973	2,031
Operation & Maintenance Subtotal	20,408	21,930	21,568	21,685	24,316	25,309
Family Housing—USAF	796	849	790	809	925	958
TOTAL, OPERATING	**34,995**	**42,194**	**42,798**	**43,606**	**46,744**	**47,735**
Programs, FY '88 Budget (Current $)						
I Strategic Forces	19,930	21,112	18,177	15,111	16,249	19,200
II General-Purpose Forces	20,213	24,452	24,106	24,637	23,745	25,306
III Intelligence & Communications	10,891	13,816	15,055	16,342	17,333	17,941
IV Airlift & Sealift	5,332	6,067	6,776	6,556	5,360	5,786
V Reserve & Guard Forces	4,468	5,236	5,005	4,955	5,415	5,538
VI Research & Development	9,285	9,641	8,826	10,022	13,284	13,105
VII Central Supply & Maintenance	7,335	7,394	7,480	8,096	7,883	7,835
VIII Training, Medical, & Other General Personnel Activities	6,723	8,129	8,432	8,477	9,311	9,505
IX Administration & Associated Activities	1,089	1,367	1,242	1,214	1,296	1,388
X Support of Other Nations	152	88	89	92	94	96

NOTE: Totals may not add because of rounding.
*Figures based on the President's FY '88 budget.

USAF AIRCRAFT PROCUREMENT—FY '80–88

CATEGORY	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85	FY '86	FY '87	FY '88
Fixed-Wing Aircraft									
Total Units Budgeted	408	313	200	197	241	286	333	265	239
Accepted/Scheduled Acceptances	354	396	370	302	218	240	239	329	307
Helicopters									
Total Units Budgeted	0	5	6	0	0	0	0	0	0
Accepted/Scheduled Acceptances	0	0	0	11	0	0	0	0	0

NOTE: FY '80–86 columns are actual; FY '87–88 columns are planned.

USAF'S AIRCRAFT—HOW MANY OF EACH TYPE AND HOW OLD?*

(Current as of September 30, 1986)

	0–3 yrs.	3–6 yrs.	6–9 yrs.	9–12 yrs.	12–15 yrs.	15–18 yrs.	18–21 yrs.	21–24 yrs.	24+ yrs.	TOTAL NUMBER	AVERAGE AGE
A-7	–	2	–	1	5	19	2	–	–	29	14.9 years
A-10	15	268	121	52	–	–	–	–	–	456	5.9 years
A-37	–	–	–	16	5	11	1	–	–	33	13.2 years
B-1	19	–	1	1	–	–	–	–	–	21	1.2 years
B-52	–	–	–	–	–	–	–	4	259	263	26.0 years
FB-111	–	–	–	–	–	61	1	–	–	62	15.9 years
C-5	7	–	–	1	33	35	–	–	–	76	13.6 years
C-9	–	–	–	3	9	8	3	–	–	23	15.5 years
C-10	30	18	–	–	–	–	–	–	–	48	2.3 years
C-12	46	–	1	28	–	–	–	–	–	75	5.2 years
C-18	–	7	–	–	–	–	–	–	–	7	4.4 years
C-20	2	1	–	–	–	–	–	–	–	3	2.9 years
C-21	80	–	–	–	–	–	–	–	–	80	1.7 years
C-22	1	–	–	–	–	–	–	–	–	1	2.6 years
C-23	18	–	–	–	–	–	–	–	–	18	1.4 years
C-130	8	–	–	52	24	55	26	179	15	359	18.6 years
C-131	–	–	–	–	–	–	–	–	1	1	31.5 years
C-135	–	–	–	–	–	–	2	208	402	612	25.2 years
C-137	2	–	–	–	1	–	–	1	3	7	17.3 years
C-140	–	–	–	–	–	–	–	6	6	12	23.9 years
C-141	–	–	–	–	–	–	221	42	–	263	20.0 years
E-3	3	8	14	9	–	–	–	–	–	34	6.9 years
E-4	–	–	–	2	2	–	–	–	–	4	12.3 years
F-4	–	–	–	99	75	315	198	28	–	715	16.4 years
F-5	2	5	2	65	25	–	–	1	–	100	10.7 years
F-15	105	165	276	159	6	–	–	–	–	711	6.5 years
F-16	395	384	84	3	–	–	–	–	–	866	3.3 years
F-100	–	–	–	–	–	–	–	–	10	10	29.4 years
F-106	–	–	–	–	–	–	–	–	25	25	26.7 years
F-111	–	2	–	13	149	138	35	–	–	337	15.4 years
H-1	–	–	–	–	24	67	30	2	–	123	16.3 years
H-3	–	–	–	–	–	9	33	14	–	56	19.6 years
H-53	–	–	–	1	5	28	8	–	–	42	16.4 years
H-60	2	9	–	–	–	–	–	–	–	11	3.5 years
O-2	–	–	–	–	–	6	3	–	–	9	17.2 years
OV-10	–	–	–	–	–	39	38	–	–	77	17.9 years
T-33	–	–	–	–	–	–	–	–	97	97	28.6 years
T-37	–	–	–	–	–	84	72	40	413	609	24.3 years
T-38	–	–	–	–	14	168	230	323	79	814	20.5 years
T-39	–	–	–	–	–	–	–	2	8	10	25.1 years
T-41	–	–	–	–	–	6	72	22	–	100	19.3 years
T-43	–	–	–	–	14	–	–	–	–	14	12.6 years
T-46	2	–	–	–	–	–	–	–	–	2	0.6 years
TR-1	13	7	–	–	–	–	–	–	–	20	2.1 years
TG-7	1	5	–	–	–	–	–	–	–	6	3.2 years
U-6	–	–	1	–	–	–	–	–	–	1	6.0 years
UV-18	–	–	–	2	–	–	–	–	–	2	9.0 years
U-26	–	1	–	–	–	–	–	–	–	1	3.0 years
TOTALS	**751**	**882**	**500**	**507**	**391**	**1,049**	**975**	**872**	**1,318**	**7,245**	**15.2 years**
PERCENT	**10%**	**12%**	**7%**	**7%**	**6%**	**15%**	**13%**	**12%**	**18%**		

Lesser than 9 years old: 2,133 aircraft (29%).
More than 9 years old: 5,112 aircraft (71%).
*Aircraft age measured in quarters.

NOTE: ARF not included in calendar age.

AIR NATIONAL GUARD AIRCRAFT—HOW MANY, HOW OLD?

(Current as of December 31, 1986)

	0–3 yrs.	3–6 yrs.	6–9 yrs.	9–12 yrs.	12–15 yrs.	15–18 yrs.	18–21 yrs.	21–24 yrs.	24+ yrs.	TOTAL NUMBER	AVERAGE AGE
A-7	2	26	–	42	163	111	–	–	–	344	13.3 years
A-10	–	–	105	1	–	–	–	–	–	106	7.3 years
A-37	–	–	–	23	7	23	–	–	–	53	13.8 years
C-5	–	–	–	–	–	3	–	–	–	3	16.3 years
C-12	6	–	–	–	–	–	–	–	–	6	1.2 years
C-22	4	–	–	–	–	–	–	–	–	4	2.0 years
C-130	23	17	16	–	–	–	8	23	122	210	20.2 years
C-131	–	–	–	–	–	–	–	–	20	20	31.4 years
C-135	–	–	–	–	–	–	–	–	104	104	27.8 years
C-141	–	–	–	–	–	–	2	4	–	6	20.8 years
F-4	–	–	–	–	–	86	375	203	–	664	20.2 years
F-15	–	–	–	47	2	–	–	–	–	49	10.7 years
F-16	2	62	26	–	–	–	–	–	–	90	4.8 years
F-106	–	–	–	–	–	–	–	–	70	70	27.1 years
H-3	–	–	–	–	–	3	6	2	–	11	19.3 years
T-33	–	–	–	–	–	–	–	–	33	33	31.1 years
T-39	–	–	–	–	–	–	–	3	1	4	23.7 years
T-43	–	–	–	–	4	–	–	–	–	4	12.7 years
TOTALS	**38**	**105**	**147**	**113**	**176**	**226**	**391**	**235**	**350**	**1,761**	**17.8 years**
PERCENT	**2%**	**6%**	**8%**	**6%**	**10%**	**13%**	**22%**	**13%**	**20%**		

Less than 9 years old: 290 aircraft (16%).
More than 9 years old: 1,491 aircraft (84%).

AIR FORCE RESERVE AIRCRAFT—HOW MANY, HOW OLD?

(Current as of March 1, 1987)

	0–3 yrs.	3–6 yrs.	6–9 yrs.	9–12 yrs.	12–15 yrs.	15–18 yrs.	18–21 yrs.	21–24 yrs.	24+ yrs.	TOTAL NUMBER	AVERAGE AGE
A-10	–	–	38	61	–	–	–	–	–	99	9.0 years
C-5	–	–	–	–	–	1	5	–	–	6	19.0 years
C-130A	–	–	–	–	–	–	–	–	47	47	31.0 years
AC-130A	–	–	–	–	–	–	–	–	10	10	32.0 years
C-130B	–	–	–	–	–	–	–	–	37	37	27.0 years
C-130E	–	–	–	–	–	–	–	–	41	41	25.0 years
C-130H	11	6	–	–	–	–	–	–	–	17	3.0 years
HC-130H	–	–	–	–	–	–	–	10	–	10	22.0 years
WC-130H	–	–	–	–	–	–	–	7	–	7	22.0 years
HC-130N	–	–	–	–	–	4	–	–	–	4	18.0 years
KC-135	–	–	–	–	–	–	–	–	24	24	29.0 years
C-141B	–	–	–	–	–	–	–	8	–	8	22.0 years
F-4	–	–	–	–	–	–	–	112	–	112	22.0 years
F-16	–	–	25	–	–	–	–	–	–	25	9.0 years
H-1	–	–	–	–	–	5	–	–	–	5	17.0 years
H-3	–	–	–	–	–	–	10	4	–	14	21.0 years
TOTALS	**11**	**6**	**63**	**61**	**0**	**10**	**15**	**141**	**159**	**466**	**20.5 years**
PERCENT	**2%**	**1%**	**14%**	**13%**	**0%**	**2%**	**3%**	**30%**	**35%**		

Less than 9 years old: 80 aircraft (17%).
More than 9 years old: 386 aircraft (83%).

ACTIVE-DUTY MILITARY PERSONNEL, RESERVE COMPONENT MILITARY PERSONNEL, AND CIVILIAN PERSONNEL STRENGTH

(Figures in thousands)

	FY '82	FY '83	FY '84	FY '85	FY '86	FY '87	FY '88
Active-Duty Military							
Army	784	780	780	777	781	781	781
Navy	553	570	578	586	586	593	593
Marine Corps	192	194	197	198	200	202	200
Air Force	581	592	597	602	608	607	598
Total	**2,110**	**2,136**	**2,152**	**2,163**	**2,175**	**2,183**	**2,172**
Reserve Components (Select)							
Army National Guard	408	417	433	441	446	453	459
Army Reserve	257	266	278	277	294	319	330
Naval Reserve	94	109	122	130	117	123	130
Marine Corps Reserve	40	43	44	42	42	42	42
Air National Guard	101	102	105	109	113	114	117
Air Force Reserve	64	67	70	75	79	80	83
Total	**964**	**1,004**	**1,052**	**1,074**	**1,091**	**1,131**	**1,161**
Direct Hire Civilian							
Army*	322	334	342	364	352	413	413
Navy	306	325	316	326	314	324	326
Air Force*	235	239	241	250	250	264	265
Defense Agencies	81	82	87	91	92	97	98
Total*	**944**	**980**	**986**	**1,031**	**1,008**	**1,098**	**1,102**

NOTE: Totals may not add because of rounding.

*These totals include Army and Air National Guard Technicians, who were converted from State to Federal employees in FY '69.

USAF FLYING SQUADRONS BY MISSION TYPE[1]

ACTIVE FORCES	FY '83	FY '84	FY '85	FY '86	FY '87*	FY '88*
Strategic Bomber	21	22	22	20	22	24
Air Refueling	35	35	35	36	36	35
Strategic Command and Control	6	6	6	6	6	6
Intelligence	3	3	3	3	3	3
Strategic Reconnaissance	1	1	1	1	1	1
Strategic Interceptor	5	5	4	4	3	2
Fighter	78	77	78	78	80	78
Tactical Reconnaissance	8	8	8	8	7	7
Tactical Electronic Warfare	2	3	3	3	4	4
Special Operations Forces	5	5	5	5	5	5
Tactical Air Command Control Systems[2]	3	3	3	3	3	3
Tactical Air Control Systems[2]	9	7	7	7	7	7
Weather	2	2	2	2	2	1
Rescue	8	8	8	9	9	7
Tactical Airlift	14	14	14	14	13	12
Strategic Airlift	17	17	17	17	17	17
Special Mission	1	1	1	1	1	1
Aeromedical Airlift	3	3	3	3	3	3
GLCM (Wings)	0	2	3	4	5	6
ICBM	25	24	23	22	20	20
TOTAL	**246**	**246**	**246**	**246**	**247**	**242**
RESERVE FORCES						
ANG Selected Reserve	91	91	91	91	91	91
Air Force Reserve[3]	56	56	56	57	57	58
TOTAL	**147**	**147**	**147**	**148**	**148**	**149**
GRAND TOTAL	**393**	**393**	**393**	**394**	**395**	**391**

*Estimate.
[1]Includes training, support, and OT&E units.
[2]Includes consolidation of certain functional groups.
[3]Includes Associate squadrons.

NUMBER OF AIRCRAFT PER ACTIVE-DUTY USAF SQUADRON

Aircraft Type	Number*
A-7	18 or 24
A-10	18 or 24
B-1	16
B-52	13, 14, 15, 16, or 19
C-5	15 or 16**
C-9	3 or 11
C-130	16
AC-130	10
KC-10	19
KC-135	13 to 25
C-141	17 or 18**
E-3	2, 4, or 16
F-4	12, 18, or 24
RF-4	18
F-5	11, 18, 20, or 21
F-15	15, 18, or 24
F-16	18 or 24
F-106	18
F-111	12, 18, or 24
FB-111	8 or 11

*For some types of aircraft, squadrons vary in size as shown here. HC-130, WC-130, T-39, and T-38 aircraft are counted as total Unit Equipment, not by squadrons.
**Reflects ongoing transfer of assets to Air Reserve Forces. (Temporary situation in C-5 squadrons.)

THE NUMBER OF ACTIVE AIRCRAFT AND FLYING HOURS

TYPE OF AIRCRAFT	FY '82	FY '83	FY '84	FY '85	FY '86	FY '87	FY '88
Bomber, Strategic	391	338	328	330	346	390	421
Tanker	542	546	556	559	572	580	570
Fighter/Interceptor/Attack	2,900	2,997	3,019	3,057	3,046	3,015	2,944
Reconnaissance/Electronic Warfare	363	385	404	418	394	401	406
Cargo/Transport	825	827	863	859	855	841	836
Search & Rescue (Fixed Wing)	36	35	35	37	37	31	28
Helicopter (includes Rescue)	227	236	237	234	232	233	178
Trainer	1,642	1,624	1,622	1,613	1,643	1,586	1,533
Utility/Observation/Other	193	206	191	180	120	117	116
TOTAL, USAF	**7,119**	**7,194**	**7,255**	**7,287**	**7,245**	**7,194**	**7,032**
Air National Guard total	1,647	1,703	1,688	1,688	1,782	1,753	1,783
Air Force Reserve total	447	458	458	468	467	505	534
TOTAL, ACTIVE AIRCRAFT, USAF, ANG, AFRES	**9,213**	**9,355**	**9,401**	**9,443**	**9,494**	**9,452**	**9,349**
Active aircraft including foreign government owned	(9,346)	(9,445)	(9,489)	(9,529)	(9,578)	(9,536)	(9,433)
FLYING HOURS (000)							
USAF	2,800	2,843	2,870	2,914	2,888	2,871	2,817
Air National Guard	411	414	416	423	412	436	443
Air Force Reserve	130	132	136	140	141	153	153
TOTAL FLYING HOURS	**3,341**	**3,389**	**3,422**	**3,477**	**3,441**	**3,460**	**3,413**

NOTE: FY '82–86 columns are actual; FY '87 and FY '88 columns are estimated.

USAF AIRCRAFT TAIL MARKINGS

Code	Aircraft	Unit, location, and command
AD	Various	Armament Division, Eglin AFB, Fla. (AFSC)
AK	F-15	21st TFW, Elmendorf AFB, Alaska (AAC)
AK	A-10	343d TFW, Eielson AFB, Alaska (AAC)
AL	F-4D	187th TFG, Dannelly Field, Ala. (ANG)
AR	RF-4C, F-5E	10th TRW, RAF Alconbury, UK (USAFE)
AZ	A-7D (F-16)*	162d TFW, Tucson IAP, Ariz. (ANG)
BA	RF-4	67th TRW, Bergstrom AFB, Tex. (TAC)
BC	OA-37	110th TASG, Battle Creek ANGB, Mich. (ANG)
BD	A-10	917th TFG, Barksdale AFB, La. (AFRES)
BT	F-15	36th TFW, Bitburg AB, Germany (USAFE)
CC	F-111D	27th TFW, Cannon AFB, N. M. (TAC)
CM	F-15	159th TFG, New Orleans NAS, La. (ANG)
CO	A-7D	140th TFW, Buckley ANGB, Colo. (ANG)
CR	F-15	32d TFS, Camp New Amsterdam, Netherlands (USAFE)
CT	A-10	103d TFG, Bradley ANGB, Conn. (ANG)
DC	F-4D	113th TFW, Andrews AFB, Md. (ANG)
DM	A-10	355th TTW, Davis-Monthan AFB, Ariz. (TAC)
DO	F-4D	906th TFG, Wright-Patterson AFB, Ohio (AFRES)
ED	Various	Air Force Flight Test Center, Edwards AFB, Calif. (AFSC)
EG	F-15	33d TFW, Eglin AFB, Fla. (TAC)
EL	A-10	23d TFW, England AFB, La. (TAC)
FF	F-15	1st TFW, Langley AFB, Va. (TAC)
FL	OV-10	549th TASTG, Patrick AFB, Fla. (TAC)
FM	F-4D	482d TFW, Homestead AFB, Fla. (AFRES)
FW	F-4C	122d TFW, Fort Wayne MAP, Ind. (ANG)
GA	F-4	35th TTW, George AFB, Calif. (TAC)
GU	F-4E	497th TFS, Taegu AB, Korea (PACAF)
HA	A-7D	185th TFG, Sioux City, Iowa (ANG)
HF	F-4C	181st TFG, Hulman RAP, Ind. (ANG)
HI	F-16	419th TFW, Hill AFB, Utah (AFRES)
HL	F-16	388th TFW, Hill AFB, Utah (TAC)
HM	AT-38	479th TTW, Holloman AFB, N. M. (TAC)
HO	F-15	49th TFW, Holloman AFB, N. M. (TAC)
HR	F-16	50th TFW, Hahn AB, Germany (USAFE)
HW	OA-37	24th COMPW, Howard AFB, Panama (TAC)
IA	A-7D	132d TFW, Des Moines MAP, Iowa (ANG)
ID	A-10	46th TFS, Grissom AFB, Ind. (AFRES)
IL	OA-37	182d TASG, Greater Peoria Airport, Ill. (ANG)
IN	A-10	434th TFW, Grissom AFB, Ind. (AFRES)
IS	F-15	57th FIS, Keflavik NAS, Iceland (TAC)
KC	A-10	442d TFW, Richards-Gebaur AFB, Mo. (AFRES)
KE	RF-4C	186th TRG, Key Field, Miss. (ANG)
KS	EC-130	7th ACCS, Keesler AFB, Miss. (TAC)
KY	RF-4C	123d TRW, Standiford Field, Ky. (ANG)
LA	F-15	405th TTW, Luke AFB, Ariz. (TAC)
LF	F-16	58th TTW, Luke AFB, Ariz. (TAC)
LH	CH-3	302d SOS, Luke AFB, Ariz. (AFRES)
LN	F-111F	48th TFW, RAF Lakenheath, UK (USAFE)
LV	A-7	4450th TACG, Nellis AFB, Nev. (TAC)
MA	A-10	104th TFG, Barnes MAP, Mass. (ANG)
MB	A-10	354th TFW, Myrtle Beach AFB, S. C. (TAC)
MC	F-16	56th TTW, MacDill AFB, Fla. (TAC)
MD	A-10	175th TFG, Martin Airport, Md. (ANG)
MI	A-7D	127th TFW, Selfridge ANGB, Mich. (ANG)
MJ	F-16	432d TFW, Misawa AB, Japan (PACAF)
MO	F-111, EF-111	366th TFW, Mountain Home AFB, Idaho (TAC)
MY	F-4E (F-16)*	347th TFW, Moody AFB, Ga. (TAC)
NA	F-16	474th TFW, Nellis AFB, Nev. (TAC)
NF	OA-37	602d TAIRCW, Davis-Monthan AFB, Ariz. (TAC)
NJ	F-4D	108th TFW, McGuire AFB, N. J. (ANG)
NM	A-7D	150th TFG, Kirtland AFB, N. M. (ANG)
NO	A-10	926th TFG, New Orleans NAS, La. (AFRES)
NY	A-10	174th TFW, Hancock Field, N. Y. (ANG)
OH	A-7D	121st TFW, Rickenbacker AFB; 178th TFG, Springfield; 180th TFG, Toledo, Ohio (ANG)
OK	A-7D	138th TFG, Tulsa IAP, Okla. (ANG)
OS	F-4E, OV-10	51st TFW, Osan AB, Korea (PACAF)
OT	Various	TAWC, Eglin AFB, Fla. (TAC)
PA	OA-37	111th TASG, Willow Grove ARF, Pa. (ANG)
PA	EC-130H	193d SOG, Harrisburg IAP, Pa. (ANG)
PN	F-4E/G, F-5	3d TFW, Clark AB, Philippines (PACAF)
PR	A-7D	156th TFG, Muniz ANGB, Puerto Rico (ANG)
PT	A-7D	112th TFG, Greater Pittsburgh IAP, Pa. (ANG)
RG	Various	Warner Robins ALC, Robins AFB, Ga. (AFLC)
RS	F-4E	86th TFW, Ramstein AB, Germany (USAFE)
SA	F-16	149th TFG, Kelly AFB, Tex. (ANG)
SC	F-16	169th TFG, McEntire ANGB, S. C. (ANG)
SD	A-7D	114th TFG, Joe Foss Field, S. D. (ANG)
SH	F-4D	507th TFG, Tinker AFB, Okla. (AFRES)
SI	F-4D	183d TFG, Capitol MAP, Ill. (ANG)
SJ	F-4E	4th TFW, Seymour Johnson AFB, N. C. (TAC)
SL	F-4E	131st TFW, Bridgeton, Mo. (ANG)
SP	F-4E/G	52d TFW, Spangdahlem AB, Germany (USAFE)
SU	A-10	51st TFW, Suwon AB, Korea (PACAF)
SW	F-16, RF-4C	363d TFW, Shaw AFB, S. C. (TAC)
TH	F-4D	301st TFW, Carswell AFB, Tex. (AFRES)
TJ	F-16	401st TFW, Torrejon AB, Spain (USAFE)
TX	F-4D	924th TFG, Bergstrom AFB, Tex. (AFRES)
TY	F-15,T-33	325th TTW, Tyndall AFB, Fla. (TAC)
UH	F-111E, EF-111	20th TFW, RAF Upper Heyford, UK (USAFE)
VA	A-7D	192d TFG, Byrd Field, Va. (ANG)
VT	F-4D (F-16)*	158th TFG, Burlington IAP, Vt. (ANG)
VV	OV-10	27th TASS, George AFB, Calif. (TAC)
WA	Various	57th FWW, Nellis AFB, Nev. (TAC)
WH	OV-10	22d TASS, Wheeler AFB, Hawaii (PACAF)
WI	A-10	128th TFW, Truax ANGB, Wis. (ANG)
WP	F-16	8th TFW, Kunsan AB, Korea (PACAF)
WR	A-10	81st TFW, RAF Bentwaters, UK (USAFE)
WW	F-4E/G	37th TFW, George AFB, Calif. (TAC)
ZF	F-4D, F-16	31st TTW, Homestead AFB, Fla. (TAC)
ZR	RF-4C	26th TRW, Zweibrücken AB, Germany (USAFE)
ZZ	F-15, RF-4C	18th TFW, Kadena AB, Okinawa (PACAF)

*Converting to F-16s.

AIR DEFENSE UNIT FIN FLASHES

Color code	Aircraft	Unit and location
Active Duty*		
Gold lightning bolt on dark-blue border	F-15, T-33	5th FIS, Minot AFB, N. D.
Blue/white stripes	F-15, T-33	48th FIS, Langley AFB, Va.
White/green eagle	F-106	49th FIS, Griffiss AFB, N. Y.
Dark blue/light blue/white star	F-15, T-33	318th FIS, McChord AFB, Wash.
Air National Guard Units		
Sea-blue wedge	F-106, T-33	102d FIW, Otis ANGB, Mass.
Rainbow	F-4D, T-33	107th FIG, Niagara Falls IAP, N. Y.
Red stripe with "Happy Hooligans" logo	F-4D, T-33	119th FIG, Hector Field, N. D.
Blue triangle and two blue stripes bearing "Montana" and "Big Sky Country" logos	F-106, T-33	120th FIG, Great Falls IAP, Mont.
Red hawk	F-4C, T-33	123d FIS (142d FIG), Portland IAP, Ore.
Blue/white lightning bolt	F-16, T-33	125th FIG, Jacksonville IAP, Fla.
Blue stripe with "California" logo	F-4D, T-33	144th FIW, Fresno Air Terminal, Calif.
Texas star on red/white jagged stripes	F-4D, T-33	147th FIG, Ellington ANGB, Tex.
Stars of Little Dipper constellation	F-4D	148th FIG, Duluth IAP, Minn.
Red dart	F-106, T-33	177th FIG, Atlantic City Airport, N. J.
Yellow and black checkerboard	F-4C, T-33	191st FIG, Selfridge ANGB, Mich.
Air Defense Training Units (ANG)		
Black hawk	F-4C	114th TFTS (142d FIG), Kingsley Field, Ore.

*The F-15 aircraft assigned to the 57th FIS, Keflavik NAS, Iceland, carries the letter tail code IS and is listed in the chart above.

UNITED STATES AIR FORCE MEDAL OF HONOR RECIPIENTS—1918–1987

NAMES, ALPHABETICALLY BY WARS AND RANK AT TIME OF ACTION	HOME TOWN	DATE AND PLACE OF ACTION	PRESENT ADDRESS OR DATE OF DEATH
WORLD WAR I			
Bleckley, 2d Lt. Erwin R.	Wichita, Kan.	Oct. 6, 1918, Binarville, France	KIA, Oct. 6, 1918
Goettler, 2d Lt. Harold E.	Chicago, Ill.	Oct. 6, 1918, Binarville, France	KIA, Oct. 6, 1918
Luke, 2d Lt. Frank, Jr.	Phoenix, Ariz.	Sept. 29, 1918, Murvaux, France	KIA, Sept. 29, 1918
Rickenbacker, Capt. Edward V.	Columbus, Ohio	Sept. 25, 1918, Billy, France	Died, July 23, 1973
WORLD WAR II			
Baker, Lt. Col. Addison E.	Chicago, Ill.	Aug. 1, 1943, Ploesti, Romania	KIA, Aug. 1, 1943
Bong, Maj. Richard I.	Poplar, Wis.	Oct. 10–Nov. 15, 1944, Southwest Pacific	Killed, Aug. 6, 1945, Burbank, Calif.
Carswell, Maj. Horace S., Jr.	Fort Worth, Tex.	Oct. 26, 1944, South China Sea	KIA, Oct. 26, 1944
Castle, Brig. Gen. Frederick W.	Manila, P.I.	Dec. 24, 1944, Liège, Belgium	KIA, Dec. 24, 1944
Cheli, Maj. Ralph	San Francisco, Calif.	Aug. 18, 1943, Wewak, New Guinea	Died as POW, Mar. 6, 1944
Craw, Col. Demas T.	Traverse City, Mich.	Nov. 8, 1942, Port Lyautey, French Morocco	KIA, Nov. 8, 1942
Doolittle, Lt. Col. James H.	Alameda, Calif.	Apr. 18, 1942, Tokyo, Japan	Carmel, Calif. (Ret. Gen.)
Erwin, SSgt. Henry E.	Adamsville, Ala.	Apr. 12, 1945, Koriyama, Japan	Leeds, Ala.
Femoyer, 2d Lt. Robert E.	Huntington, W. Va.	Nov. 2, 1944, Merseburg, Germany	KIA, Nov. 2, 1944
Gott, 1st Lt. Donald J.	Arnett, Okla.	Nov. 9, 1944, Saarbrücken, Germany	KIA, Nov. 9, 1944
Hamilton, Maj. Pierpont M.	Tuxedo Park, N. Y.	Nov. 8, 1942, Port Lyautey, French Morocco	Died, Mar. 4, 1982
Howard, Lt. Col. James H.	Canton, China	Jan. 11, 1944, Oschersleben, Germany	Belleair Bluffs, Fla. (Ret. Brig. Gen.)
Hughes, 2d Lt. Lloyd H.	Alexandria, La.	Aug. 1, 1943, Ploesti, Romania	KIA, Aug. 1, 1943
Jerstad, Maj. John L.	Racine, Wis.	Aug. 1, 1943, Ploesti, Romania	KIA, Aug. 1, 1943
Johnson, Col. Leon W.	Columbia, Mo.	Aug. 1, 1943, Ploesti, Romania	McLean, Va. (Ret. Gen.)
Kane, Col. John R.	McGregor, Tex.	Aug. 1, 1943, Ploesti, Romania	Barber, Ark. (Ret. Col.)
Kearby, Col. Neel E.	Wichita Falls, Tex.	Oct. 11, 1943, Wewak, New Guinea	KIA, Mar. 5, 1944, Wewak, New Guinea
Kingsley, 2d Lt. David R.	Portland, Ore.	June 23, 1944, Ploesti, Romania	KIA, June 23, 1944
Knight, 1st Lt. Raymond L.	Houston, Tex.	Apr. 25, 1945, Po Valley, Italy	KIA, Apr. 25, 1945
Lawley, 1st Lt. William R., Jr.	Leeds, Ala.	Feb. 20, 1944, Leipzig, Germany	Montgomery, Ala. (Ret. Col.)
Lindsey, Capt. Darrell R.	Jefferson, Iowa	Aug. 9, 1944, Pontoise, France	KIA, Aug. 9, 1944
Mathies, SSgt. Archibald	Scotland	Feb. 20, 1944, Leipzig, Germany	KIA, Feb. 20, 1944
Mathis, 1st Lt. Jack W.	San Angelo, Tex.	Mar. 18, 1943, Vegesack, Germany	KIA, Mar. 18, 1943
McGuire, Maj. Thomas B., Jr.	Ridgewood, N.J.	Dec. 25–26, 1944, Luzon, P.I.	KIA, Jan. 7, 1945, Negros, P.I.
Metzger, 2d Lt. William E., Jr.	Lima, Ohio	Nov. 9, 1944, Saarbrücken, Germany	KIA, Nov. 9, 1944
Michael, 1st Lt. Edward S.	Chicago, Ill.	Apr. 11, 1944, Brunswick, Germany	Fairfield, Calif. (Ret. Lt. Col.)
Morgan, 2d Lt. John C.	Vernon, Tex.	July 28, 1943, Kiel, Germany	Marina del Rey, Calif. (Ret. Col.)
Pease, Capt. Harl, Jr.	Plymouth, N.H.	Aug. 7, 1942, Rabaul, New Britain	KIA, Aug. 7, 1942
Pucket, 1st Lt. Donald D.	Longmont, Colo.	July 9, 1944, Ploesti, Romania	KIA, July 9, 1944
Sarnoski, 2d Lt. Joseph R.	Simpson, Pa.	June 16, 1943, Buka, Solomon Is.	KIA, June 16, 1943
Shomo, Maj. William A.	Jeannette, Pa.	Jan. 11, 1945, Luzon, P.I.	Pittsburgh, Pa. (Ret. Lt. Col.)
Smith, SSgt. Maynard H.	Caro, Mich.	May 1, 1943, St. Nazaire, France	Died, May 11, 1984
Truemper, 2d Lt. Walter E.	Aurora, Ill.	Feb. 20, 1944, Leipzig, Germany	KIA, Feb. 20, 1944
Vance, Lt. Col. Leon R., Jr.	Enid, Okla.	June 5, 1944, Wimereaux, France	Killed, July 26, 1944, near Iceland
Vosler, TSgt. Forrest L.	Lyndonville, N.Y.	Dec. 20, 1943, Bremen, Germany	Baldwinsville, N.Y.
Walker, Brig. Gen. Kenneth N.	Cerrillos, N.M.	Jan. 5, 1943, Rabaul, New Britain	KIA, Jan. 5, 1943
Wilkins, Maj. Raymond H.	Portsmouth, Va.	Nov. 2, 1943, Rabaul, New Britain	KIA, Nov. 2, 1943
Zeamer, Maj. Jay, Jr.	Carlisle, Pa.	June 16, 1943, Buka, Solomon Is.	Boothbay Harbor, Me. (Ret. Lt. Col.)
KOREA			
Davis, Maj. George A., Jr.	Dublin, Tex.	Feb. 10, 1952, Sinuiju-Yalu River, No. Korea	KIA, Feb. 10, 1952
Loring, Maj. Charles J., Jr.	Portland, Me.	Nov. 22, 1952, Sniper Ridge, No. Korea	KIA, Nov. 22, 1952
Sebille, Maj. Louis J.	Harbor Beach, Mich.	Aug. 5, 1950, Hamch'ang, So. Korea	KIA, Aug. 5, 1950
Walmsley, Capt. John S., Jr.	Baltimore, Md.	Sept. 14, 1951, Yangdok, No. Korea	KIA, Sept. 14, 1951
VIETNAM			
Bennett, Capt. Steven L.	Palestine, Tex.	June 29, 1972, Quang Tri, So. Vietnam	KIA, June 29, 1972
Day, Col. George E.	Sioux City, Iowa	Conspicuous gallantry while POW	Shalimar, Fla. (Ret. Col.)
Dethlefsen, Maj. Merlyn H.	Greenville, Iowa	Mar. 10, 1967, Thai Nguyen, No. Vietnam	Fort Worth, Tex. (Ret. Col.)
Fisher, Maj. Bernard F.	San Bernardino, Calif.	Mar. 10, 1966, A Shau Valley, So. Vietnam	Kuna, Idaho (Ret. Col.)
Fleming, 1st Lt. James P.	Sedalia, Mo.	Nov. 26, 1968, Duc Co, So. Vietnam	Active duty, Col., Lackland AFB, Tex.
Jackson, Lt. Col. Joe M.	Newnan, Ga.	May 12, 1968, Kham Duc, So. Vietnam	Kent, Wash. (Ret. Col.)
Jones, Lt. Col. William A. III	Norfolk, Va.	Sept. 1, 1968, Dong Hoi, No. Vietnam	Killed, Nov. 15, 1969, Woodbridge, Va.
Levitow, A1C John L.	Hartford, Conn.	Feb. 24, 1969, Long Binh, So. Vietnam	Vienna, Va.
Sijan, Capt. Lance P.	Milwaukee, Wis.	Conspicuous gallantry while POW	Died while POW, Jan. 1968
Thorsness, Lt. Col. Leo K.	Walnut Grove, Minn.	Apr. 19, 1967, No. Vietnam	Santa Monica, Calif. (Ret. Col.)
Wilbanks, Capt. Hilliard A.	Cornelia, Ga.	Feb. 24, 1967, Dalat, So. Vietnam	KIA, Feb. 24, 1967
Young, Capt. Gerald O.	Anacortes, Wash.	Nov. 9, 1967, Da Nang area, So. Vietnam	Anacortes, Wash. (Ret. Lt. Col.)

SOME FAMOUS FIRSTS AMONG US BOMBARDMENT UNITS

June 12, 1918 First bombs dropped by an AEF bomb unit: 8 Breguet 14s of the 96th Aero Sqdn., led by Maj. Harry M. Brown, on Dommary-Baroncourt railyards in France.

Dec. 10, 1941 First heavy bomb mission of WW II: 5 B-17s of the 93d Bomb Sqdn., 19th Bomb Gp., led by Maj. Cecil Combs, attacked Japanese convoy near Vigan, P.I., also sank the first enemy vessel by US aerial combat bombing.

Apr. 18, 1942 First mission against Japan: 16 B-25s of the 17th Bomb Gp. and 89th Recce Sqdn., led by Lt. Col. James H. Doolittle, launched from the carrier *Hornet*.

June 12, 1942 First mission against a European target: 13 B-24s of HALPRO Detachment, led by Col. H. A. Halverson, flying from Egypt against Ploesti oil fields.

Jan. 27, 1943 First mission against the German homeland: 53 B-17s and B-24s of the 1st and 2d Bomb Wgs., flying from the UK, attacked the Wilhelmshaven naval base.

Aug. 6, 1945 First atomic bomb mission: The *Enola Gay*, a 509th Composite Gp. B-29, piloted by Col. Paul W. Tibbets, Jr., flying from Tinian, attacked Hiroshima, Japan.

USAF Leaders Through The Years

SECRETARIES OF THE AIR FORCE

Stuart Symington	Sept. 18, 1947	Apr. 24, 1950
Thomas K. Finletter	Apr. 24, 1950	Jan. 20, 1953
Harold E. Talbott	Feb. 4, 1953	Aug. 13, 1955
Donald A. Quarles	Aug. 15, 1955	Apr. 30, 1957
James H. Douglas, Jr.	May 1, 1957	Dec. 10, 1959
Dudley C. Sharp	Dec. 11, 1959	Jan. 20, 1961
Eugene M. Zuckert	Jan. 24, 1961	Sept. 30, 1965
Harold Brown	Oct. 1, 1965	Feb. 15, 1969
Robert C. Seamans, Jr.	Feb. 15, 1969	May 14, 1973
John L. McLucas	July 18, 1973	Nov. 23, 1975
James W. Plummer (acting)	Nov. 24, 1975	Jan. 1, 1976
Thomas C. Reed	Jan. 2, 1976	Apr. 6, 1977
John C. Stetson	Apr. 6, 1977	May 18, 1979
Hans Mark	July 26, 1979	Feb. 9, 1981
Verne Orr	Feb. 9, 1981	Nov. 30, 1985
Russell A. Rourke	Dec. 9, 1985	Apr. 7, 1986
Edward C. Aldridge, Jr.	June 9, 1986	

USAF CHIEFS OF STAFF

Gen. Carl A. Spaatz	Sept. 26, 1947	Apr. 29, 1948
Gen. Hoyt S. Vandenberg	Apr. 30, 1948	June 29, 1953
Gen. Nathan F. Twining	June 30, 1953	June 30, 1957
Gen. Thomas D. White	July 1, 1957	June 30, 1961
Gen. Curtis E. LeMay	June 30, 1961	Jan. 31, 1965
Gen. John P. McConnell	Feb. 1, 1965	July 31, 1969
Gen. John D. Ryan	Aug. 1, 1969	July 31, 1973
Gen. George S. Brown	Aug. 1, 1973	June 30, 1974
Gen. David C. Jones	July 1, 1974	June 20, 1978
Gen. Lew Allen, Jr.	July 1, 1978	June 30, 1982
Gen. Charles A. Gabriel	July 1, 1982	June 30, 1986
Gen. Larry D. Welch	July 1, 1986	

CHIEF MASTER SERGEANTS OF THE AIR FORCE

CMSAF Paul W. Airey	Apr. 3, 1967	Aug. 1, 1969
CMSAF Donald L. Harlow	Aug. 1, 1969	Oct. 1, 1971
CMSAF Richard D. Kisling	Oct. 1, 1971	Oct. 1, 1973
CMSAF Thomas N. Barnes	Oct. 1, 1973	Aug. 1, 1977
CMSAF Robert D. Gaylor	Aug. 1, 1977	Aug. 1, 1979
CMSAF James M. McCoy	Aug. 1, 1979	July 1, 1981
CMSAF Arthur L. Andrews	Aug. 1, 1981	Aug. 1, 1983
CMSAF Sam E. Parish	Aug. 1, 1983	June 30, 1986
CMSAF James C. Binnicker	July 1, 1986	

AIR FORCE COMMUNICATIONS COMMAND

Maj. Gen. Harold W. Grant	July 1, 1961	Feb. 15, 1962
Maj. Gen. Kenneth P. Bergquist	Feb. 16, 1962	June 30, 1965
Maj. Gen. J. Francis Taylor, Jr.	July 1, 1965	Oct. 31, 1965
Maj. Gen. Richard P. Klocko	Nov. 1, 1965	July 2, 1967
Maj. Gen. Robert W. Paulson	July 15, 1967	Aug. 1, 1969
Maj. Gen. Paul R. Stoney	Aug. 1, 1969	Oct. 31, 1973
Maj. Gen. Donald L. Werbeck	Nov. 1, 1973	Aug. 24, 1975
Maj. Gen. Rupert H. Burris	Aug. 25, 1975	Oct. 31, 1977
Maj. Gen. Robert E. Sadler	Nov. 1, 1977	July 1, 1979
Maj. Gen. Robert T. Herres	July 1, 1979	July 27, 1981
Maj. Gen. Robert F. McCarthy	July 27, 1981	June 1, 1984
Maj. Gen. Gerald L. Prather	June 1, 1984	Aug. 28, 1986
Maj. Gen. John T. Stihl	Aug. 28, 1986	

Formerly Air Force Communications Service.
Redesignated Air Force Communications Command Nov. 15, 1979.

AIR FORCE LOGISTICS COMMAND

Gen. Joseph T. McNarney	Oct. 14, 1947	Aug. 31, 1949
Lt. Gen. Benjamin W. Chidlaw	Sept. 1, 1949	Aug. 20, 1951
Gen. Edwin W. Rawlings	Aug. 21, 1951	Feb. 28, 1959
Lt. Gen. William F. McKee	Mar. 1, 1959	Mar. 14, 1959
Gen. Samuel E. Anderson	Mar. 15, 1959	July 31, 1961
Gen. William F. McKee	Aug. 1, 1961	June 30, 1962
Gen. Mark E. Bradley, Jr.	July 1, 1962	July 31, 1965
Gen. Kenneth B. Hobson	Aug. 1, 1965	July 31, 1967
Gen. Thomas P. Gerrity	Aug. 1, 1967	Feb. 24, 1968
Lt. Gen. Lewis L. Mundell (acting)	Feb. 24, 1968	Mar. 28, 1968
Gen. Jack G. Merrell	Mar. 29, 1968	Sept. 11, 1972
Gen. Jack J. Catton	Sept. 12, 1972	Aug. 31, 1974
Gen. William V. McBride	Sept. 1, 1974	Aug. 31, 1975
Gen. F. Michael Rogers	Sept. 1, 1975	Jan. 27, 1978
Gen. Bryce Poe II	Jan. 28, 1978	July 31, 1981
Gen. James P. Mullins	Aug. 1, 1981	Nov. 1, 1984
Gen. Earl T. O'Loughlin	Nov. 1, 1984	

Formerly Air Materiel Command.
Redesignated as Air Force Logistics Command Apr. 1, 1961.

AIR FORCE SPACE COMMAND

Gen. James V. Hartinger	Sept. 1, 1982	Aug. 1, 1984
Gen. Robert T. Herres	Aug. 1, 1984	Oct. 1, 1986
Maj. Gen. Maurice C. Padden	Oct. 1, 1986	

AIR FORCE SYSTEMS COMMAND

Maj. Gen. David M. Schlatter	Feb. 1, 1950	June 24, 1951
Lt. Gen. Earle E. Partridge	June 24, 1951	June 20, 1953
Lt. Gen. Donald L. Putt	June 30, 1953	Apr. 14, 1954
Lt. Gen. Thomas S. Power	Apr. 15, 1954	June 30, 1957
Maj. Gen. John W. Sessums, Jr.	July 1, 1957	July 31, 1957
Lt. Gen. Samuel E. Anderson	Aug. 1, 1957	Mar. 9, 1959
Maj. Gen. John W. Sessums, Jr.	Mar. 10, 1959	Apr. 24, 1959
Gen. Bernard A. Schriever	Apr. 25, 1959	Aug. 31, 1966
Gen. James Ferguson	Sept. 1, 1966	Aug. 30, 1970
Gen. George S. Brown	Sept. 1, 1970	July 31, 1973
Gen. Samuel C. Phillips	Aug. 1, 1973	Aug. 31, 1975
Gen. William J. Evans	Sept. 1, 1975	July 31, 1977
Gen. Lew Allen, Jr.	Aug. 1, 1977	Mar. 13, 1978
Gen. Alton D. Slay	Mar. 14, 1978	Feb. 1, 1981
Gen. Robert T. Marsh	Feb. 1, 1981	Aug. 1, 1984
Gen. Lawrence A. Skantze	Aug. 1, 1984	

Formerly Air Research and Development Command.
Redesignated as Air Force Systems Command Apr. 1, 1961.

AIR TRAINING COMMAND

Lt. Gen. John K. Cannon	Apr. 15, 1946	Oct. 15, 1948
Lt. Gen. Robert W. Harper	Oct. 14, 1948	June 30, 1954
Maj. Gen. Glenn O. Barcus	July 1, 1954	July 25, 1954
Lt. Gen. Charles T. Myers	July 26, 1954	July 31, 1958
Lt. Gen. Frederic H. Smith, Jr.	Aug. 1, 1958	July 31, 1959
Lt. Gen. James E. Briggs	Aug. 1, 1959	July 31, 1963
Lt. Gen. Robert W. Burns	Aug. 1, 1963	Aug. 10, 1964
Lt. Gen. William W. Momyer	Aug. 11, 1964	June 30, 1966
Lt. Gen. Sam Maddux, Jr.	July 1, 1966	Aug. 30, 1970
Lt. Gen. George B. Simler	Sept. 1, 1970	Sept. 9, 1972
Lt. Gen. William V. McBride	Sept. 9, 1972	Aug. 31, 1974
Lt. Gen. George H. McKee	Sept. 1, 1974	Aug. 31, 1975
Gen. John W. Roberts	Sept. 1, 1975	Apr. 1, 1979
Gen. B. L. Davis	Apr. 1, 1979	July 29, 1981
Gen. Thomas M. Ryan, Jr.	July 29, 1981	June 30, 1983
Gen. Andrew P. Iosue	July 1, 1983	Aug. 28, 1986
Lt. Gen. John A. Shaud	Aug. 28, 1986	

AIR UNIVERSITY

Maj. Gen. Muir S. Fairchild	Mar. 15, 1946	May 17, 1948
Maj. Gen. Robert W. Harper	May 17, 1948	Oct. 15, 1948
Gen. George C. Kenney	Oct. 16, 1948	July 27, 1951
Lt. Gen. Idwal H. Edwards	July 28, 1951	Feb. 28, 1953
Lt. Gen. Laurence S. Kuter	Apr. 15, 1953	May 31, 1955
Lt. Gen. Dean C. Strother	June 1, 1955	June 30, 1958
Lt. Gen. Walter E. Todd	July 15, 1958	July 31, 1961
Lt. Gen. Troup Miller, Jr.	Aug. 1, 1961	Dec. 31, 1963
Lt. Gen. Ralph P. Swofford, Jr.	Jan. 1, 1964	July 31, 1965
Lt. Gen. John W. Carpenter III	Aug. 1, 1965	July 31, 1968
Lt. Gen. Albert P. Clark	Aug. 1, 1968	July 31, 1970
Lt. Gen. Alvan C. Gillem II	Aug. 1, 1970	Oct. 31, 1973
Lt. Gen. F. Michael Rogers	Nov. 1, 1973	Aug. 31, 1975
Lt. Gen. Raymond B. Furlong	Sept. 1, 1975	July 1, 1979
Lt. Gen. Stanley M. Umstead	July 1, 1979	July 24, 1981
Lt. Gen. Charles G. Cleveland	July 24, 1981	Aug. 1, 1984
Lt. Gen. Thomas C. Richards	Aug. 1, 1984	Nov. 6, 1986
Lt. Gen. Truman Spangrud	Nov. 6, 1986	

Air University was part of Air Training Command between May 1978 and July 1983.

ALASKAN AIR COMMAND

Brig. Gen. Joseph H. Atkinson	Oct. 1, 1946	Feb. 25, 1949
Brig. Gen. Frank A. Armstrong, Jr.	Feb. 26, 1949	Dec. 27, 1950
Maj. Gen. William D. Old	Dec. 27, 1950	Oct. 14, 1952
Brig. Gen. W. R. Agee	Oct. 27, 1952	Feb. 26, 1953
Maj. Gen. George R. Acheson	Feb. 26, 1953	Feb. 1, 1956
Lt. Gen. Joseph H. Atkinson	Feb. 24, 1956	July 16, 1956
Maj. Gen. Frank A. Armstrong, Jr.	July 17, 1956	Oct. 23, 1956
Maj. Gen. James H. Davies	Oct. 24, 1956	June 27, 1957
Lt. Gen. Frank A. Armstrong, Jr.	June 28, 1957	Aug. 18, 1957
Brig. Gen. Kenneth H. Gibson	Aug. 19, 1957	Aug. 13, 1958
Maj. Gen. C. F. Necrason	Aug. 14, 1958	July 19, 1961
Maj. Gen. Wendell W. Bowman	July 26, 1961	Aug. 8, 1963
Maj. Gen. James C. Jensen	Aug. 15, 1963	Nov. 14, 1966
Maj. Gen. Thomas E. Moore	Nov. 15, 1966	July 24, 1969
Maj. Gen. Joseph A. Cunningham	July 25, 1969	July 31, 1972
Maj. Gen. Donavon F. Smith	Aug. 1, 1972	June 5, 1973
Maj. Gen. Charles W. Carson, Jr.	June 18, 1973	Mar. 2, 1974
Maj. Gen. Jack K. Gamble	Mar. 19, 1974	June 30, 1975
Lt. Gen. James E. Hill	July 1, 1975	Oct. 14, 1976
Lt. Gen. M. L. Boswell	Oct. 15, 1976	June 30, 1978
Lt. Gen. Winfield W. Scott, Jr.	July 1, 1978	Apr. 1, 1981
Lt. Gen. Lynwood E. Clark	Apr. 1, 1981	Aug. 31, 1983
Lt. Gen. Bruce K. Brown	Sept. 1, 1983	Sept. 26, 1985
Lt. Gen. David L. Nichols	Sept. 27, 1985	

ELECTRONIC SECURITY COMMAND

Col. Roy H. Lynn	Oct. 26, 1948	July 5, 1949
Col. Travis M. Hetherington	July 6, 1949	Feb. 21, 1951
Maj. Gen. Roy H. Lynn	Feb. 22, 1951	Feb. 13, 1953
Maj. Gen. Harold H. Bassett	Feb. 14, 1953	Jan. 3, 1957
Maj. Gen. Gordon L. Blake	Jan. 4, 1957	Aug. 5, 1959
Maj. Gen. John B. Ackerman	Aug. 6, 1959	Sept. 20, 1959
Maj. Gen. Millard Lewis	Sept. 21, 1959	Aug. 31, 1962
Maj. Gen. Richard P. Klocko	Sept. 1, 1962	Oct. 15, 1965
Maj. Gen. Louis E. Coira	Oct. 16, 1965	July 18, 1969
Maj. Gen. Carl W. Stapleton	July 19, 1969	Feb. 23, 1973
Maj. Gen. Walter T. Galligan	Feb. 24, 1973	May 16, 1974
Maj. Gen. Howard P. Smith	May 17, 1974	July 31, 1975
Maj. Gen. K. D. Burns	Aug. 1, 1975	Jan. 18, 1979
Maj. Gen. Doyle E. Larson	Jan. 19, 1979	July 31, 1983
Maj. Gen. John B. Marks	Aug. 1, 1983	Apr. 16, 1985
Maj. Gen. Paul H. Martin	Apr. 17, 1985	

Formerly USAF Security Service.
Redesignated Electronic Security Command Aug. 1, 1979.

MILITARY AIRLIFT COMMAND

Lt. Gen. Laurence S. Kuter	June 1, 1948	Oct. 28, 1951
Lt. Gen. Joseph Smith	Nov. 15, 1951	June 30, 1958
Lt. Gen. William H. Tunner	July 1, 1958	May 31, 1960
Gen. Joe W. Kelly, Jr.	June 1, 1960	July 18, 1964
Gen. Howell M. Estes, Jr.	July 19, 1964	July 31, 1969
Gen. Jack J. Catton	Aug. 1, 1969	Sept. 12, 1972
Gen. Paul K. Carlton	Sept. 20, 1972	Mar. 31, 1977
Gen. William G. Moore, Jr.	Apr. 1, 1977	June 30, 1979
Gen. Robert E. Huyser	July 1, 1979	June 26, 1981
Gen. James R. Allen	June 26, 1981	June 30, 1983
Gen. Thomas M. Ryan, Jr.	July 1, 1983	Sept. 19, 1985
Gen. Duane H. Cassidy	Sept. 20, 1985	

Formerly Military Air Transport Service.
Redesignated as Military Airlift Command Jan. 1, 1966.

PACIFIC AIR FORCES

Lt. Gen. Ennis C. Whitehead	Dec. 30, 1945	Apr. 25, 1949
Lt. Gen. George E. Stratemeyer	Apr. 26, 1949	May 20, 1951
Lt. Gen. Earle E. Partridge (acting)	May 21, 1951	June 9, 1951
Gen. O. P. Weyland	June 10, 1951	Mar. 25, 1954
Gen. Earle E. Partridge	Mar. 26, 1954	May 31, 1955
Gen. Laurence S. Kuter	June 1, 1955	July 31, 1959
Gen. Emmett O'Donnell, Jr.	Aug. 1, 1959	July 31, 1963
Gen. Jacob E. Smart	Aug. 1, 1963	July 31, 1964
Gen. Hunter Harris, Jr.	Aug. 1, 1964	Jan. 31, 1967
Gen. John D. Ryan	Feb. 1, 1967	July 31, 1968
Gen. Joseph J. Nazzaro	Aug. 1, 1968	July 31, 1971
Gen. Lucius D. Clay, Jr.	Aug. 1, 1971	Sept. 30, 1973
Gen. John W. Vogt	Oct. 1, 1973	June 30, 1974
Gen. Louis L. Wilson, Jr.	July 1, 1974	May 31, 1977
Lt. Gen. James A. Hill	June 1, 1977	June 14, 1978
Lt. Gen. James D. Hughes	June 15, 1978	July 1, 1981
Lt. Gen. Arnold W. Braswell	July 1, 1981	Sept. 30, 1983
Gen. Jerome F. O'Malley	Oct. 8, 1983	Nov. 1, 1984
Gen. Robert W. Bazley	Nov. 1, 1984	Dec. 16, 1986
Gen. Jack I. Gregory	Dec. 16, 1986	

Formerly Far East Air Forces.
Redesignated as Pacific Air Forces July 1, 1957.

STRATEGIC AIR COMMAND

Gen. George C. Kenney	Mar. 21, 1946	Oct. 15, 1948
Gen. Curtis E. LeMay	Oct. 16, 1948	June 30, 1957
Gen. Thomas S. Power	July 1, 1957	Nov. 30, 1964
Gen. John D. Ryan	Dec. 1, 1964	Jan. 31, 1967
Gen. Joseph J. Nazzaro	Feb. 1, 1967	July 31, 1968
Gen. Bruce K. Holloway	Aug. 1, 1968	Apr. 30, 1972
Gen. John C. Meyer	May 1, 1972	July 31, 1974
Gen. Russell E. Dougherty	Aug. 1, 1974	July 31, 1977
Gen. Richard H. Ellis	Aug. 1, 1977	Aug. 1, 1981
Gen. B. L. Davis	Aug. 1, 1981	Aug. 1, 1985
Gen. Larry D. Welch	Aug. 1, 1985	June 30, 1986
Gen. John T. Chain, Jr.	July 1, 1986	

TACTICAL AIR COMMAND

Lt. Gen. E. R. Quesada	Mar. 21, 1946	Nov. 23, 1948
Maj. Gen. Robert M. Lee	Dec. 24, 1948	June 20, 1950
Maj. Gen. Glenn O. Barcus	July 17, 1950	Jan. 25, 1951
Gen. John K. Cannon	Jan. 25, 1951	Mar. 31, 1954
Gen. O. P. Weyland	Apr. 1, 1954	July 31, 1959
Gen. Frank F. Everest	Aug. 1, 1959	Sept. 30, 1961
Gen. Walter C. Sweeney, Jr.	Oct. 1, 1961	July 31, 1965
Gen. Gabriel P. Disosway	Aug. 1, 1965	July 31, 1968
Gen. William W. Momyer	Aug. 1, 1968	Sept. 30, 1973
Gen. Robert J. Dixon	Oct. 1, 1973	Apr. 30, 1978
Gen. W. L. Creech	May 1, 1978	Nov. 1, 1984
Gen. Jerome F. O'Malley	Nov. 1, 1984	Apr. 20, 1985
Gen. Robert D. Russ	May 22, 1985	

US AIR FORCES IN EUROPE

Brig. Gen. John F. McBain	Aug. 15, 1947	Oct. 20, 1947
Lt. Gen. Curtis E. LeMay	Oct. 20, 1947	Oct. 15, 1948
Lt. Gen. John K. Cannon	Oct. 16, 1948	Jan. 20, 1951
Gen. Lauris Norstad	Jan. 21, 1951	July 26, 1953
Lt. Gen. William H. Tunner	July 27, 1953	June 30, 1957
Gen. Frank F. Everest	July 1, 1957	July 31, 1959
Gen. Frederic H. Smith, Jr.	Aug. 1, 1959	June 30, 1961
Gen. Truman H. Landon	July 1, 1961	July 31, 1963
Gen. Gabriel P. Disosway	Aug. 1, 1963	July 31, 1965
Gen. Bruce K. Holloway	Aug. 1, 1965	July 31, 1966
Gen. Maurice A. Preston	Aug. 1, 1966	July 31, 1968
Gen. Horace M. Wade	Aug. 1, 1968	Jan. 31, 1969
Gen. Joseph R. Holzapple	Feb. 1, 1969	Aug. 31, 1971
Gen. David C. Jones	Sept. 1, 1971	June 30, 1974
Gen. John W. Vogt	July 1, 1974	Aug. 31, 1975
Gen. Richard H. Ellis	Sept. 1, 1975	July 31, 1977
Gen. William J. Evans	Aug. 1, 1977	Aug. 1, 1978
Gen. John W. Pauly	Aug. 1, 1978	Aug. 1, 1980
Gen. Charles A. Gabriel	Aug. 1, 1980	June 30, 1982
Gen. Billy M. Minter	July 1, 1982	Nov. 1, 1984
Gen. Charles L. Donnelly, Jr.	Nov. 1, 1984	May 1, 1987
Gen. William L. Kirk	May 1, 1987	

USAF ACADEMY SUPERINTENDENTS

Lt. Gen. Hubert R. Harmon	July 27, 1954	July 27, 1956
Maj. Gen. James E. Briggs	July 28, 1956	Aug. 16, 1959
Maj. Gen. William S. Stone	Aug. 17, 1959	June 30, 1962
Maj. Gen. Robert H. Warren	July 1, 1962	June 30, 1965
Lt. Gen. Thomas S. Moorman	July 1, 1965	July 31, 1970
Lt. Gen. Albert P. Clark	Aug. 1, 1970	July 31, 1974
Lt. Gen. James R. Allen	Aug. 1, 1974	July 31, 1977
Lt. Gen. Kenneth L. Tallman	Aug. 1, 1977	June 16, 1981
Maj. Gen. Robert E. Kelley	June 16, 1981	July 4, 1983
Lt. Gen. Winfield W. Scott, Jr.	July 5, 1983	

AIR FORCE RESERVE

Maj. Gen. Rollin B. Moore, Jr.	Aug. 1, 1968	Jan. 26, 1972
Brig. Gen. Alfred Verhulst (acting)	Jan. 27, 1972	Mar. 15, 1972
Maj. Gen. Homer I. Lewis	Mar. 16, 1972	Apr. 8, 1975
Maj. Gen. William Lyon	Apr. 16, 1975	Apr. 16, 1979
Maj. Gen. Richard Bodycombe	Apr. 17, 1979	Oct. 31, 1982
Maj. Gen. Sloan R. Gill	Nov. 1, 1982	Oct. 31, 1986
Maj. Gen. Roger P. Scheer	Nov. 1, 1986	

Since Mar. 16, 1972, the Chief of Air Force Reserve has been dual-hatted as Commander, Hq. Air Force Reserve (AFRES). The earlier chief of Hq. Air Force Reserve was Maj. Gen. Tom E. Marchbanks, Jr., from Jan. 18, 1968, to Feb. 1, 1971.

AIR NATIONAL GUARD

Col. William A. R. Robertson	Nov. 28, 1945	Oct. 1948
Maj. Gen. George G. Finch	Oct. 1948	Sept. 25, 1950
Maj. Gen. Earl T. Ricks	Oct. 13, 1950	Jan. 4, 1954
Maj. Gen. Winston P. Wilson	Jan. 26, 1954	Aug. 5, 1962
Maj. Gen. I. G. Brown	Aug. 6, 1962	Apr. 19, 1974
Maj. Gen. John J. Pesch	Apr. 20, 1974	Jan. 31, 1977
Maj. Gen. John T. Guice	Feb. 1, 1977	Apr. 1, 1981
Maj. Gen. John B. Conaway	Apr. 1, 1981	

The head of the Air National Guard was Chief, Aviation Group, National Guard Bureau until 1948, when the title changed to Chief, Air Force Division, NGB. In Dec. 1969 the title was changed to the present Director, Air National Guard.

Air Force Magazine's Guide to Aces

In compiling this list of aces who flew with USAF and its predecessor organizations (the Air Service and the Army Air Forces), AIR FORCE Magazine has used official USAF sources except for World War I. During that war, many Americans scored victories serving with foreign countries. As a result, these men do not appear on official lists as "American" aces. We have included in our list of World War I aces both those who flew with the American Air Service and with the British or French. The lists for World War II, Korea, and Vietnam include only AAF/USAF airmen.

The USAF Historical Research Center, Maxwell AFB, Ala., has completed a detailed accounting of the Air Service victory credits in World War I, AAF victory credits in World War II, and USAF victory credits in Korea and Southeast Asia. The World War II list took much time as a result of the great number of victories (16,591 full and partial credits) and the many different procedures used to record them. The final documented list of all World War II combat scores is now available in printed form. It is USAF Historical Study No. 85, titled "USAF Credits for the Destruction of Enemy Aircraft, World War II." Copies at $8.85 each may be ordered from the USAF Historical Research Center, Maxwell AFB, Ala. 36112.

Although some World War I totals (notably Frank Luke's) include balloons, all entries for subsequent conflicts are for air-to-air victories.

—THE EDITORS

LEADING AMERICAN ACES OF WORLD WAR I

(Ten or more victories)

Rickenbacker, Capt. Edward V. (AEF)	26	Luke, 2d Lt. Frank, Jr. (AEF)	18	Bennett, 1st Lt. Louis B. (RFC)	12
Lambert, Capt. William C. (RFC)	22	Lufbery, Maj. Raoul G. (FFC/LE)	17	Kindley, Capt. Field E. (AEF)	12
Gillette, Capt. Frederick W. (RFC)	20	Kullberg, Lt. Harold A. (RFC)	16	Putnam, 1st Lt. David E. (LE/AEF)	12
Malone, Capt. John J. (RN)	20	Rose, Capt. Oren J. (RFC)	16	Springs, Capt. Elliott W. (AEF)	12
Wilkinson, Maj. Alan M. (RFC)	19	Warman, Lt. C. T. (RFC)	15	Iaccaci, Lt. Thayer A. (RFC)	11
Hale, Capt. Frank L. (RFC)	18	Libby, Capt. Frederick (RFC)	14	Landis, Capt. Reed G. (AEF)	11
Iaccaci, Capt. Paul T. (RFC)	18	Vaughn, 1st Lt. George A. (AEF)	13	Swaab, Capt. Jacques M. (AEF)	10
		Baylies, Lt. Frank L. (FFC/LE)	12		

AEF—American Expeditionary Force
FFC—French Flying Corps
LE—Lafayette Escadrille
RFC—Royal Flying Corps (British)
RN—Royal Navy (British)

LEADING ARMY AIR FORCES ACES OF WORLD WAR II

(Fourteen and a half or more victories)

Bong, Maj. Richard I.	40	Duncan, Col. Glenn E.	19.50	Anderson, Capt. Clarence E., Jr.	16.25
McGuire, Maj. Thomas B., Jr.	38	Carson, Capt. Leonard K.	18.50	Dunham, Lt. Col. William D.	16
Gabreski, Lt. Col. Francis S.	28*	Eagleston, Maj. Glenn T.	18.50*	Harris, Lt. Col. Bill	16
Johnson, Capt. Robert S.	27	Hill, Col. David L. (AVG/USAF) (12.25)	18.25**	Welch, Capt. George S.	16
MacDonald, Col. Charles H.	27	Older, Lt. Col. Charles H. (AVG/USAF) (11.25)	18.25**	Beerbower, Capt. Donald M.	15.50
Preddy, Maj. George E.	26.83	Beckham, Maj. Walter C.	18	Brown, Maj. Samuel J.	15.50
Meyer, Lt. Col. John C.	24*	Green, Maj. Herschel H.	18	Peterson, Capt. Richard A.	15.50
Schilling, Col. David C.	22.50	Herbst, Lt. Col. John C.	18	Whisner, Capt. William T., Jr.	15.50*
Johnson, Lt. Col. Gerald R.	22	Zemke, Lt. Col. Hubert	17.75	Blakeslee, Col. Donald J. M. (ES/USAF) (3.5)	15**
Kearby, Col. Neel E.	22	England, Maj. John B.	17.50	Bradley, Lt. Col. Jack T.	15
Robbins, Maj. Jay T.	22	Beeson, Capt. Duane W.	17.33	Cragg, Maj. Edward	15
Christensen, Capt. Fred J.	21.50	Thornell, 1st Lt. John F., Jr.	17.25	Foy, Maj. Robert W.	15
Wetmore, Capt. Ray S.	21.25	Reed, Lt. Col. William N. (AVG/USAF) (11)	17**	Hofer, 2d Lt. Ralph K.	15
Voll, Capt. John J.	21	Varnell, Capt. James S., Jr.	17	Homer, Capt. Cyril F.	15
Mahurin, Maj. Walker M.	20.75*	Johnson, Maj. Gerald W.	16.50	Bochkay, Capt. Donald H.	14.84
Lynch, Lt. Col. Thomas J.	20	Godfrey, Capt. John T.	16.33	Landers, Lt. Col. John D.	14.50
Westbrook, Lt. Col. Robert B.	20			Powers, Capt. Joe H., Jr.	14.50
Gentile, Capt. Donald S.	19.83				

* Aces who added to these scores by victories in the Korean War. Ranks are as of last victory in World War II.
AVG—American Volunteer Group
ES—Eagle Squadron
** The Historical Research Center has no way of verifying kills claimed (in parentheses) while flying with AVG or ES.

USAF ACES OF THE KOREAN WAR

McConnell, Capt. Joseph, Jr.	16	Hagerstrom, Maj. James P.	8.50*	Whisner, Maj. William T., Jr.	5.50*
Jabara, Maj. James	15*	Risner, Capt. Robinson	8	Baldwin, Col. Robert P.	5
Fernandez, Capt. Manuel J.	14.50	Ruddell, Lt. Col. George I.	8*	Becker, Capt. Richard S.	5
Davis, Maj. George A., Jr.	14*	Buttlemann, 1st Lt. Henry	7	Bettinger, Maj. Stephen L.	5
Baker, Col. Royal N.	13*	Jolley, Capt. Clifford D.	7	Creighton, Maj. Richard D.	5*
Blesse, Maj. Frederick C.	10	Lilley, Capt. Leonard W.	7	Curtin, Capt. Clyde A.	5
Fischer, 1st Lt. Harold E.	10	Adams, Maj. Donald E.	6.50	Gibson, Capt. Ralph D.	5
Garrison, Lt. Col. Vermont	10*	Gabreski, Col. Francis S.	6.50*	Kincheloe, Capt. Iven C., Jr.	5
Johnson, Col. James K.	10*	Jones, Lt. Col. George L.	6.50	Latshaw, Capt. Robert T., Jr.	5
Moore, Capt. Lonnie R.	10	Marshall, Maj. Winton W.	6.50	Moore, Capt. Robert H.	5
Parr, Capt. Ralph S., Jr.	10	Kasler, 1st Lt. James H.	6	Overton, Capt. Dolphin D., III	5
Foster, Capt. Cecil G.	9	Love, Capt. Robert J.	6	Thyng, Col. Harrison R.	5*
Low, 1st Lt. James F.	9			Westcott, Maj. William H.	5

*These are in addition to World War II victories.

AAF/USAF ACES OF WORLD WAR II AND LATER WARS

	WW II	KOREA	TOTAL		WW II	KOREA	TOTAL
Gabreski, Col. Francis S.	28	6.50	34.50	Johnson, Col. James K.	1	10	11
Meyer, Col. John C.	24	2	26	Ruddell, Lt. Col. George I.	2.50	8	10.50
Mahurin, Col. Walker M.	20.75	3.50	24.25	Thyng, Col. Harrison R.	5	5	10
Davis, Maj. George A., Jr.	7	14	21	Colman, Capt. Philip E.	5	4	9
Whisner, Maj. William T., Jr.	15.50	5.50	21	Heller, Lt. Col. Edwin L.	5.50	3.50	9
Eagleston, Col. Glenn T.	18.50	2	20.50	Chandler, Maj. Van E.	5	3	8
Garrison, Lt. Col. Vermont	7.33	10	17.33	Hockery, Maj. John J.	7	1	8
Baker, Col. Royal N.	3.50	13	16.50	Creighton, Maj. Richard D.	2	5	7
Jabara, Maj. James	1.50	15	16.50	Emmert, Lt. Col. Benjamin H., Jr.	6	1	7
Olds, Col. Robin	12	4*	16	Bettinger, Maj. Stephen L.	1	5	6
Mitchell, Col. John W.	11	4	15	Visscher, Maj. Herman W.	5	1	6
Brueland, Maj. Lowell K.	12.50	2	14.50	Liles, Capt. Brooks J.	1	4	5
Hagerstrom, Maj. James P.	6	8.50	14.50	Mattson, Capt. Conrad E.	1	4	5
Hovde, Lt. Col. William J.	10.50	1	11.50	Shaeffer, Maj. William F.	2	3	5

* Colonel Olds's 4 additional victories came during the Vietnam War.

AMERICAN ACES OF THE VIETNAM WAR

DeBellevue, Capt. Charles B. (USAF)	6
Cunningham, Lt. Randy (USN)	5
Driscoll, Lt. William (USN)	5
Feinstein, Capt. Jeffrey S. (USAF)	5
Ritchie, Capt. Richard S. (USAF)	5

LEADING AIR SERVICE/ AAF/USAF ACES OF ALL WARS

Bong, Maj. Richard I.	40	WW II	Kearby, Col. Neel E.	22	WW II
McGuire, Maj. Thomas B., Jr.	38	WW II	Robbins, Maj. Jay T.	22	WW II
Gabreski, Col. Francis S.	34.50	WW II, Korea	Christensen, Capt. Fred J.	21.50	WW II
Johnson, Lt. Col. Robert S.	27	WW II	Wetmore, Capt. Ray S.	21.25	WW II
MacDonald, Col. Charles H.	27	WW II	Davis, Maj. George A., Jr.	21	WW II, Korea
Preddy, Maj. George E.	26.83	WW II	Voll, Capt. John J.	21	WW II
Meyer, Col. John C.	26	WW II, Korea	Whisner, Maj. William T., Jr.	21	WW II, Korea
Rickenbacker, Capt. Edward V.	26	WW I	Eagleston, Col. Glenn T.	20.50	WW II, Korea
Mahurin, Col. Walker M.	24.25	WW II, Korea	Lynch, Lt. Col. Thomas J.	20	WW II
Schilling, Col. David C.	22.50	WW II	Westbrook, Lt. Col. Robert B.	20	WW II
Johnson, Lt. Col. Gerald R.	22	WW II	Gentile, Capt. Donald S.	19.83	WW II

SOME FAMOUS FIGHTER FIRSTS

First American to down 5 enemy aircraft in WW I	Capt. Frederick Libby (serving with the RFC)
First American ace of WW I	Capt. Alan M. Wilkinson (RFC)
First American ace to serve with the AEF	Capt. Raoul G. Lufbery (FFC/LE)
First American AEF ace of WW I	Capt. Douglas Campbell
First American ace of WW II	Pilot Officer William R. Dunn (RAF)
First American USAAF ace of WW II	Lt. Boyd D. "Buzz" Wagner
First American to score an aerial victory in Korea	1st Lt. William G. Hudson (June 27, 1950)
First jet-to-jet kill of the Korean War	1st Lt. Russell J. Brown (Nov. 8, 1950)
First American ace of the Korean War	Capt. James Jabara (May 20, 1951)
First American ace of two wars	Maj. A. J. "Ajax" Baumler (8 in Spain; 5 in WW II)
First USAF ace of two wars	Maj. William T. Whisner, Jr. (15.5 in WW II; 5.5 in Korea)
First USAF ace with victories in WW II and Vietnam	Col. Robin Olds (12 in WW II; 4 in Vietnam)

Source: *Fighter Aces*, by Col. Raymond F. Toliver and Trevor J. Constable, Macmillan Co., N. Y., 1965.

Air Force Communications Command

Air Force Communications Command began its second twenty-five years of service as a major support command this year. It enters its second quarter century with a new commander, Maj. Gen. John T. Stihl, and a renewed commitment to provide excellent service to other Air Force operational and support commands.

The motto "Providing the Reins of Command" aptly describes AFCC's mission. This highly diversified command provides communications, automatic data processing, and air traffic services vital to Air Force operations. Although their missions are diversified, AFCC people focus on a common goal: effective and responsive service to the user.

As the Air Force's most widely dispersed major command, AFCC has 745 units at more than 470 locations worldwide. More than seventy-five percent of the 50,000 military and 8,000 civilian members assigned to AFCC serve in technical career fields—one-third of them overseas. Additionally, the 16,000 Air National Guard and Air Force Reserve members gained by AFCC in wartime are a good example of DoD's Total Force policy. In fact, Guard and Reserve people contributed 79,000 work-days last year to the command's mission.

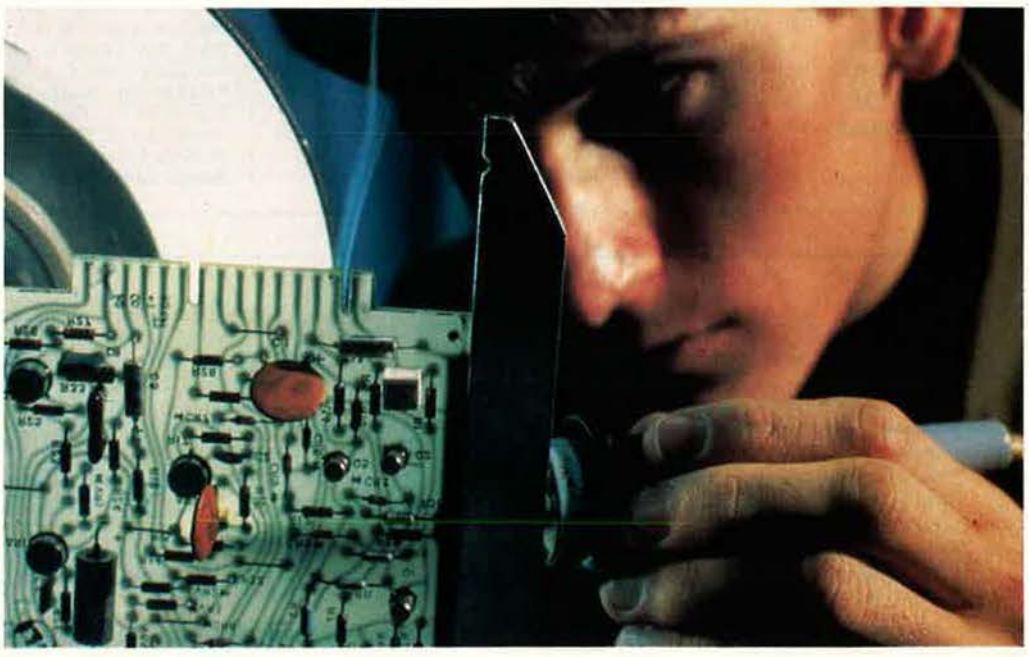
AFCC units can be found on virtually every Air Force installation. For example, base-level AFCC units operate and maintain inter- and intrabase communications, data processing, and air traffic systems for host commanders and are actually under his operational control. The base communications officer, a key member of the host commander's staff, also serves as the local AFCC unit commander. This "dual-hat" arrangement emphasizes AFCC's commitment to service—the key to AFCC's success in meeting user requirements.

AFCC also supports commanders with air traffic services. Last fiscal year, air traffic controllers handled more than 14,000,000 aircraft operations and were involved in saving twenty-six lives and fourteen aircraft valued at more than $20 million. Additionally, AFCC's six facility-checking aircraft travel the world testing the quality, responsiveness, and safety of air traffic services in airspace controlled by the Air Force.

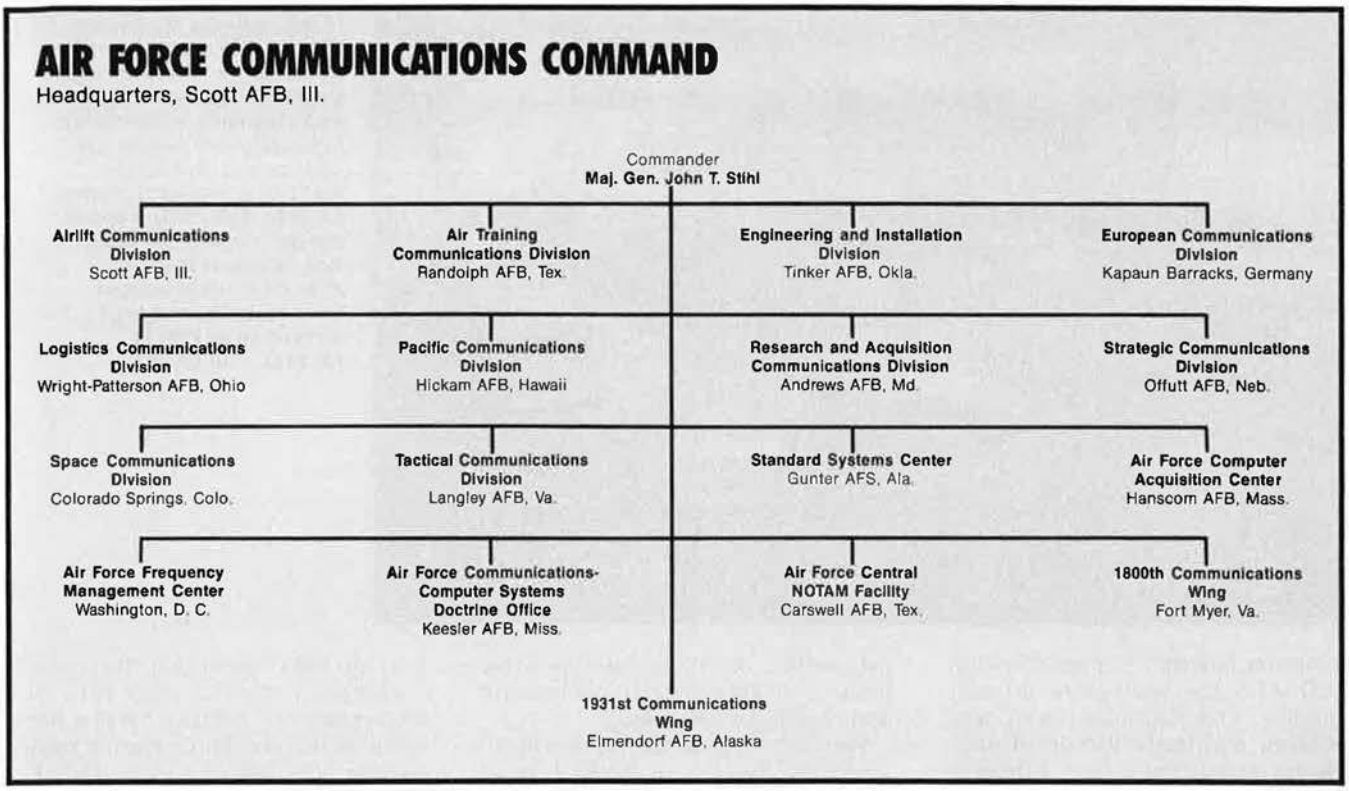
AFCC also engineers and installs new equipment. In fact, engineering and installation units provided $140 million worth of service last year—and that's just the cost of installation, not the equipment. E&I people travel around the globe installing new electronic systems or providing on-site maintenance that would otherwise have to be done back at the factory.

In addition to serving fixed Air Force locations, AFCC also provides wartime and contingency communications in a bare-base environment. Combat communications units perform this mission with tactical equipment capable of going virtually anywhere. These units support such JCS exercises as Bright Star and Team Spirit and also provide essential communications and air traffic services during real-world deployments. Combat Challenge '86, the first annual competition between combat communications units, allowed these warriors to sharpen their skills and choose the "best of the best."

The command adopted several initiatives to improve service to users. These changes help AFCC meet its growing acquisition responsibilities. To begin with, AFCC established a new headquarters deputate, which consolidates all acquisition functions under one organizational roof. As the name implies, the Acquisition and Integration deputate acquires new communication, data processing, and air traffic control systems. Keep-



Air Force Communications Command is highly diverse and provides communications, automatic data processing, and air traffic services. With 745 units at more than 470 locations worldwide, AFCC can provide wartime and contingency communications in a bare-base environment. This technician is soldering a circuit board.



ing minimum essential requirements in mind, AI selects the best solution, ensuring that it is compatible with projected Air Force architecture. AFCC then competitively acquires the system for the user.

AFCC's Standard Systems Center at Gunter AFS, Ala., also streamlined the way standardized software and hardware are procured. The Center buys off-the-shelf, commercially available systems competitively to meet the user's minimum essential requirements. Like the AI deputate, the new SSC structure also emphasizes support to users. The SSC defines the best technical solution and through competition ensures the lowest possible cost to the government.

Numerous success stories illustrate the command's efforts to support their users. For instance, AFCC upgraded data-processing service throughout the Air Force through the Phase IV program. Completed in 1986, it replaced 224 old base-level mainframe computers with 154 modern ones. AFCC people also modernized twenty-three base telephone exchanges in 1986 with new electronic equipment, providing better, more survivable telephone service.

Whether installing new equipment, helping a pilot land safely, operating the telephone switchboard, or acquiring the latest computer technology, Air Force Communications Command provides a critically important element in our national defense. True to its motto, AFCC does, indeed, provide the reins of command for our Air Force. ■

Air Force Logistics Command

Air Force Logistics Command continued in 1986 to emphasize the five major areas it has stressed since 1984. Topping the list of priorities is the command's goal of enhancing its overall weapon systems support. Toward that end, AFLC worked hard in 1986 to stay in touch with its "customers," the operational commands, and to be responsive to their logistical needs.

An example of that responsiveness can be seen in a look at US Air Forces in Europe. USAFE's goal at the start of Fiscal Year 1986 was to reduce aircraft "downtime" caused by maintenance and supply. Maintenance downtime decreased from 19.8 percent to 15.7 percent, and supply downtime decreased from nine percent to 7.5 percent. The result was an increase in the mission-capable rate to eighty percent, or, on the average, twenty-nine more aircraft available every day of the year for flying. Gen. Charles L. Donnelly, Jr., then USAFE's Commander in Chief, wrote, "We could not have accomplished this significant feat without your [AFLC's] tremendous support."

Gen. Earl T. O'Loughlin, AFLC's Commander, has stated, "Keeping the fleet flying through innovative maintenance and spare-parts programs is our main job."

Innovation is being teamed with modernization in meeting AFLC's goal of upgrading the vintage information systems used to manage the command's vast network of parts and equipment. AFLC expended great effort in bringing into contract most of the major Logistics Modernization Systems.

For example, the Sacramento Air Logistics Center, at McClellan AFB, Calif., took delivery of AFLC's first—and totally new—Engineering Data

In the Avionics Modernization Program for the F-111 fleet, the Air Force, through Logistics Command, acted as its own prime contractor in dealing with twelve subcontractors. The entire F-111 fleet will be upgraded by 1994. This picture shows the Sacramento Air Logistics Center at McClellan AFB, Calif., where depot-level maintenance is performed on all F-111s, FB-111s, and EF-111s.

Computer Assisted Retrieval System.

EDCARS uses state-of-the-art technologies to revolutionize the storage, retrieval, and transmission of engineering data in digital form. EDCARS, which uses optical disks to store the information, is a joint procurement effort with the Army Materiel Command.

AFLC awarded a contract to develop the Reliability and Maintainability Information System. REMIS replaces twenty-eight antiquated computer systems and improves the availability, accuracy, and flow of essential information. Fully operational by 1990, REMIS is an integration of fragmented, outdated systems into a cohesive on-line system.

The Depot Maintenance Management Information System, or DMMIS, is one of nine new computer systems being developed for AFLC under the modernization program. By 1990, DMMIS will replace forty-one of the command's fifty-six maintenance computer systems.

The activation of the Contracting Information Data System (CIDS) and its integration into the Defense Data Network gave AFLC a way to tap into acquisitions data bases around the command. Buyers can now get almost instant information on specific parts or suppliers via the system. Part of the still-evolving Contract Data Management System, CIDS is a big first step in the evolution of a paperless contracting environment.

A computer-based stock control and distribution system is also being developed for AFLC. The new system will replace twenty-three computer systems currently in use spanning requisition, issue, receipt, and shipment processing at Hq. AFLC and the five centers. It will account for more than 1,600,000 stock line items worth approximately $20 billion.

Weapon System Management Information System, or WSMIS, is an automated method designed to predict aircraft combat capabilities using logistics resource, performance, and status information. WSMIS determines combat ratings throughout the Air Force as a part of the Air Force Unit Status Reporting System.

Among the other three major areas, AFLC's campaign to improve the quality of life for its people forged ahead with both the Military Construction Program and in-house resources being used to modernize and improve work areas. In the quest to enhance the image of AFLC in the public eye, the concept of "accountability" and a concerted effort to present the whole story of mission support pricing were key. There has been a steady climb upward from the stories of the $7,600 coffee pots and the $9,000 Allen wrenches of the early 1980s.

Hand-in-hand is the goal of maximizing the efficiency of the command's financial management. AFLC achieved tangible success in 1986 by using the funds appropriated by Congress more effectively during the first year they were available, including eighty-five percent of the funds to purchase replacement parts for aircraft.

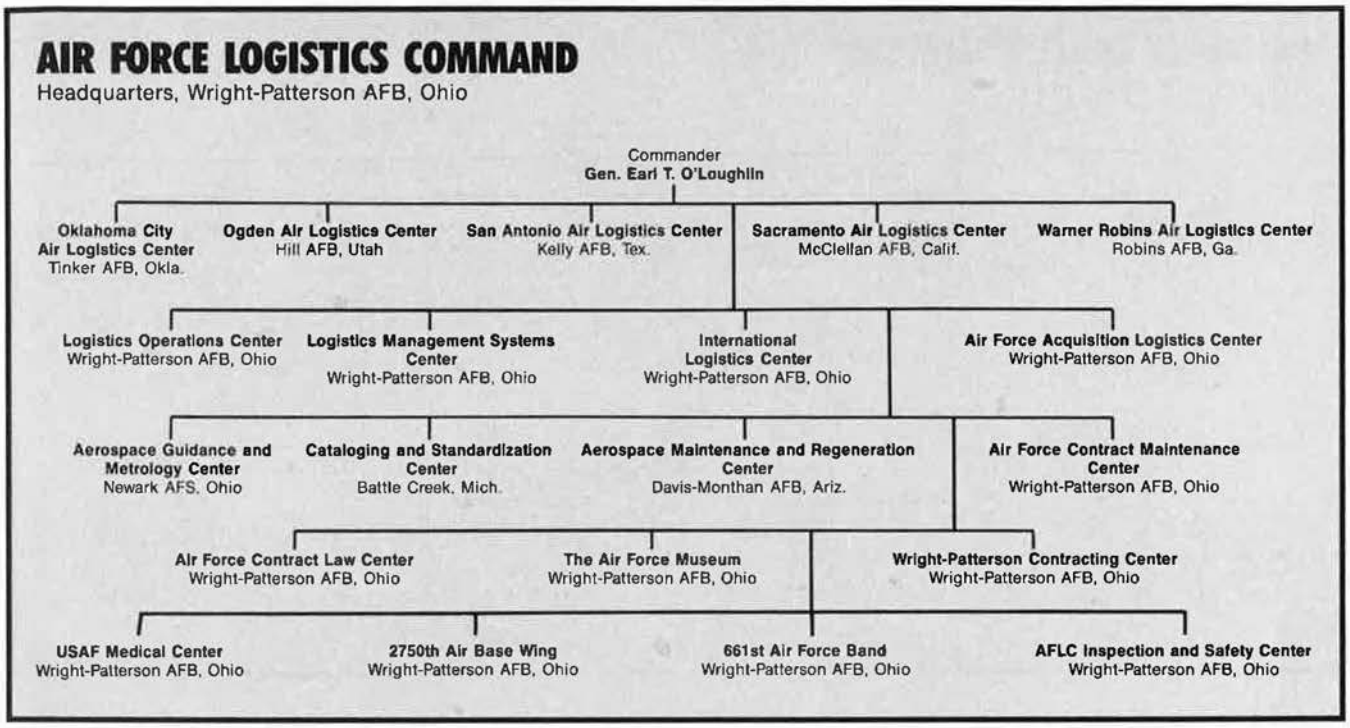
The command's Air Logistics Centers had a number of successes. The first FB-111A to undergo the Avionics Modernization Program, or AMP, rolled out at McClellan AFB in December 1986. The AMP will upgrade the bomb navigation system on all 386 aircraft of the Air Force's F-111 fleet by 1994, extending the plane's usable life to the year 2010. With this project, the Air Force for the first time acted as its own prime contractor in dealing with twelve subcontractors.

The MICAP (mission capable) Repair Tracking System at San Antonio Air Logistics Center, Kelly AFB, Tex., is saving time and money by making it easier to follow the progress of top-priority items as they make their way through the repair process. The new data system is expected to save about $35,000 each quarter in the repair of MICAP items.

At Tinker AFB, Okla., home of the Oklahoma City Air Logistics Center, an innovative contracting process makes it the first government activity to contract directly with a producer for natural gas. It is estimated that more than $3 million a year will be saved.

Warner Robins ALC was selected as the system program manager and source of repair for the Joint Surveillance and Target Attack Radar System, or JSTARS, and the E-8A aircraft. The Center at Robins AFB, Ga., also has an interservice support agreement with the Navy to work seventy-four Navy C-130 aircraft.

At Wright-Patterson AFB, Ohio, portions of an ongoing $116 million military construction project were completed, allowing several departments of the USAF Medical Center, Wright-Patterson, to move into new facilities. The medical center serves some 12,600 active-duty, 22,300 dependent, and 23,300 retired military personnel in the Dayton, Ohio, area. When the construction project is completed in 1989, the facility will be the second largest medical center in the Air Force.



For the future, AFLC has focused on six major objectives—all driven in some way by the surge of technology. The first is a commitment to prepare the command to be able to maintain modular electronics—both hardware and software—by 1990. Second is the objective of examining how logistics processes will be affected by these modular electronic developments.

Support of advanced materials and structures, such as those expected to be part of the Advanced Tactical Fighter, are at the core of the third objective. Fourth, the command is preparing to manage and use digital data throughout the manufacturing and repair processes.

Fifth, AFLC recognizes that it needs to look at its total work force and revamp procedures where needed to meet emerging logistics challenges. With predictions of a shrinking number of employees in the face of increasing work requirements, that's no small challenge. Finally, AFLC has set an objective to restructure its organization to exploit information technology by 1998. With the Logistics Modernization Systems expected to be fully on line by the early 1990s, the way AFLC operates will inevitably change. The command must tailor its organization to meet the hardware and software upgrades and the dynamic operating environment.

By planning now, AFLC's 90,000-plus civilian employees and nearly 12,000 active-duty members are preparing for the technological changes that will drive the Air Force into the twenty-first century. ■

Air Force Space Command

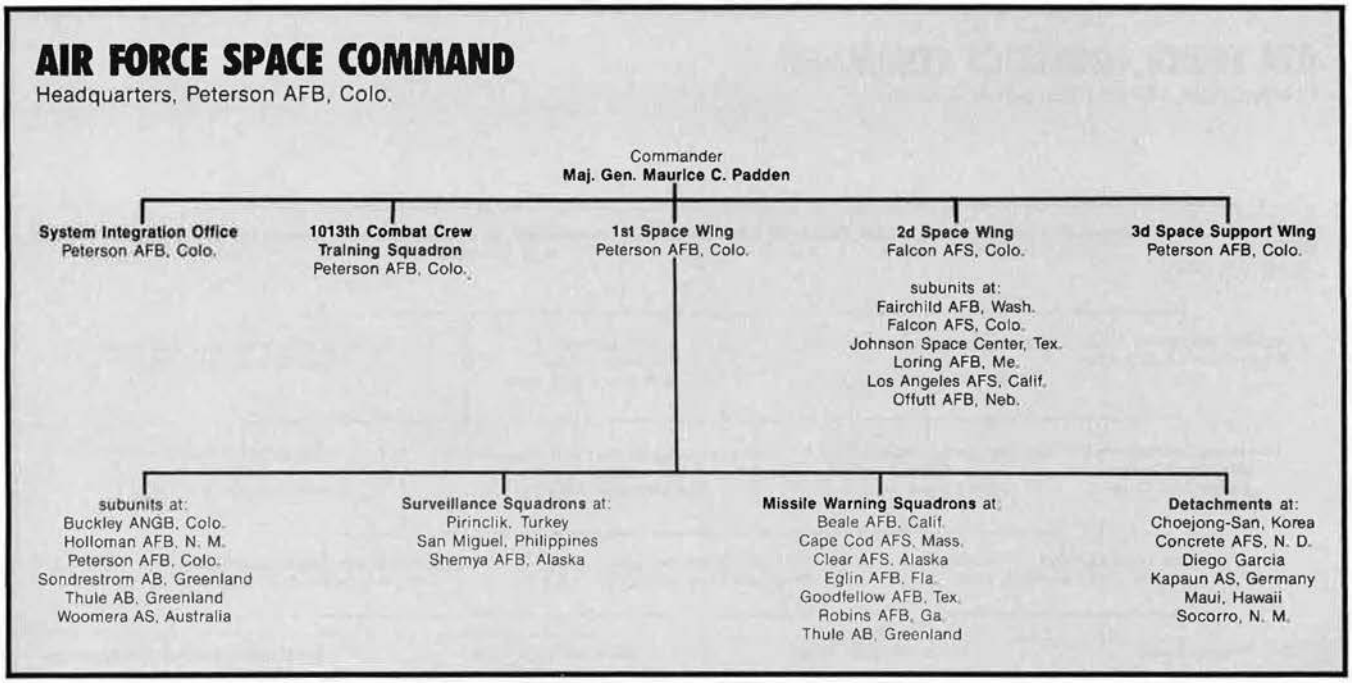
The Air Force Space Command, now in its fifth year, is responsible for organizing, training, equipping, and operating forces in support of the United States Space Command. These forces focus on missile warning, space surveillance, and space operations.

At more than twenty sensor locations around the globe, men and women of Air Force Space Command provide our front line of defense. With responsibility for missile warning, the command ensures accurate, timely, reliable, and unambiguous warning of attack by either intercontinental or sea-launched ballistic missiles. This is the first step in a successful military defense process and is key to successful deterrence.

Air Force Space Command sensors also look beyond ballistic missile trajectories to continually monitor all man-made objects in orbit. The mission here is to detect, track, identify, and catalog objects orbiting all the way out to deep space and ranging in size from large spacecraft to an astronaut's glove. Thousands of observations are taken daily to satisfy these space surveillance requirements.

Air Force Space Command also provides resources for the operational mission of space control. These operations are analogous to the naval mission of sea control. They provide freedom of action for friendly forces and, when directed, deny it to an enemy. They include all of the broad aspects of protection of US and allied space systems and negation of enemy space systems.

By the end of the year, the command will become responsible for the Air Force Satellite Control Network, a global network of sites commanding a variety of space systems. These operational systems provide support to all US forces around the globe and to the National Command Authorities. Space support is analogous to air support or naval support, providing services unique to its operating medium. In the case of Air Force Space



Command, navigation, communications, warning, and surveillance are the services provided.

Fulfilling these operational missions to meet the requirements of USCINCSPACE is the primary focus for the new commander of Air Force Space Command, Maj. Gen. Maurice C. Padden. Formerly under a common commander with NORAD and US Space Command, the newly designated AFSPACECOM Commander now has sole responsibility for 7,200 Air Force military and civilian personnel and about 4,200 contractor personnel assigned worldwide. The command operates three bases and six stations at the following locations: Peterson AFB, Colo.; Thule and Sondrestrom ABs in Greenland; Clear AFS, Alaska; Concrete AFS, N. D.; Falcon AFS, Colo.; Cape Cod AFS, Mass.; Eldorado AFS, Tex.; and Cheyenne Mountain AFS, Colo.

To look after these assets, Air Force Space Command employs three wings. The 1st Space Wing was established at Peterson AFB, Colo., to operate missile warning and space surveillance sites around the world. In performance of its warning mission, the wing manages the people and equipment that monitor strategic ballistic missile and space booster launches.

Several recent improvements have been made to these aerospace defense assets. During 1986, a new phased-array radar opened at Robins AFB, Ga., and in 1987, another will come on line at Eldorado AFS, Tex. These two new sites will incorporate the latest radar technology to provide significantly improved detection and tracking capability for submarine-launched ballistic missiles.

In addition, the BMEWS radar at Thule AB, Greenland, will finish its upgrade in early 1987, using the latest phased-array technology. Finally, wing units dedicated to the mission of space surveillance provide more than 30,000 daily space observations in order to keep track of more than 6,000 orbiting man-made objects.

The 2d Space Wing, located at Falcon AFS near Colorado Springs, is charged with the mission of satellite operations. The wing performs this complex and highly demanding mission primarily from its Consolidated Space Operations Center (CSOC) operating through a global network of ground stations. Some of these stations are shared in common by the various military satellite constellations, and some are dedicated to specific systems.

By October of this year, the wing will assume operational and resource management responsibility for the common user segment known as the Air Force Satellite Control Network. This phased transfer will mark a turnover of primary authority for this global operational network from Air Force Systems Command. Presently, the 2d Space Wing controls Navstar Global Positioning satellites from the CSOC. In the future, control from there will also support the Satellite Early Warning System (SEWS), the Defense Satellite Communications System (DSCS), and the Fleet Satellite Communications System (FLTSATCOM).

In addition, the next-generation strategic and tactical military communications constellation, Milstar, will be added to the wing's inventory. For launch support, the command's 1st Manned Spaceflight Control Squadron maintains a sizable presence at the Johnson Space Center in Houston.

Finally, the 1000th Satellite Operations Group, a 2d Space Wing unit at Offutt AFB, Neb., controls operational weather satellites in support of military operations worldwide, using sites at both Loring AFB, Me., and Fairchild AFB, Wash.

The 3d Space Support Wing (3d SSW), activated last October, is Air Force Space Command's newest organization. The wing's primary mission is support. Specifically, 3d SSW is the single organization responsible for supporting the command's installations around the globe. This concept is particularly well suited to Air Force Space Command, because it permits the 1st and 2d Space Wing commanders, with their global basing, to concentrate on operational missions and technical support matters. Created from existing resources, 3d SSW provides a framework for future growth as the command's mission expands while achieving better management of space support assets.

Air Force Space Command is striving to improve the quality of its space systems operators through dedicated training. Air Training Command began Undergraduate Space Training (UST) after Air Force Space Command established a need for the

course and assisted in its development.

UST is designed to prepare officers for a career in space operations. The course concentrates on basic knowledge and skills in common areas of space operations and provides an orientation base for system-specific follow-on training. The 1013th Combat Crew Training Squadron (CCTS) provides specific crew positional training for locations assigned to or supported by Air Force Space Command.

As a result of UST and CCTS training, Air Force Space Command and supported organizations are provided with operators possessing broader backgrounds, enabling easy transition to any space mission area.

Today, Air Force Space Command is facing ever-increasing challenges and opportunities. With the increasing importance of space-based assets, the command plays an ever-greater role in supporting our forces, assuring our national security, and maintaining peace through deterrence. The future offers unlimited prospects for those manning the ramparts of "The High Frontier." ■

Air Force Systems Command

The focus is on the future at Air Force Systems Command, a coalition of research, development, test and evaluation, and acquisition communities shaping tomorrow's Air Force today.

The command's primary mission is to advance aerospace technology, to incorporate those advances in the development and improvement of aerospace systems, and to acquire qualitatively superior, cost-effective, and logistically supported aerospace systems and equipment. The reliability and maintainability of these systems are considered equal to cost and performance goals. Such attention during design and production phases ensures long-term benefits of increased combat capability and decreased maintenance hours and cost. It is through AFSC that USAF's operational and support commands receive the weapons, equipment, and initial spare parts needed to defend the nation.

With the conclusion of a six-month comprehensive study last year known as Project Forecast II, the command identified technologies and systems concepts that could spark major increases in the nation's military capability.

The command's 27,770 military and 29,515 civilians are the people shaping tomorrow's Air Force. Their research, development, test, and acquisition roles make AFSC the Air Force's major employer of scientists and engineers.

Systems Command will manage more than $30 billion in FY '87—roughly one-third of the total Air Force budget. The command currently administers more than 21,800 active contracts valued at approximately $193 billion. Current AFSC foreign military sales management responsibilities include $34 billion of active cases with an undelivered value of more than $18 billion.

Within the past year, AFSC has achieved a number of significant research, development, and systems acquisition milestones.

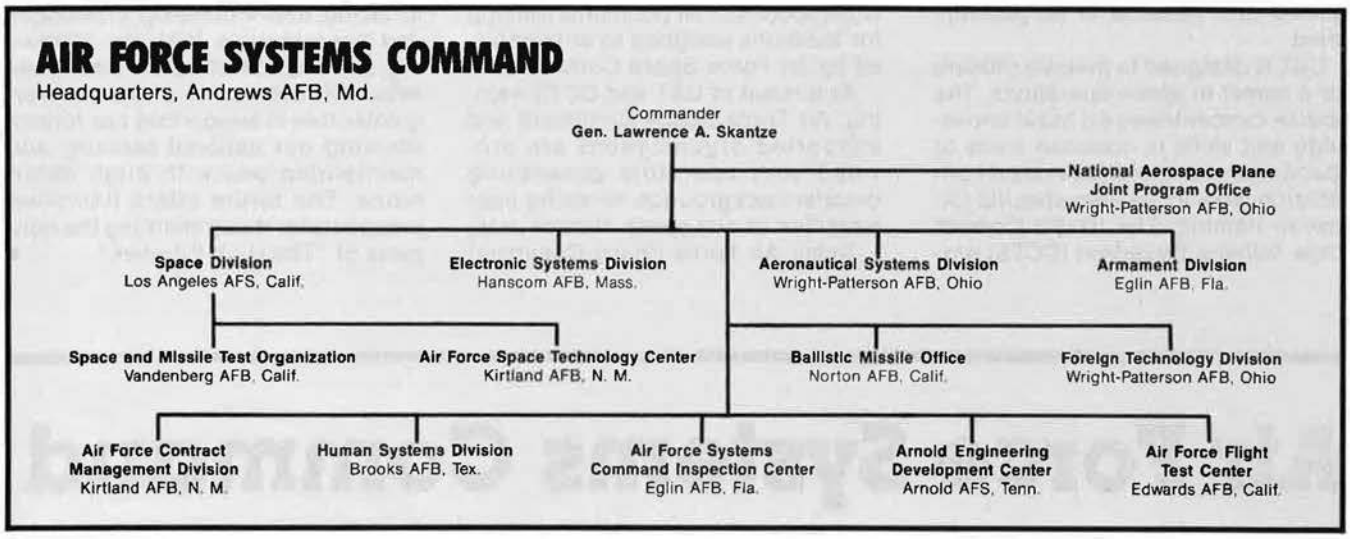
- The command awarded just over $13 billion in competitive contract awards for the year, more than double the $6.2 billion (twenty-six percent) it awarded competitively in 1984. Increased competition for AFSC contracts has resulted in a number of programs being under cost, acquisition of more reliable products with better warranties, and improved contractor responsiveness.

- In early 1986, the National Aerospace Plane program office was established at Wright-Patterson AFB. Program goals call for developing and demonstrating the technologies necessary for cruising in the atmosphere at hypersonic speeds at altitudes as high as 350,000 feet and flying directly into low-earth orbit in a single-stage vehicle.

- Aeronautical Systems Division at Wright-Patterson AFB, Ohio, entered a fifty-month demonstration/validation phase of developing an Advanced Tactical Fighter (ATF) as the Air

The dials and gauges of today's cockpits may be a thing of the past when technologies derived from work being done with the MAGIC (Microcomputer Application of Graphics and Interactive Communications) simulator come to fruition. The MAGIC simulator, one project of AFSC's Aeronautical Systems Division's Wright Aeronautical Laboratories, combines voice and touch imputs to help pilots "fly" missions.

—Photo by Guy Aceto, Art Director



Force's air-superiority fighter for the 1990s and beyond. Enhanced reliability and maintainability characteristics will ensure that the ATF will be able to fill the high-performance, air-superiority role in countering the Soviet fighter threat.

• Strategic force modernization and improvement continued, with initial operational capability for two major AFSC systems: the B-1B at Dyess AFB, Tex., and the Peacekeeper intercontinental ballistic missile at F. E. Warren AFB, Wyo.

• ASD began contractual work on the air defense fighter program, in which 270 F-16As will be modified to replace aging F-4 fighters and provide timely and reliable tactical assessment of bomber and cruise missile attacks, control access to North American airspace, and, if necessary, respond to attack.

• Human Systems Division located at Brooks AFB, Tex., led two new AFSC initiatives from the Project Forecast II study—Super Cockpit and Robotic Telepresence. Super Cockpit is a revolutionary modular crew station that fuses information from avionics, weapons, and sensors to communicate three-dimensional spherical awareness to the pilot. The goal of the Robotic Telepresence initiative is to project human sensory and cognitive skills safely into dangerous environments through low-cost mobile robots.

• Space Division at Los Angeles AFS had a successful year. A Fleet Satellite Communications system was launched December 4 from Cape Canaveral AFS, Fla., on an Atlas Centaur booster, bringing the number of operational satellites in orbit to five. The system provides communication to Navy ships, selected Air Force and Navy aircraft, submarines, global ground stations, and Presidential command networks.

• Under the management of the Space Test Program Office, a Polar BEAR satellite was successfully launched into space November 13 from Vandenberg AFB, Calif., on a Scout launch vehicle. The spacecraft is a refurbished Transit satellite that had been on display at the Smithsonian Institution from 1976 to 1984. Data from this experimental mission should aid in improving polar communications during periods when the aurora borealis is active and causes communications interference.

• Joint Air Force and Navy testing progressed in 1986 on the Advanced Medium-Range Air-to-Air Missile (AMRAAM), in full-scale development by the Armament Division at Eglin AFB, Fla. Test launches have demonstrated capabilities that far exceed those of current operational air-to-air missiles, including launch-and-leave as well as multiple launches against multiple targets. ■

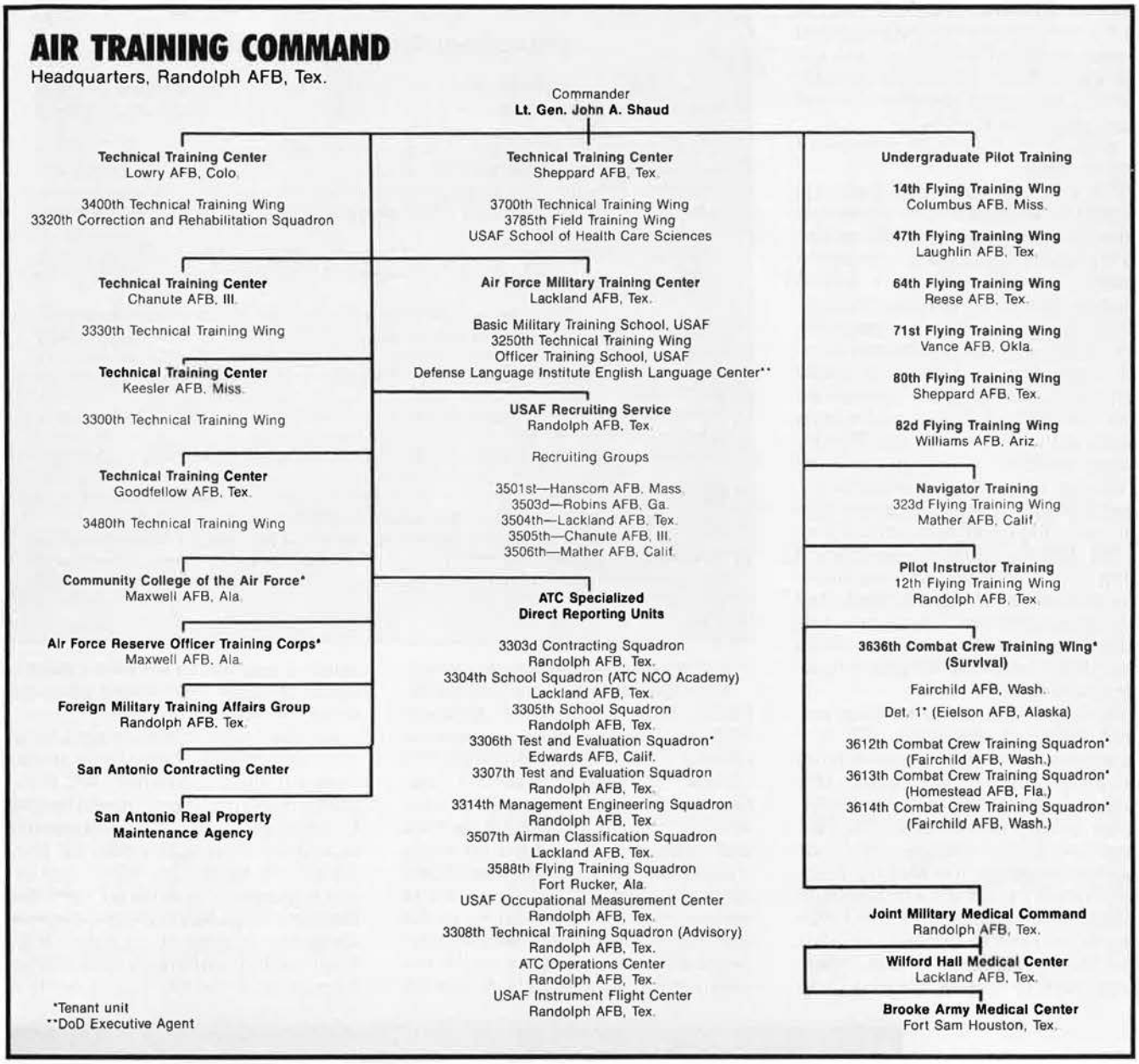
Air Training Command

The Air Training Command remains at the forefront of America's airpower capability, providing the Air Force with its most critical resource—high-quality, well-trained, motivated people. Using the very best of rapidly advancing technology and systems, ATC continues to ensure that Air Force people are sufficient in numbers, quality, and expertise to meet the challenges of our high-tech future. Today, the command is implementing fundamental changes in training approach and philosophy that will have a significant impact on the Air Force's mission capability well into the twenty-first century.

The first step toward providing a quality, trained force is recruiting the best qualified young people available. The Air Force Recruiting Service continues to set the pace among America's uniformed services in this regard, producing impressive results *(see the accompanying box).*

ATC is the "First Command" for Air Force people. Virtually all enlisted members and nearly ninety percent of officers come to ATC for their introduction to the Air Force. In FY '86, more than 65,000 young Americans were transformed into airmen through basic training at Lackland AFB's Military Training Center—"The Gateway to the Air Force."

The command also introduced nearly 6,000 new officers to the Air Force through its two commissioning programs. The Officer Training School, also at Lackland AFB, commissioned 2,600 new lieutenants. The Air Force Reserve Officer Training



Corps produced another 3,300 new officers from its 132 detachments at colleges and universities throughout the nation.

Medical Service officers also begin their Air Force careers in ATC. In FY '86, ATC's USAF School of Health Care Science, Sheppard AFB, Tex., graduated 1,450 new active-duty physicians, dental officers, nurses, and other health-care professionals from its Military Indoctrination for Medical Service Officers Course.

Appropriately, initial training is only the beginning. ATC goes far beyond the basics, teaching the skills needed by today's—and tomorrow's—Air Force. The command's thirteen major installations host six technical training centers, six undergraduate pilot training wings, one pilot instructor training wing, and one basic and advanced navigator training wing. ATC also operates survival training at four locations and field training units at ninety-seven locations worldwide. This network of continuing career training opportunities is crucial in an era of rapidly changing technology and touches nearly every Air Force member.

A total of 4,800 courses in 350 different career specialties makes ATC the largest education and training system in the free world. As that giant system moves steadily in the direction of increased hands-on training for those who will work in sortie-generating skills, increasingly better graduates are the valued result. Airmen with skills more advanced than current three-level qualifications will soon be emerging from ATC's schools to take their places on Air Force flight lines. This stride forward in sortie-generating skill training is a result of prudent use of advanced training technology that allows an offset of less "in the schoolhouse" training—and cost—for some in our nonsortie-generating skills.

To prepare for the Air Force's growing role in space, selected officers are now enrolled in Undergraduate Space Training, a new twenty-week program at the Lowry Technical Training Center, Lowry AFB, Colo. The first class graduated in February 1987, and plans call for a production rate of nearly 300 officers per year.

ATC continues to launch the careers of tomorrow's aviation leaders, last year pinning wings on more than 1,700 new active-duty pilots and more than 650 active-duty navigators. ATC's undergraduate flying training also

trained pilots and navigators from the Air Force Reserve and the Air National Guard. Substantial changes are under way in both pilot and navigator training programs, designed to produce graduates even better prepared to perform at their first permanent duty stations.

The UPT syllabus has been expanded to fifty-two weeks, permitting enhanced instruction and less vulnerability of the schedule to inclement weather conditions. In both undergraduate pilot and navigator training, ATC is moving toward implementation of a "dual track" or specialized training mode. The specialized navigator training is under way, and specialized pilot training will follow in the early 1990s with delivery of the Tanker-Transport-Bomber Training System.

Survival training is provided for aircrew members and appropriate others, including USAF Academy cadets, by the 3636th Combat Crew Training Wing (USAF Survival School), headquartered at Fairchild AFB, Wash. The school teaches basic survival, water survival, and Arctic survival to more than 12,000 students per year at locations around the country.

The USAF Occupational Measurement Center at Randolph AFB is a focal point for evaluating and refining our programs and techniques. This unique organization operates the Air Force occupational analysis program, plans and analyzes Air Force training, develops the Military Training Standard for all noncommissioned officers, develops Air Force tests in support of the Weighted Airman Promotion System, and assists in application of new training technologies throughout the Air Force.

ATC's Community College of the Air Force, headquartered at Maxwell AFB, Ala., is the largest community college in the nation. Through this unique institution, airmen can combine Air Force training and off-duty education to earn associate degrees that relate directly to their Air Force specialties. The college's classrooms span the globe and are open only to enlisted members of the Air Force, Air National Guard, and the Air Force Reserve. In just fifteen years, CCAF has awarded 50,000 associate of applied science degrees to Air Force people eager to reach their fullest potential while serving their country.

Air Training Command plays a large role in promoting international understanding and cooperation. ATC manages the technical and flying training for more than 4,000 men and women from more than eighty nations. During FY '86, more than 3,267 international students graduated from the Defense Language Institute's English Language School at Lackland AFB. Pilot training is offered to NATO allies through the Euro-NATO Joint Jet Pilot

Recruiting: The Best Year Ever

The United States Air Force Recruiting Service saw FY '86 as the best recruiting year ever. For the fourth straight year, Recruiting Service achieved 100 percent or more in all sixteen goaled programs.

In 1986, recruiters brought in more than 64,000 people with no prior military service. Of these, almost ninety-nine percent were high school graduates, with more than forty-five percent scoring in the top two mental categories on their qualifying tests. Approximately 2,000 people with prior military service were also recruited.

Officer Training School at Lackland AFB, Tex., attracted some 2,700, and more than 1,200 health-care professionals received direct commissions in the Air Force Medical Service.

During FY '87, Air Force recruiters will seek about 61,000 volunteers for today's high-technology Air Force. Goals are about 52,000 people without prior military service, 1,500 with prior military service, 1,600 college graduates for officer training, and more than 1,250 health professionals, including a requirement for 114 physicians.

With headquarters at Randolph AFB, Tex., the Recruiting Service commander also functions as Air Training Command's Deputy Chief of Staff for Recruiting.

Recruiting Service is composed of a headquarters staff, five recruiting groups, and thirty-five squadrons. Some 1,300 subordinate recruiting offices are located throughout the United States, at Puerto Rico and Guam, and at some areas in Europe and the Pacific with large American populations.

About 500 new recruiters are needed each year to help meet Air Force personnel requirements. Career noncommissioned officers interested in learning more about this challenging duty should call the Recruit-the-Recruiter Team Chief at AUTOVON 487-2812.

—USAF photo by AIRMAN Magazine

A student navigator and his instructor pilot prepare to fly a low-level training mission in a Cessna T-37 out of Mather AFB, Calif. Mather is the Department of Defense's executive agent for navigator training, and in addition to Air Force, Navy, and Marine Corps navigators, the school also instructs navigators of allied countries.

Training program at Sheppard AFB, Tex., with 125 international pilot graduates in FY '86. The Aviation Leadership Program is another ATC effort, begun this year, to provide additional flying training opportunities for nations not included in NATO.

ATC also has a large commitment to joint service efficiency. Through the Interservice Training Review Organization, ATC cooperates with the other services to ensure that training is conducted jointly whenever it offers clear advantages. In addition, ATC this year became executive agent for the Joint Military Medical Command, composed of some 7,300 people in the San Antonio area.

This first-of-its-kind medical command combines Wilford Hall Air Force Medical Center, the Brooke Army Medical Center, and the clinics at Randolph, Kelly, and Brooks AFBs into a joint organization, responsible for all military health-care services and graduate medical education in San Antonio. It is expected to be the model for similar joint commands to be established in other regions with large military populations.

Air Training Command continues to "show the way" to potential recruits, basic trainees, student pilots, experienced flight line supervisors—literally to hundreds of thousands who come into contact with its vast resources, programs, and capabilities each year. "The First Command" is doing its part, today as in the past, providing the trained, quality people who keep the United States Air Force the best in the world. ■

Air University

Air University (AU), headquartered at Maxwell AFB, Ala., provides professional military education (PME) degree-granting and professional continuing education (PCE) for officers, NCOs, and civilians.

Most of AU's PME schools are located at Maxwell AFB. These include Air War College (AWC) for senior officers, Air Command and Staff College (ACSC) for midcareer officers, and Squadron Officer School (SOS) for company grade officers. The Air Force Senior Noncommissioned Officer Academy (SNCOA), the highest level of NCO PME, is located at nearby Gunter AFS.

Other major AU organizations include the Center for Professional Development (CPD); the Center for Aerospace Doctrine, Research, and Education (CADRE); the Air University Library (AUL); and Hq. Civil Air Patrol-USAF (CAP-USAF) (all at Maxwell); the Extension Course Institute (ECI) and the Air Force Logistics Management Center (LMC) at Gunter AFS; and the Air Force Institute of Technology (AFIT) located at Wright-Patterson AFB, Ohio.

The 3800th Air Base Wing is the host unit, and its primary mission is to operate and maintain Maxwell AFB and Gunter AFS by providing total logistical support and base services to Air University and other tenant organizations. The 3800th Air Base Squadron has specific responsibility for supporting tenant units housed at Gunter.

Nearly 2,800 military and 1,700 civilian personnel are permanently assigned to AU. Close to 12,000 military and civilians completed resident AU classes last year. Thousands more completed courses through nonresident seminar and correspondence programs.

Recently, AWC initiated several major programs to enhance the Air Force's warfighting capability by emphasizing the unique skills, perspectives, knowledge, and analytical thinking required of senior officers. These programs included the addition of eight MAJCOM Academic Chairs filled by highly select command representatives, an increased emphasis in the curriculum on joint and combined operations, a greatly expanded executive and health-assessment program, and procurement of computer equipment and educational software to aid curriculum development and student learning. AWC also conducted an extensive associate program worldwide, with more than 9,100 senior officers and DoD civilians enrolled.

The Air Force National Security Briefing Team, in its fourth year, was awarded the Air Force Association's Special Citation in recognition of its sustained outstanding performance while educating the public in support of the US Air Force and the United States of America. Since 1983, the team has made more than 1,000 briefings in forty-seven states.

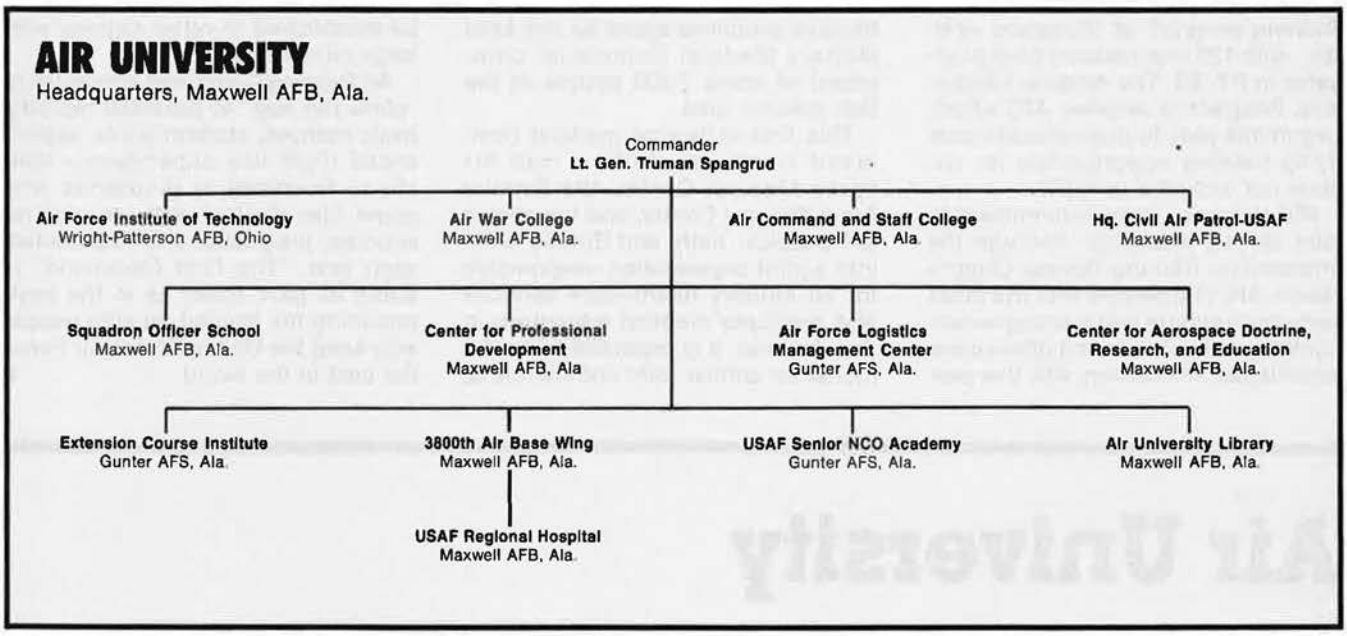
CADRE developed and conducted a CSAF-directed Senior Officer Combat Employment Course. The course provided general officers with a unique, operational, combat-oriented experience to enhance the understanding of warfare and the ability to conduct air operations in a joint context. Consequently, because of its resounding success, the CADRE Senior Officer Directorate is currently working with the Army to develop a joint curriculum to enhance our capability to fight in a joint environment.

As a directorate of CADRE, the Air Force Wargaming Center (AFWC) is designated the clearinghouse for Air Force wargaming applications and is the Air Force focal point for information on computer-assisted wargames. Currently, AFWC is developing a computer-assisted wargaming system called the Command Readiness Exercise System (CRES) to teach wartime decision-making and to explore new concepts and strategies using real-world or notional data.

CADRE's Airpower Research Institute continues its research efforts concentrating on both low-intensity conflict and nuclear deterrence/warfighting issues. Recently, ARI assumed publishing responsibilities for the recently discontinued *Air University Review* and will publish the new *Airpower Journal* in 1987 to provide an active forum for new ideas and professional debate.

The Combat Employment Institute is a newly created directorate charged with conducting the Combined Air Warfare and the Contingency/Wartime Planning courses. The former course provides a macro view of theater employment, specifically dealing with doctrine, command arrangements, US and allied military capabilities, and threat. The Contingency/Wartime Planning course covers the basics of USAF and joint planning across the functional arenas.

ACSC hosted its third annual Latin American Symposium. Fifty military officers, career diplomats, and private citizens from fifteen countries attended. Also, ACSC held its sixth Gathering of Eagles in May 1986. Twenty famous aviators participated



in the symposium designed to develop interest in aviation history.

SOS continued its emphasis on leadership in 1986 by implementing a "Combat Leadership Exercise" (CLX). The exercise gives students leadership opportunities in a physically demanding and mentally stressful environment. In addition, SOS increased its capabilities to educate company grade officers with the installation of microcomputers in each classroom. The computers are for student use and will be tied in to the Air Force Wargaming Center for force employment and other wargaming exercises.

During 1986, the USAF SNCOA was awarded the USAF Organizational Excellence Award and dedicated its academic facility, Kisling Hall, in honor of late former Chief Master Sergeant of the Air Force Richard D. Kisling. The USAF Enlisted Heritage Hall, the only facility dedicated to enlisted Air Force heritage, was formally opened. Also, another quality-of-life improvement for senior NCOs attending the school was achieved with the opening of two ninety-person private room dormitories.

AUCPD was activated in August 1986. The new organization was formed by merging the Leadership and Management Development Center and the Educational Development Center. Professional development courses are provided by AUCPD through seven professional continuing education schools that offer forty-nine courses in specialized areas.

More than 4,000 students graduated from courses in such career fields as comptroller, historian, judge advocate, chaplain, personnel, aircraft maintenance, resource management, and systems information. Wing and base commanders attend courses of instruction on commander's responsibilities. The AUCPD USAF Chaplain Resource Board provided programs and support to assist Air Force chaplains worldwide. In addition, the AUCPD International Officer School increased the capabilities of selected international officers to participate in other Air Force-sponsored PME and functional programs.

AFIT is responsible for university-level education in support of Air Force and DoD requirements by providing accredited resident degree and professional continuing education programs in its schools of Engineering, Civil Engineering, and Systems and Logistics. In addition, AFIT places students and monitors their academic progress at civilian institutions. During FY '86, more than 5,000 Air Force members attended approximately 350 civilian colleges, universities, and medical schools and seventy-five industrial firms worldwide through AFIT-sponsored civilian institutions programs.

AFIT will soon begin construction on its new Science and Research Center. The $12.8 million facility will house a new computer center, an auditorium, a centralized, high-technology library, classrooms, student seminar areas, a faculty research area with laboratories, and administrative facilities. The 110,000-square-foot structure will connect the School of Engineering with the School of Systems and Logistics and will better accommodate the growing number of students attending AFIT each year.

ECI is the center for the Air Force's correspondence education programs. As such, the institute enables all Air Force and DoD personnel to meet our nation's readiness needs by providing career development, specialized, and professional military education courses. With an enrollment of nearly 425,000, ECI is currently undertaking initiatives to automate the production of course materials, develop interface between the AU Registrar and the military personnel system, and link ECI with education and OJT offices worldwide.

AUL—largest and most comprehensive military library in the free world—successfully brought up the first operating module of its new Integrated Library System (ILS). The module, the Online Public Access Catalogs, replaces the traditional card catalog and increases the efficiency of student and faculty research. During 1987, the library will bring up other modules, which control acquisition and provide online circulation. When fully implemented, the ILS will support up to 100 terminals capable of accessing the facility's impressive research collections from anywhere in Air University.

Also active under the AU umbrella is Hq. CAP-USAF, the Air Force organization that advises and assists Civil Air Patrol with its primary missions of emergency services, aerospace education, and a cadet program for youth. Some 257 active-duty military and civilian personnel are assigned to CAP-USAF throughout the US and Puerto Rico in support of the Civil Air Patrol. Nearly 500 Air Force and Army Reservists actively assist CAP activities through CAP-USAF. During 1986, Civil Air Patrol saved 135 lives, making this the fourth consecutive year, and the fifth time in CAP's history, their record has exceeded 100 saves. ■

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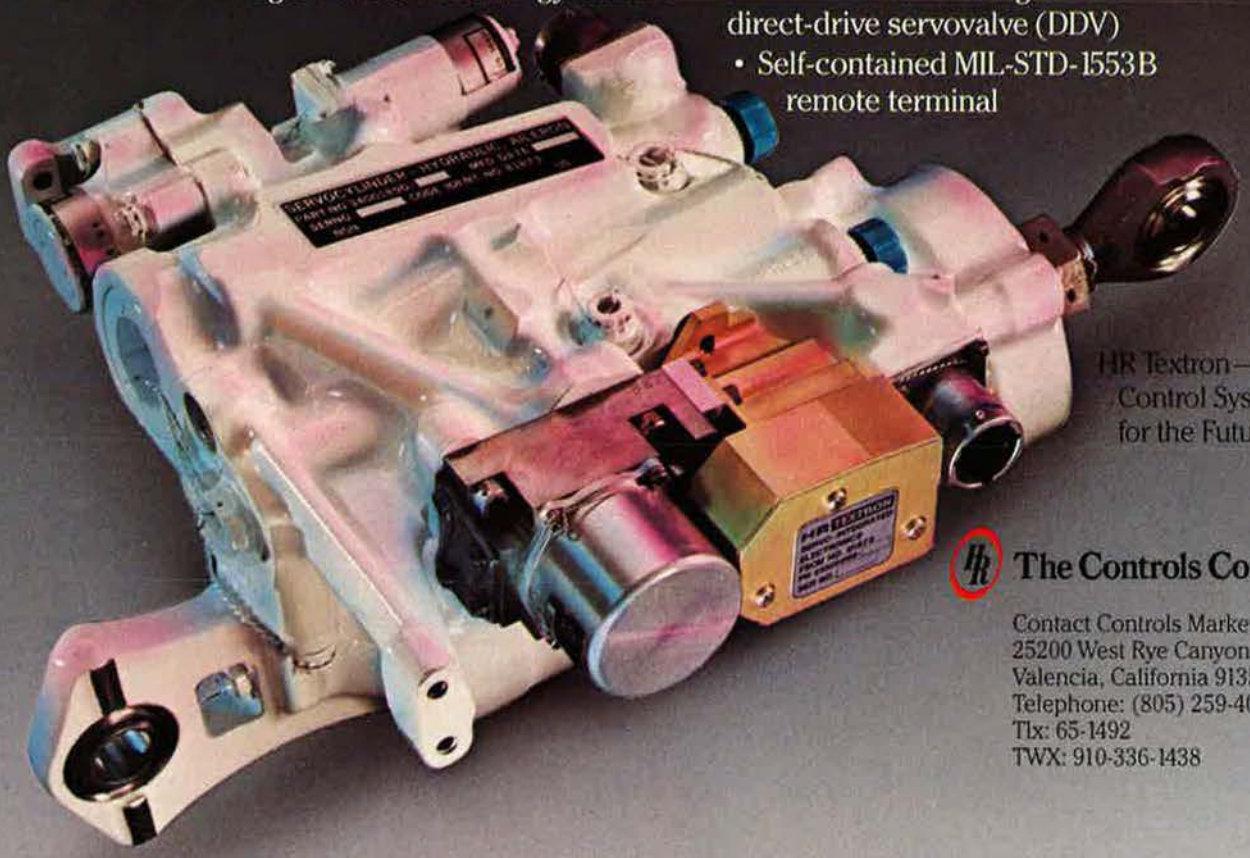

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Alaskan Air Command

Along with the extreme beauty, a military assignment to the Great Land offers many challenges. A harsh Arctic environment and vast distances with a limited road network pose challenges as the men and women of Alaskan Air Command fulfill their command's motto of providing "Top Cover for America."

AAC provides, trains, and equips tactical air forces to preserve the national sovereignty of the United States's lands, waters, and airspace. Responsibility for the command's vast area of operations rests with the 826 officers, 6,628 enlisted people, and 1,437 civilian employees.

Alaska's military significance and strategic location have been recognized for many years. At no other place on the globe are the US and USSR closer together. The two land masses are separated by only forty-four nautical miles at the Bering Strait.

Alaska lies across the Great Circle routes connecting the Orient with Europe and North America, making Alaska an ideal location for deployment or refueling of aircraft flying polar routes.

As the senior military officer in Alaska, the AAC Commander is the coordinating authority for all joint military administrative and logistical matters in Alaska and is the military point of contact for the state.

The AAC Commander also serves as Commander, Alaskan North American Aerospace Defense Command Region. In this capacity, he is responsible to CINCNORAD for the defense of North America against aerospace attack and for accomplishing assigned operational missions. In 1986, a Canadian Forces brigadier general was assigned as the Region's deputy commander.

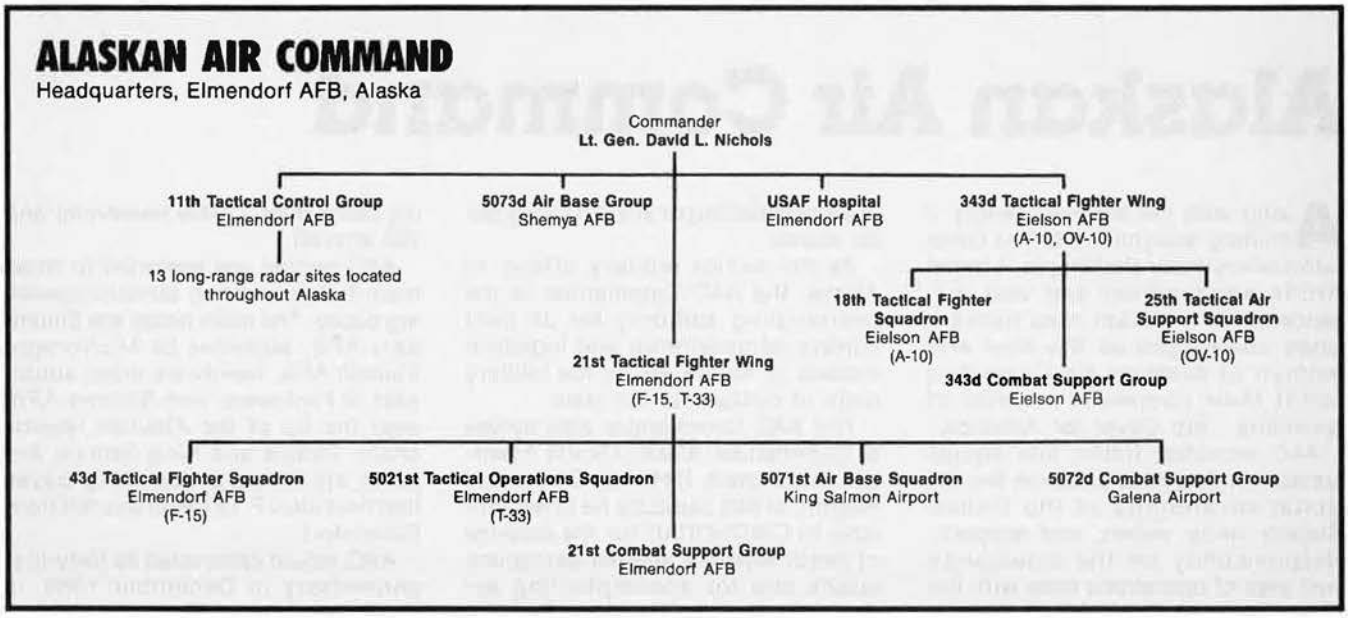
In the event of natural disaster, emergency, or when directed by the Joint Chiefs of Staff, the AAC Commander becomes the Commander, Joint Task Force-Alaska (JTF-AK), responsible for unified defense of mainland Alaska. In addition to numerous command post exercises, JTF-AK participated in Brim Frost '87, a major joint Arctic training exercise involving more than 21,000 personnel and 130 aircraft.

AAC people are assigned to three main bases and two forward operating bases. The main bases are Elmendorf AFB, adjacent to Anchorage; Eielson AFB, twenty-six miles southeast of Fairbanks; and Shemya AFB, near the tip of the Aleutian Islands chain. Galena and King Salmon Airports are forward operating bases that host alert F-15 Eagle aircraft from Elmendorf.

AAC, which celebrated its forty-first anniversary in December 1986, is headquartered at Elmendorf, home also of the 11th Tactical Control Group, 21st Tactical Fighter Wing (host unit), and 21st Combat Support Group. Assigned to the 21st TFW are the 43d Tactical Fighter Squadron, flying F-15 Eagles, and the 5021st Tactical Operations Squadron.

The 21st TFW is charged with an air superiority and intercept mission as America's first line defense in this hemisphere. More than thirty Soviet aircraft have been intercepted by the 43d TFS "Hornets" this year.

Now in its forty-second year of "providing top cover for America," Alaskan Air Command defends territory that is only forty-four miles from the Soviet Union at some points. This F-15, belonging to the 21st Tactical Fighter Wing's 43d TFS at Elmendorf AFB, is being towed out to the ramp after maintenance. Alaska's Chugach Mountains are in the background. Alaskan Air Command works out of three main and two forward operating bases.



Aircraft, equipment, and personnel from the 21st TFW deployed to Prudhoe Bay, Alaska, operating for the first time above the Arctic Circle on the coast of the Arctic Ocean. Additionally, wing assets deployed to Weapon System Evaluation Program training at Tyndall AFB, Fla.; a dissimilar air-to-air exercise at Shaw AFB, S. C.; and Nellis AFB DACT training. The 21st TFW hosted several deployments by Air National Guard and US Navy units to Alaska.

The 11th TCG is responsible for the 3d Air Support Operations Center, the Region Operations Control Center (ROCC), and the command's thirteen long-range radar sites. Modernization of the thirty-year-old Alaskan Air Defense System was marked by radar system conversion and continued integration of the Joint Surveillance System (JSS) into the 11th TCG's ROCC.

In the JSS system, data from the 11th TCG's thirteen radar sites is received by means of satellite links and displayed on consoles at the ROCC. F-15 fighters are directed to locations anywhere in Alaska from the ROCC with radios that are remoted over satellite.

The thirteen long-range radar sites located along the western periphery and interior of the state are maintained and operated by contractor personnel, saving the Air Force about $108 million annually compared to costs in the mid-1970s. Also, 1,500 blue-suit remote assignments have been eliminated as a result of the successful Seek Igloo radar.

To provide backup for current single-thread satellite communications, AAC has successfully employed Meteor Burst communications technology. In addition to providing radar data from remote long-range radar sites, Meteor Burst communications can also be used to direct fighter intercepts.

Eielson AFB, named in honor of Carl Ben Eielson, an Arctic pioneer and Alaskan aviator, is headquarters for the 343d Tactical Fighter Wing, the 343d Combat Support Group, and the new 343d Mission Support Squadron. The wing's 18th Tactical Fighter Squadron operates the command's A-10 Thunderbolt II close air support aircraft, while the 25th Tactical Air Support Squadron flies the newly assigned OV-10 Bronco forward air control aircraft, which replaced the O-2 Skymasters during 1986.

The 18th TFS trains and equips its people to fight in the demanding close air support role, with particular emphasis placed on antiarmor capability in supporting friendly ground forces in an Arctic environment. The 25th TASS can deploy throughout Alaska to provide control elements for close air support operations. The squadron conducts training operations by providing Army units with ground and airborne forward air controllers. Visual reconnaissance, search-and-rescue, artillery adjustment, flare support, and cold weather testing round out the squadron's mission.

Tactical fighter units from all over the Air Force, Air Force Reserve, and Air National Guard traveled to Eielson to take advantage of the area's large airspace and to provide close air support to the Alaskan-based Army ground forces during Yukon Lightning '86, Alaska's first A-10 tactical employment competition hosted by the Alaskan Air Command.

Strategic Air Command's 6th Strategic Wing makes its headquarters at Eielson AFB. The 6th SW is responsible for all SAC operations in Alaska. The wing flies strategic reconnaissance missions employing the RC-135 aircraft and manages the Alaskan Tanker Task Force employing the KC-135A aircraft on temporary duty to the wing from active-duty Air Force, Air Force Reserve, and Air National Guard units based in the continental United States.

Continuing efforts to upgrade facilities at Eielson AFB saw the completion of 300 Cool HOME (Housing Opportunity for Military at Eielson) enlisted family housing units, completion of the largest combined medical/dental clinic in the Air Force, construction of the new Army and Air Force Exchange Service minimall, completion of a new eight-bay aircraft maintenance hangar, and addition of the 168th Aerial Refueling Squadron's (ANG) four KC-135 Stratotankers and maintenance and support personnel during 1986.

AAC operates the Elmendorf Rescue Coordination Center (RCC). The RCC coordinates search-and-rescue efforts involving aircraft and people from all military services and many federal, state, local, and civil volunteer agencies. During 1986, the RCC coordinated 174 requests for emergency assistance from military and civilian persons in distress and was credited with saving 101 lives. Since its inception in October 1961, the RCC has recorded more than 3,948 saves and assisted more than 10,037 people. ■

Tactical Air Command

The mission of Tactical Air Command (TAC) is to organize, train, equip, and maintain combat-ready forces capable of rapid deployment and employment as well as to ensure that strategic air defense forces are ready to meet the challenges of peacetime air sovereignty and wartime air defense. TAC is also charged with the responsibility of working with the Army, Navy, and Marine Corps to develop doctrine, procedures, tactics, techniques, training, publications, and equipment for joint operations.

When mobilized, more than 74,000 members of the Air National Guard (ANG) and the Air Force Reserve (AFRES), along with their 1,600 aircraft, are assigned to TAC to accomplish its wartime mission. In total, TAC and these TAC-gained units consist of more than 4,000 aircraft (some forty-four percent of all USAF aircraft) and more than 192,000 people (23,000 officers, 152,000 enlisted personnel, and 17,000 civilians).

TAC's joint service responsibilities include providing the Air Force component of the US Readiness Command, US Atlantic Command, US Central Command, and US Southern Command. The TAC commander is triple-hatted as MAJCOM commander, USCINCAFRED, and CINCAFLANT. TAC's Ninth Air Force commander doubles as COMUSCENTAF, and TAC's Twelfth Air Force commander doubles as COMUSSOUTHAF. TAC's First Air Force commander also doubles as the commander of the CONUS North American Aerospace Defense Region, which, along with the Alaskan and Canadian regions, provides an operational command and control system for NORAD.

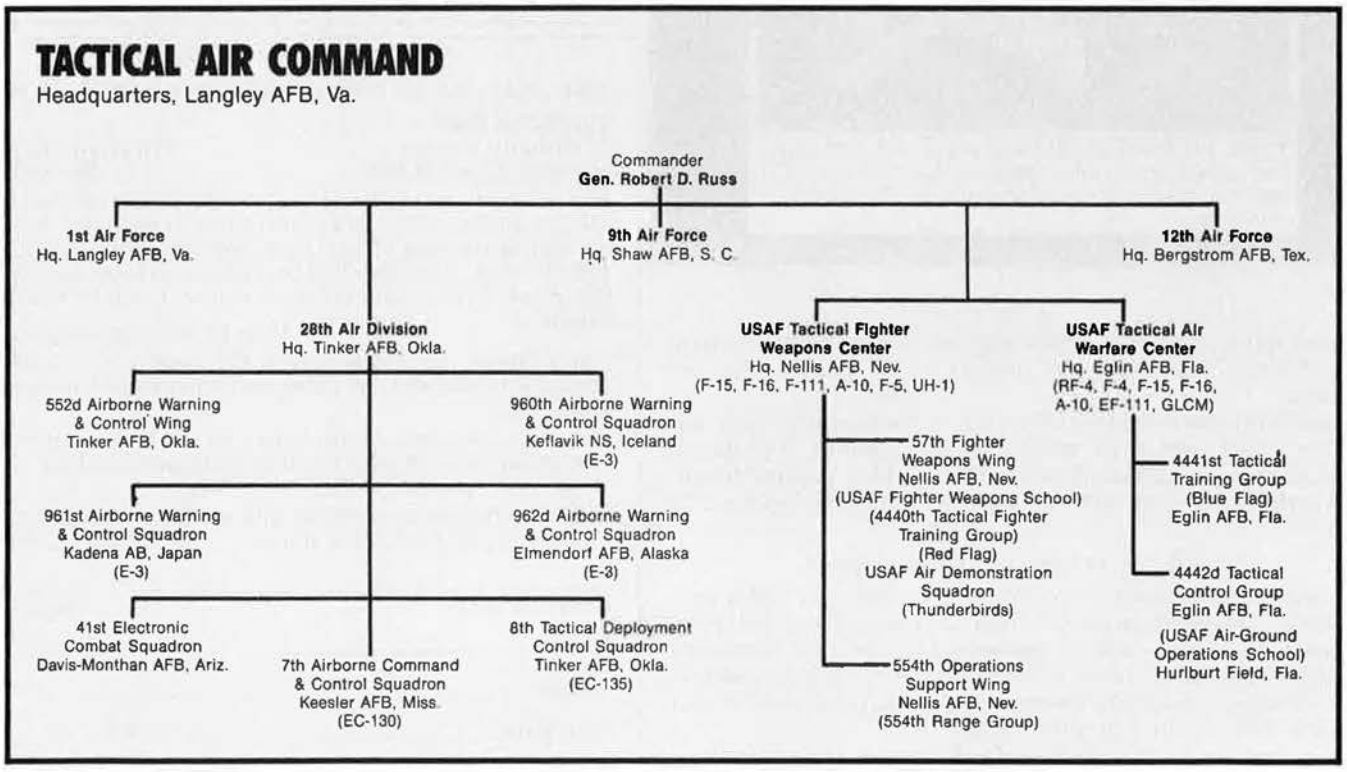
As AFRED, TAC forces perform tactical fighter, reconnaissance, command and control, and electronic combat operations during worldwide contingencies. In support of USCENTCOM, TAC provides combat-ready units for joint operations in Southwest Asia. When activated as Air Forces Atlantic under the unified Atlantic Command, TAC conducts air operations within the USLANTCOM area, which includes the North Atlantic and Caribbean. In support of the joint US Southern Command in Latin America, TAC forces provide air defense, tactical air support, and command and control for the region as required.

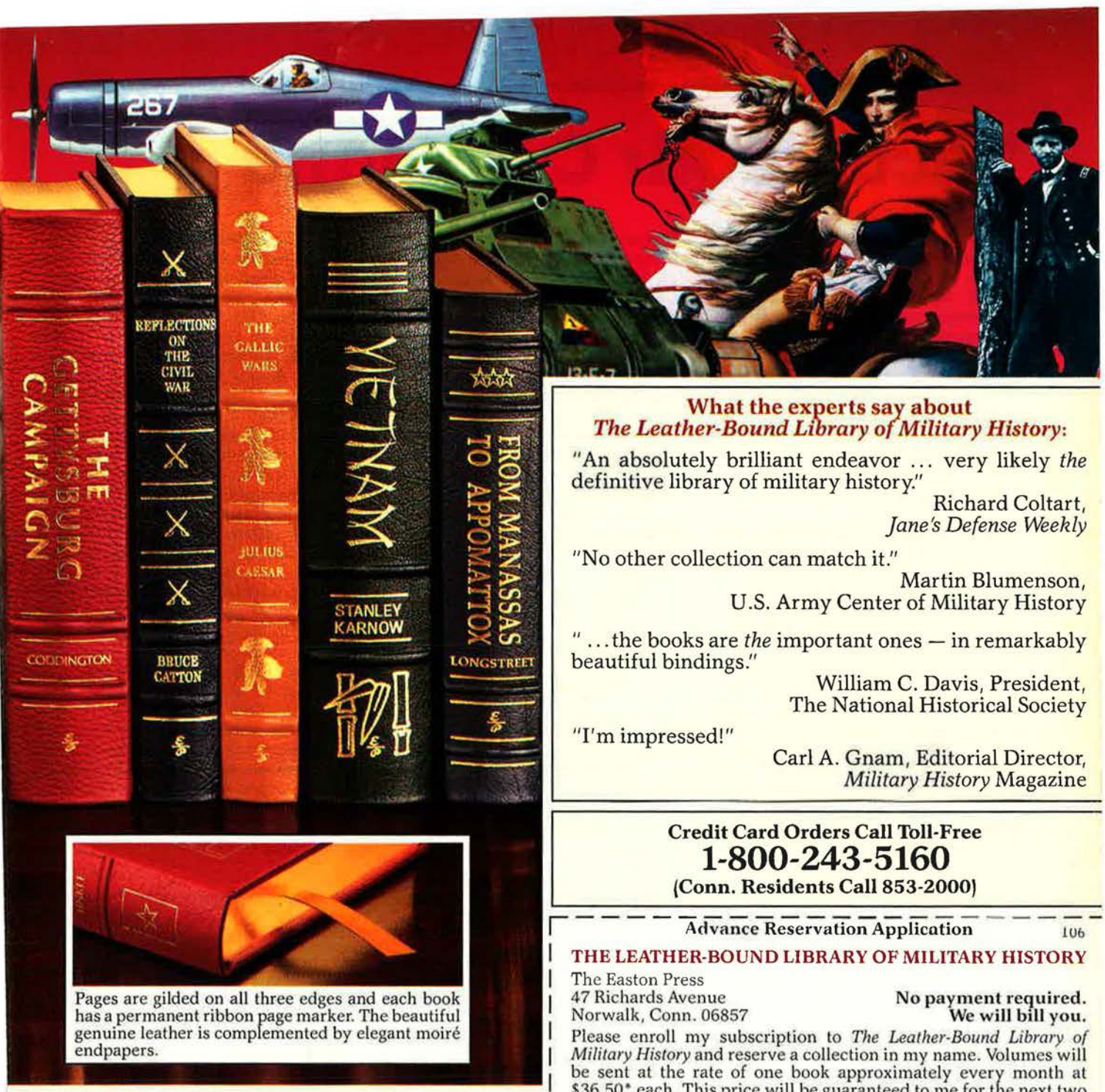
TAC's forces are organized under three numbered air forces and three major direct reporting units.

First Air Force, headquartered at Langley AFB, Va., includes four air divisions in the continental United States, Air Forces Iceland at Keflavik Naval Station, the USAF Air Defense Weapons Center at Tyndall AFB, Fla., the Distant Early Warning System, a computer software development squadron, and a support squadron. The First Air Force commander, as commander CONUS NORAD Region, reports directly to CINCNORAD for the air sovereignty and air defense of the CONUS. Twenty-six fighter alert sites, forty-seven CONUS surveillance radar sites, and thirty-one DEW Line radar sites operate around the clock to support the air defense mission.

The USAF Air Defense Weapons Center (USAFADWC), Tyndall AFB, Fla., managed by First Air Force, trains aircrews and weapons controllers, develops air defense tactics and procedures, and manages all CONUS USAF drone aerial target operations.

Ninth Air Force at Shaw AFB, S. C., has ten wings performing tactical fighter operations and training as well





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Commander
Maj. Gen. Buford D. Lary

- **23d Air Division**
  Hq. Tyndall AFB, Fla.
  (F-15, F-16, T-33, F-4C)
- **24th Air Division**
  Hq. Griffiss AFB, N. Y.
  (F-4C/D, F-106)
- **25th Air Division**
  Hq. McChord AFB, Wash.
  (F-15, F-16, F-4C, T-33)
- **26th Air Division**
  Hq. March AFB, Calif.
  (T-33, F-4D)
- **Air Forces Iceland**
  Keflavik NS, Iceland
  (F-15)
- **4700th Air Defense Squadron**
  Peterson AFB, Colo.
  (DEW Line)
- **4702d Computer Services Squadron**
  Tyndall AFB, Fla.
- **4722d Support Squadron**
  North Bay ASN, Canada
- **USAF Air Defense Weapons Center**
  Hq. Tyndall AFB, Fla.
  - **325th Tactical Training Wing**
    Tyndall, AFB, Fla.
    (F-15, T-33)
  - **475th Weapons Evaluation Group**
    Tyndall AFB, Fla.
    (QF-100, UQF-100D, BQM-34A/F, MQM-107B)

as reconnaissance and the tactical air control mission.

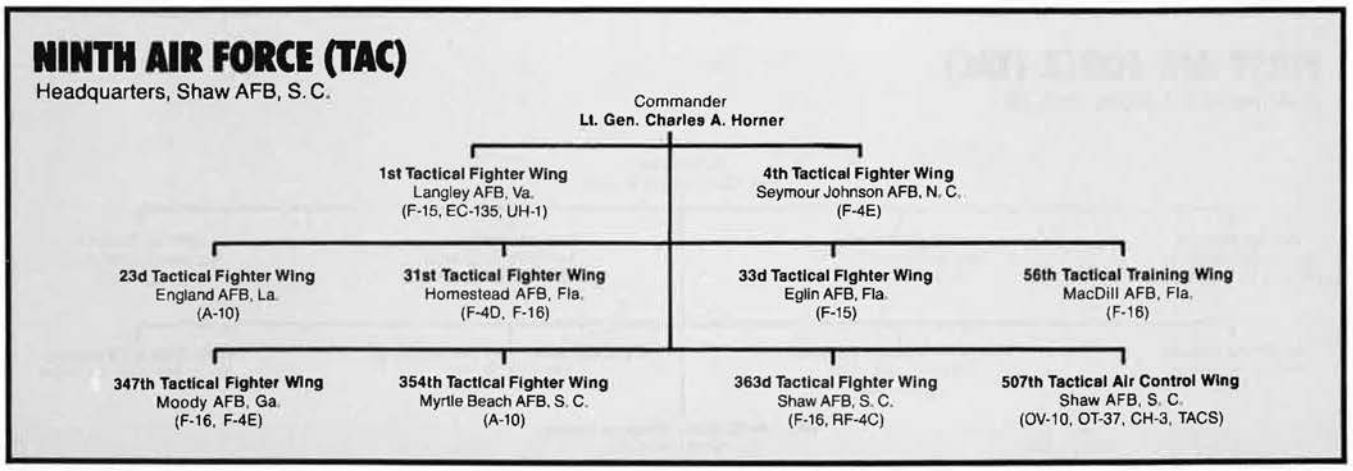
Twelfth Air Force at Bergstrom AFB, Tex., has five air divisions. Four of the air divisions and thirteen wings perform tactical fighter operations and training, reconnaissance, tactical air control, and a wide range of electronic combat tasks, including F-4G Wild Weasel and EF-111A Raven support jamming. One group is responsible for ground-launched cruise missile training. The fifth air division, the USAF Southern Air Division (USAFSO) at Howard AFB, Panama, is responsible for the joint defense of the Panama Canal. USAFSO assists in training Latin American air forces, provides air support for combined training exercises with Latin American military forces, and carries out search-and-rescue activities in the region.

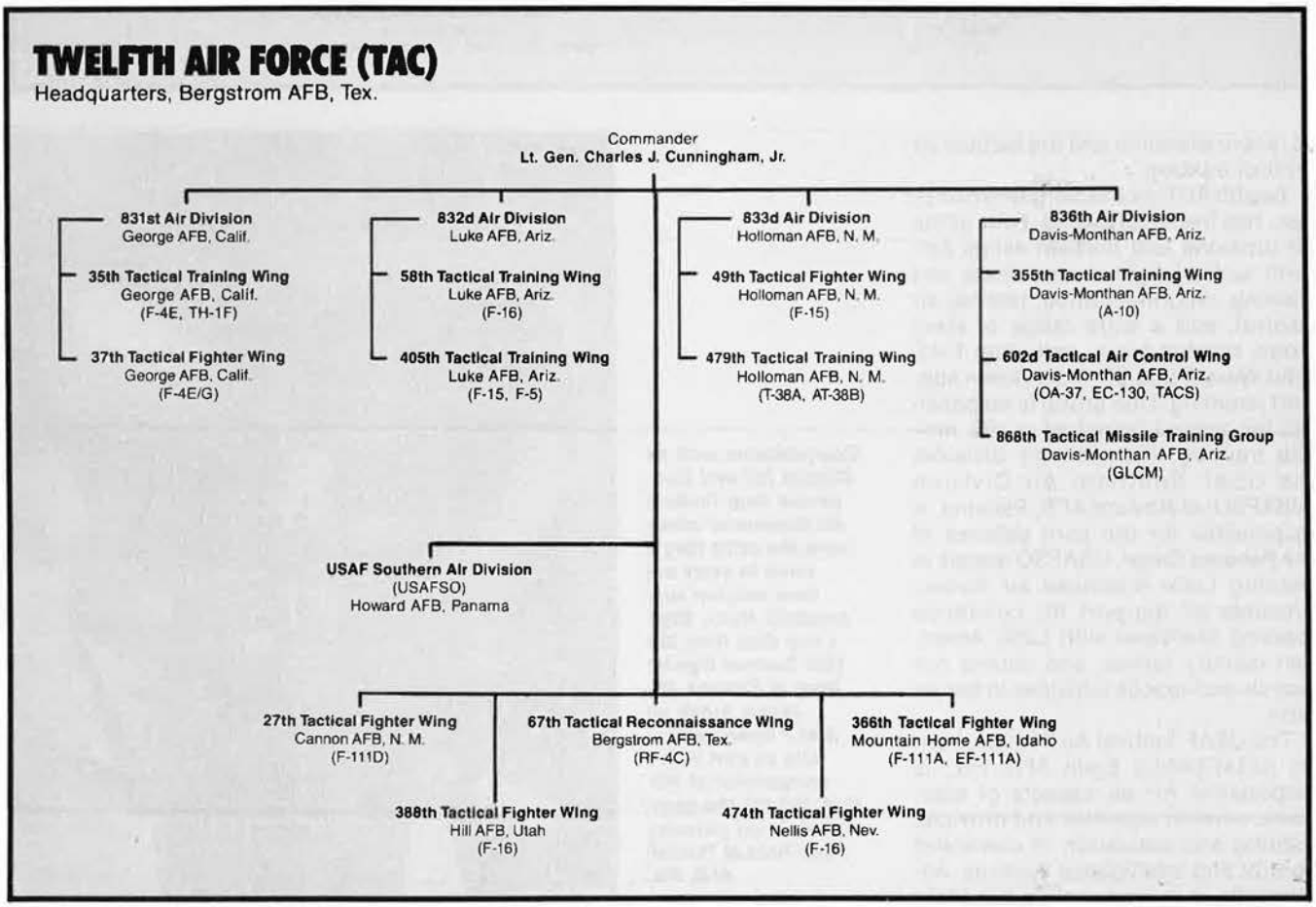
The USAF Tactical Air Warfare Center (USAFTAWC), Eglin AFB, Fla., is responsible for all aspects of electronic combat activities and provides training and evaluation of command control and intelligence systems. Additionally, it is responsible for TAC's "Green Flag" exercises, in which TAC aircrews, as well as those from our sister services, fly realistic, simulated combat missions in a demanding electronic jamming environment to test and evaluate equipment, tactics, and procedures developed for use under these conditions.

The USAF Tactical Fighter Weapons Center (USAFTFWC), Nellis AFB, Nev., conducts advanced training and testing in tactical air concepts, doctrine, weapons, and tactics. USAFTFWC also evaluates equipment and munitions designed for tactical fighter operations. The USAF Air Demonstration Squadron, the Thunderbirds, is a USAFTFWC unit. The Center is responsible for all Red Flag activities and TAC's aggressor forces.

Competitions such as William Tell and Gunsmoke help Tactical Air Command crews hone the skills they'll need to carry out their mission successfully. Here, SSgt. Larry Rice from the 18th Tactical Fighter Wing at Kadena AB, Japan, loads an AIM-7 Sparrow missile as part of the competition at William Tell '86, the biennial air-to-air gunnery meet held at Tyndall AFB, Fla.

The 28th Air Division, Tinker AFB, Okla., operates E-3 AWACS, EC-130E, EC-130H, and EC-135 aircraft. The air division comprises a wing at Tinker AFB, Okla.; squadrons at Kadena AB, Japan, Keflavik NS, Iceland, Davis-Monthan AFB, Ariz., Keesler AFB, Miss., and Elmendorf AFB, Alaska; as well as a detachment in Saudi Arabia. The E-3 provides surveillance and warning, control of friendly fighters, airborne battle management, and an airborne command post in support of NORAD for air defense of North America. The two versions of the C-130 pro-





vide airborne battlefield command and control and jamming of enemy command control and communications networks. The EC-135s serve as flying command posts to assist overseas deployments of tactical fighter aircraft.

During the last year, TAC continued its highly praised "Flag" programs to provide combat training under realistic conditions. Key Flag programs include the following:

• **Checkered Flag** assists in unit preparation for operations from overseas bases. Under Checkered Flag, TAC fighter squadrons and tactical air control units are assigned a specific overseas deployment location. Aircrews and tactical air controllers study and practice all facets of operation from these locations. Flying units deploy regularly to their Checkered Flag bases for realistic on-scene training.

• **Red Flag** furnishes tactical fighter training in a large, joint, combined exercise, giving aircrews experience against simulated enemy ground and air opposition. As many as 300 aircraft, including Navy and Marine Corps forces as well as those of our allies, fly up to 4,500 sorties during each six-week exercise.

• **Green Flag** is an "electronic combat Red Flag" that focuses on integrating and improving the electronic combat (EC) capabilities of the tactical air forces. USAFTAWC, in coordination with USAFTFWC, provides the exercise scenarios in which to test, evaluate, and train, using appropriate tactics and electronic combat systems.

• **Copper Flag,** the air defense equivalent of Red Flag, is conducted

at Tyndall AFB, Fla., to increase the readiness of air defense forces. These exercises provide individual aircrew and weapons controller and command control system training against realistic simulated enemy attacks in scenarios covering the full range of attack and defense options.

- **Silver Flag** trains combat support force units to operate in a potentially hostile bare/austere base environment. Personnel are tasked to resolve a variety of simulated combat problems that closely resemble the circumstances likely to be encountered in a war or contingency.
- **Blue Flag** provides real-time command control and communications training for battle staff personnel in realistic joint and combined NATO, Korean, and Southwest Asian scenarios. Training is provided not only for TAC people but for personnel from other Air Force commands, our sister services, and, on a regular basis, from allied services as well.

Significant events in TAC over the past year were numerous: The Continental United States NORAD Region was activated at Langley AFB, Va., October 1. William Tell '86, the USAF biennial worldwide air-to-air gunnery meet, was conducted at Tyndall AFB, Fla., October 12–25. Reconnaissance Air Meet '86, the first TAC-sponsored international tactical reconnaissance competition, was held at Bergstrom AFB, Tex., November 1–8.

The Air Force's new dual-role fighter, the F-15E Strike Eagle, specializing in night, all-weather attack, was officially presented in a rollout ceremony in December. The aging O-2A Forward Air Control aircraft was replaced at several TAC locations by either OV-10 Bronco, OA-37 Dragonfly, or OT-37 aircraft. The F-16 Fighting Falcon's 1,000,000th flight hour was recognized in a special event at Homestead AFB, Fla., in December.

TAC made significant progress over the past year by increasing its participation in joint exercises as well as active interaction within the Joint Force Development Process (JFDP). A major goal of this process has been to maximize our total force warfighting capability by fielding affordable joint forces. TAC has been tasked with fourteen of thirty-seven joint initiatives that focus on a broad range of issues and are designed to increase our joint warfighting capabilities.

A few examples of this cooperation include the development of the Army-Air Force Joint Surveillance and Target Attack Radar System (JSTARS), the development of Army-Air Force doctrine and procedures for the external defense of air bases, the refinement of procedures for requesting and controlling close air support in rear operations, improvements in joint suppression of enemy air defenses, and the development of a joint reconnaissance roadmap to identify requirements and refine the force mix for future surveillance systems—all key products of the JFDP.

Finally, the Thunderbirds Air Demonstration Squadron performed seventy demonstrations at thirty-three Stateside locations before more than 7,000,000 spectators. ■

United States Air Forces in Europe

The United States Air Forces in Europe (USAFE) is a vital element of the highly successful North Atlantic Treaty Organization—an alliance partnership involving sixteen sovereign nations. The air component of the US European Command (EUCOM), USAFE is comprised of Third Air Force in the United Kingdom, Sixteenth Air Force in the Southern/Mediterranean Region, and Seventeenth Air Force in Central Europe.

The 63,000 military men and women in USAFE and their 11,000 civilian team members are "the tip of the sword"—dedicated to deterring Soviet aggression, but, if deterrence should fail, ready to join our NATO allies in defending Western Europe. The 69,000 family members in seventeen European countries also share the sacrifices of maintaining freedom's sword.

USAFE's day-to-day business approach stems from an unwavering belief that if the command takes care of its people, the people will take care of the mission. Consequently, quality of life remains a top command priority. Accompanied tour options have been increased, and family service centers have tripled in the last three years. In Turkey, 750 family housing units were recently completed. Another 4,000 units are under construction throughout the command, and there are plans to lease 7,400 more. Unaccompanied personnel recently gained 3,300 new housing units, another 4,000 are being renovated, and 11,000 units are scheduled for construction. Eighteen morale, welfare, and recreation construction/upgrade projects were begun in 1986 at a cost of $23 million.

USAFE's men and women operate and maintain a state-of-the-art tactical fighting force including the A-10 (largest wing in the Air Force), F-4G and RF-4C, F-15C/D, F-16A/B/C/D, F-111, EF-111A, and the F-5E for air-to-air combat training. USAFE also owns the Air Force's only operational wings of BGM-109G ground-launched cruise missiles. Five of six wings have been activated, with the last wing being activated in mid-1987. Other major commands support USAFE with the TR-1, SR-71, KC-10, KC-135, C-130, C-23A, and other transport aircraft and helicopters. Strategic airlift is provided by C-141s, C-5s, and civilian contract flights from the continental United States.

USAFE is at the forefront in developing combined doctrine, plans, procedures, and realistic training exercises with NATO allies. The command has also been the key test-bed for developing joint European doctrine, procedures, and materiel interoperability with the US Army, Navy, and Marine Corps. Flying high-performance tactical aircraft in the most strenuous combat training environment in the Air Force and hampered by the worst flying weather in the Air Force, USAFE attained its lowest Class A flight mishap record for the second consecutive year. Logging more than 225,000 hours in 1986, command aircrews lost only five aircraft—significantly below the overall tactical air force rate.

Several modernization programs provide improvements necessary to meet continued Soviet technological and numerical advancements. Late

UNITED STATES AIR FORCES IN EUROPE

Headquarters, Ramstein AB, West Germany

US European Command (USEUCOM) — **US Air Force (USAF)**

Headquarters
United States Air Forces in Europe (USAFE)
Hq. Ramstein AB, West Germany
Gen. William L. Kirk, Commander in Chief

3d Air Force
Hq. RAF Mildenhall, UK
Maj. Gen. William K. James, Commander

16th Air Force
Hq. Torrejon AB, Spain
Maj. Gen. Thomas A. Baker, Commander

17th Air Force
Hq. Sembach AB, West Germany
Maj. Gen. Richard M. Pascoe, Commander

7455th Tactical Intelligence Wing
Ramstein AB, West Germany

7350th Air Base Group
Tempelhof Airport, Berlin

The USAFE organizational chart above shows peacetime lines of command. This chart shows the NATO wartime command lines of authority.

Allied Command Europe (ACE)

Allied Forces Central Europe (AFCENT)

Allied Air Forces Central Europe (AAFCE)
Hq. Ramstein AB, West Germany
Gen. William L. Kirk, Commander

Second Allied Tactical Air Force (2ATAF)
Hq. Moenchen-Gladbach, West Germany
Air Marshal Sir Anthony Skingsley

Fourth Allied Tactical Air Force (4ATAF)
Hq. Heidelberg, West Germany
Lt. Gen. Walter Schmitz, Commander

—USAF photo by Sgt. David Nolan

Because they have to look the forces of the Warsaw Pact square in the eyes every day, the units that make up USAFE must be in a constant state of readiness. These F-111s, loaded with practice bombs for a training sortie, are from the 48th Tactical Fighter Wing at RAF Lakenheath, England. This is one of the units that carried out reprisal raids against terrorist strongholds in Libya last year.

One of USAFE's unique missions is that of operations with the BGM-109 Tomahawk ground-launched cruise missile, or GLCM. USAFE will eventually have six operational wings of these weapons. This is one of the transporter/erectors that can carry four missiles.

last year, the command began receiving F-16C/Ds equipped with the new F110-GE-100 engine, and the last unit equipped with the F-16A/B will convert to C/Ds in FY '88. In mid-1987, the command begins an F-15 swapout and retrofit to provide improved avionics under the Multinational Staged Improvement Program (MSIP), which will continue for several years.

Weapon system upgrades have been further enhanced through improvements in munitions storage and handling. USAFE has led the Air Force in developing explosives separation requirements that improve munitions positioning and enable more efficient use of existing storage facilities. A Combat Ammunition Production (CAP) phase has been added to the command "loadeo" competition to emphasize munitions handling during integrated combat turns.

Another development, the Rapid Assembly of Munitions System (RAMS), improves combat capability by providing a more efficient method

THIRD AIR FORCE (USAFE)

Headquarters, RAF Mildenhall, United Kingdom

Commander
Maj. Gen. William K. James

- **10th Tactical Reconnaissance Wing** — RAF Alconbury, UK (RF-4, F-5, SAC TR-1)
- **20th Tactical Fighter Wing** — RAF Upper Heyford, UK (F-111, EF-111)
- **48th Tactical Fighter Wing** — RAF Lakenheath, UK (F-111)
- **81st Tactical Fighter Wing** — RAF Bentwaters/Woodbridge, UK (A-10; MAC Rescue HC-130, HH-53)
- **303d Tactical Missile Wing** — RAF Molesworth, UK (BGM-109G GLCM)
- **501st Tactical Missile Wing** — RAF Greenham Common, UK (BGM-109G GLCM)
- **513th Tactical Airlift Wing** — RAF Mildenhall, UK (USAFE EC-135; MAC rotational C-130; SAC rotational KC-135, SAC SR-71)
- **7020th Air Base Group** — RAF Fairford, UK (SAC rotational KC-135)
- **7274th Air Base Group** — RAF Chicksands, UK (Support; communications)

SIXTEENTH AIR FORCE (USAFE)

Headquarters, Torrejon AB, Spain

Commander
Maj. Gen. Thomas A. Baker

- **Hq. TUSLOG** — Ankara AS, Turkey (Logistics management)
- **401st Tactical Fighter Wing** — Torrejon AB, Spain (F-16)
- **406th Tactical Fighter Training Wing** — Zaragoza AB, Spain (Tactical range support, weapons)
- **487th Tactical Missile Wing** — Comiso AS, Italy (BGM-109G GLCM)
- **39th Tactical Group** — Incirlik AB, Turkey (Rotational USAFE aircraft)
- **7217th Air Base Group** — Ankara AS, Turkey (Command and logistical management)
- **40th Tactical Group** — Aviano AB, Italy (Rotational USAFE aircraft)
- **7206th Air Base Group** — Hellenikon AS, Greece (Support; communications)
- **7275th Air Base Group** — San Vito dei Normanni AS, Italy (Support; communications)
- **7276th Air Base Group** — Iraklion AS, Crete (Support; communications)
- **7241st Air Base Group** — Izmir AS, Turkey (NATO unit support)

SEVENTEENTH AIR FORCE (USAFE)

Headquarters, Sembach AB, Germany

Commander
Maj. Gen. Richard M. Pascoe

- **65th Air Division**, Sembach AB, Germany
  - **52d Tactical Fighter Wing**, Spangdahlem AB, Germany (F-4G, F-16C/D, converting from F-4E)
  - **66th Electronic Combat Wing**, Sembach AB, Germany (EF-111A stationed at RAF Upper Heyford, UK; EC-130H)
  - **601st Tactical Control Wing**, Sembach AB, Germany (Command control communications)
- **26th Tactical Reconnaissance Wing**, Zweibrücken AB, Germany (RF-4, C-23)
- **36th Tactical Fighter Wing**, Bitburg AB, Germany (F-15A/B)
- **38th Tactical Missile Wing**, Wueschheim AS, Germany (BGM-109G GLCM)
- **50th Tactical Fighter Wing**, Hahn AB, Germany (F-16A/B)
- **485th Tactical Missile Wing**, Florennes AB, Belgium (BGM-109G GLCM)
- **486th Combat Support Group**, Woensdrecht AB, The Netherlands (Converts to tactical missile wing in mid-1987—BGM-109G GLCM)
- **7100st Combat Support Group**, Lindsey AS, Germany (USAF Regional Medical Center; collocated operating bases; munitions support squadrons; command control communications)
- **32d Tactical Fighter Squadron**, Camp New Amsterdam, The Netherlands (F-15)
- **316th Air Division**, Ramstein AB, Germany
  - **86th Tactical Fighter Wing**, Ramstein AB, Germany (F-16C/D)
  - **377th Combat Support Wing**, Ramstein AB, Germany (Support)

It is vitally important that USAFE be kept up to date with the most modern equipment the Air Force can offer, and that commitment is graphically shown in this picture. These F-16Cs from Hahn AB, West Germany, are being refueled by a KC-135 tanker that has been brought up to KC-135R standard.

—USAF photo by SSgt. Fernando Serna

of assembling munitions over a sustained period. USAFE has also helped develop two multinational electronic warfare training facilities—one in northern England and the other in France and Germany.

Through US and NATO funding, the command has completed three hardened avionics shelters and has four more scheduled to be in service this year. Other hardening, sheltering, and chemical-warfare protection programs are also under way throughout the command. New materials are being stocked, and, through a pioneering agreement between the United Kingdom and the US, training has increased in rapid runway and utilities repair. Rapier point-air-defense missiles manned by the British are operational at several main US operating bases in the United Kingdom.

Following the example set by the US and UK agreement establishing the Rapier role model, the US concluded agreements with Germany and Turkey whereby nationals in each country will man and operate US-owned air defense assets—Roland and Patriot in Germany and Rapier in Turkey—to provide critically needed air defense in NATO.

For medical response, USAFE has four Flying Ambulance Surgical Trauma (FAST) teams that can be on their way to anywhere in the command within four hours. In addition to peacetime facilities, the command maintains surgical, medical, and support equipment and supplies in a "ready" status in seven contingency hospitals. This combined 4,700-bed capacity represents a 100 percent increase in the past three years. A major construction project is planned for a 1,000-bed hospital in Luxembourg, and USAFE is negotiating medical response agreements with other NATO countries.

Hard work and sacrifice are the way of life for USAFE's dedicated professionals and their families. They share with our allies a proud record of more than forty years of peace and stability in Western Europe and pledge themselves to extend that success as far into the future as possible. ■

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- Maintenance for the Air Force KC10/CF6-50 engine.
- Maintenance analysis of the Navy TF34 and T56 engines.
- Maintenance and logistic support for the U.S. Air Force C-22 Program.
- Reliability-centered maintenance analysis for the Department of Defense.
- Overhaul of T43-A/JT8D engines.
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Air Force Accounting and Finance Center

The Air Force Accounting and Finance Center (AFAFC), located at Lowry AFB, Colo., is the focal point for Air Force financial operations for the worldwide network of 119 Air Force Accounting and Finance Offices (AFOs), numerous disbursing agent offices and geographically separated units, and 132 Air Reserve Forces payroll offices.

The Center provides centralized pay service to all Air Force military members, including active duty, retired, Air National Guard, and Air Force Reserve. AFAFC also accounts for all money appropriated to the Air Force and reports to Congress and financial managers throughout the government on the use of these funds.

AFAFC is also the DoD executive agent for supporting the Security Assistance Accounting Center (SAAC). SAAC, which is collocated with AFAFC, is a component of the Defense Security Assistance Agency, responsible for overall financial management of the total DoD Foreign Military Sales (FMS) program. These responsibilities include centralized accounting, billing, collecting, analysis, and systems development for the 16,000 active FMS cases valued at approximately $144 billion. To improve FMS financial management, SAAC is developing an automated accounting and billing system that will be linked to improved automated systems in each of the services.

In 1986, the Center's sixty-three officers, 151 enlisted, and 2,200 civilians paid more than 818,000 active, Guard, and Reserve personnel from combined appropriations totaling more than $21 billion. AFAFC personnel accounted for more than $120 billion, controlled more than 31,000 reports, and processed more than 1,400,000 disbursement and collection vouchers.

The Joint Uniform Military Pay System Data Collection System (JDC) currently operates at all Air Force AFOs and several agent locations. This system decreased the amount of time required for pay actions by reducing the processing time from seven days to twenty-four hours while saving 155 manpower spaces Air Force-wide.

An Electronic Case Control System is now used to allow smoother communication between AFAFC and AFOs. Message traffic now travels virtually instantaneously.

Two new Automatic Teller Machine (ATM) projects are being developed. The Trainee Military Pay System improves customer service using up-to-date technology while helping AFO personnel. The Worldwide ATM Prototype Test will determine whether active-duty personnel could be paid partial, casual, or travel payments through an ATM.

Retired Pay Operations paid more than $6.6 billion to more than 538,000 retirees and 32,000 annuitants under the various survivor benefit plans. Air Force retirees enjoy customer service at 119 bases worldwide in addition to service over toll-free telephone lines from anywhere in the US. An automatic call sequencer was installed on all incoming toll-free lines to control and direct phone calls, ensuring better service through prompt answering, announcement of messages, and distribution of calls in the order in which they are received.

The new Casualty and Annuitant Pay System, implemented last year, improves casualty reporting, provides faster settlements of arrears of pay and survivor benefit cost refunds, and expedites the first check to annuitants. The total system overhaul is scheduled for completion in December 1989.

A team of accounting and automation specialists is designing a centralized pay system for all Air Force civilians. The current system, which operates at 100 locations throughout the Air Force, is complex and labor intensive. Under a centralized method, civilians will be paid from AFAFC. This new system will operate more efficiently and provide better service.

In 1986, the Comptroller Office of the Future program installed twenty-two Sperry System II computer systems in base-level comptroller organizations. These new computers are used to run accounting and finance as well as budget systems. In addition, a major application software development project started in late 1981 is now virtually complete.

Last year brought the largest change in travel entitlements in more than a decade and produced one of the best years for the military in increased compensation. Also last year, a striking new way of paying travel allowances to Air Force civilians was implemented. Lodgings Plus now pays civilians traveling within the continental US the actual cost of housing plus a set rate for meals and incidental expenses. Maximum locality rates were set by the General Services Administration. This year, a similar system will pay military travel when implemented.

To complement the changes in travel pay, a new system is under development to automate travel-voucher processing. The system will provide an integrated one-step process for computing vouchers, making payments, updating accounting records, and posting a centrally maintained travel record. This should speed up travel voucher processing time, improving customer service.

The Center embarked on an aggressive program to collect debts due the Air Force. A new three-phase effort called Departmental Accounts Receivable System is streamlining debt collection while complying with the Debt Collection Act passed by Congress. In 1986, the Air Force collected $300,000 more than the previous year because of new initiatives in debt collections.

The accounting and finance network achieved a milestone by successfully implementing the Treasury Electronic Fund Transfer System (EFTS) at 170 Air Force and Air National Guard Stateside civilian pay offices. We were the first DoD agency to implement EFTS for civilian net payroll and savings allotments to financial institutions.

The banking industry continues to recognize the Air Force direct deposit program called SURE-PAY as one of the most successful in the world. Currently, ninety-two percent of active duty, eighty-three percent of all civilian employees, thirty-eight percent of the Air Force Reserve, and forty percent of the Air National Guard participate voluntarily.

The Center's Directorate of Resource Management is designing a new office information system to meet specific needs of the user. The Office Information System (OIS) and the Local Area Network (LAN) provide

the latest innovations to rid employees of the tedious methods of handling paperwork. The LAN will connect this electronic marvel to other offices within DoD through the Defense Data Network and the Comptroller Office Automated Network.

Last year marked the thirty-fifth anniversary of AFAFC. During our celebration, we adopted a new motto: "Serving with honor . . . honored with trust." With this attitude, the people of the Air Force Accounting and Finance Center look forward to serving tomorrow's Air Force. ■

Air Force Audit Agency

The Air Force Audit Agency (AFAA), a separate operating agency headquartered at Norton AFB, Calif., provides all levels of Air Force management with independent, objective, and constructive evaluations of the effectiveness and efficiency with which managerial responsibilities (financial, operational, and support) are carried out.

J. H. Stolarow, Auditor General of the Air Force, reports to the Secretary of the Air Force and has direct access to the Chief of Staff. This enables AFAA to assess the activities and functions it audits independently. (The Assistant Secretary of the Air Force for Financial Management provides technical guidance and supervision on audit policy and management matters.) Brig. Gen. Basil H. Pflumm, the Deputy Auditor General, in the Pentagon, acts for the Auditor General at the Air Staff and Secretariat.

The AFAA has two staff directorates (Operations and Resource Management) and the following three line directorates:

- *The Acquisition and Logistics Systems Directorate,* located at Wright-Patterson AFB, Ohio, directs the development and management of audits relating to supply, maintenance, acquisitions, weapon systems, foreign military sales, and installation-level logistics.
- *The Forces and Support Management Directorate,* located at Norton AFB, directs the development and management of audits relating to personnel, support services, information technology, comptroller, nonappropriated funds, forces management, communications, intelligence, and transportation.
- *The Field Activities Directorate,* also at Norton AFB, manages installation-level audit work at sixty-eight area audit offices located at major Air Force installations worldwide. Supervision of the sixty-eight offices is exercised through four geographic region offices located at Andrews AFB, Md. (Eastern), Offutt AFB, Neb. (Central), McClellan AFB, Calif. (Western), and Ramstein AB, West Germany (European).

In March 1986, the office of the Representative for Air Force Logistics Command ADP Modernization was established at Wright-Patterson AFB to review programs and provide management advisory support in connection with the AFLC ADP Modernization Program (updating computerized logistics system). This representative reports directly to the Auditor General.

The agency has two basic procedures for reporting audit results to Air Force management:

- Reports of audit containing the overall results of centrally directed multisite audit efforts, which are addressed to senior personnel at top major command and Air Staff management levels.
- Reports of audit containing results of installation-level audits, which are addressed to local commanders.

The Audit Agency employs more than 1,000 people and has a civilian/military ratio of seventy-five/twenty-five. Ninety-seven percent of the auditors have at least one college degree, and forty-three percent have graduate degrees. Also, thirty-eight percent are certified public accountants, certified internal auditors, and/or certified information system auditors. ■

Air Force Commissary Service

The Air Force Commissary Service, with headquarters at Kelly AFB, Tex., operates 113 troop support facilities and 142 resale stores worldwide.

The primary mission of AFCOMS in peacetime and wartime is troop support. The separate operating agency ensures that food and rations are available for troops either on the battlefield or in dining facilities.

AFCOMS most visible mission is the day-to-day operation of resale commissary stores in the United States and abroad. In 1986, AFCOMS handled more than $2.1 billion in sales, averaging almost $8.5 million in daily sales, making AFCOMS the twelfth largest food retailing group in the United States.

Recent surveys show that the commissary benefit is considered the second most important nonpay compensation for Air Force people, ranking just behind medical benefits as the reason career airmen remain in USAF.

Air Force commissaries sell goods at cost plus a five percent surcharge required by law to pay for equipment, supplies, and other operating expenses. Patrons can save an average of twenty-five percent by shopping in the commissary.

In 1986, smart shoppers saved even more by redeeming more than 90,000,000 cents-off coupons. Close to $36.5 million in savings was generated through the use of coupons.

The major goal of the almost 11,000 civilian and military employees of AFCOMS is to provide excellent commissary service. Initiatives in the past have gone a long way toward meeting this goal, and 1986 was no exception.

AFCOMS opened more stores on Sunday to provide additional shopping hours for working couples. Commissaries located near other stores combined their operating schedules to provide authorized patrons shopping enjoyment seven days a week.

In addition, salad bars began appearing in some stores, and more will

add this feature. The salad bars provide patrons with convenient nutritional food for a light lunch or premeal salad.

Additional Wee Serv stores—small, convenience stores collocated with the main stores—were opened. Wee Servs are open hours the main store is generally closed. They sell quick stop items, such as bread and milk and other fast-selling staple items.

AFCOMS has also taken some behind-the-scene steps to ensure excellent commissary service. Several stores now operate the Automated Commissary Operations System. When installation of the automated system is completed by 1988, all phases of commissary operations will be tracked by computer. For the first time ever, a commissary officer will know at the stroke of a few computer keys what items sell and how many of those items are likely to be sold. ACOS is linked to the scanning systems installed at the checkout of most commissaries.

At the headquarters, the Commissary Automated Management Network is being installed. CAMNET will allow real-time communication with any commissary store on the system. Through CAMNET, headquarters personnel will be able to track store operations and keep a closer eye on potential problems. ■

Air Force Engineering and Services Center

The Air Force Engineering and Services Center (AFESC), with headquarters at Tyndall AFB, Fla., has a multiple role. It functions as an integral part of the Air Staff, recommending policies and developing programs in support of Hq. USAF. As a separate operating agency, the Center provides direct assistance to all major commands as well as base-level engineering and services organizations worldwide. It conducts comprehensive wartime training for more than 13,000 active-duty and reserve engineering and services members each year. It also has a critical research and development mission covering the entire spectrum of Air Force engineering and services peacetime and wartime requirements.

More than 600 highly qualified, carefully selected professionals provide engineering and services guidance and assistance worldwide in the areas of readiness (encompassing all Prime BEEF, Prime RIBS, and Red Horse forces), fire protection, facility energy, civil and environmental engineering, housing and services (including food services and mortuary services), and the overall operation and maintenance of facilities at all Air Force installations. The Center also has the Engineering and Services Laboratory devoted to civil engineering and environmental research, development, testing, and evaluation.

By providing expertise with its headquarters staff and traveling teams, the Center helps solve the problems of today as well as planning for the engineering and services needs of the future.

The AFESC Commander reports directly to the Director of Engineering and Services at Air Force headquarters in Washington, D. C.

In 1986, Hq. AFESC and its traveling teams:

- Incorporated firefighter Prime BEEF teams into the contingency training program at AFESC, Det. 2, Eglin AFB, Fla.
- Established a $53 million temporary lodging facilities (TLF) new construction program Air Force-wide at thirty-nine bases and received approval for a follow-on program by the Air Force Welfare Board.
- Played a key role in obtaining changes in public law for next-of-kin travel at government expense to attend funerals, for transportation of remains at government expense for retired members under certain conditions, and for establishing equity in priority of survivors to receive personal effects and property of members.
- Completed a general-purpose vehicle study resulting in recognition of vehicle shortage impacts on civil engineering productivity and instituted GSA vehicle leasing for 300 vehicles at seven test bases in FY '86 and 1,500 more vehicles at seventy-three locations in FY '87 to offset vehicle shortages.
- Rebuilt four large generator sets for Thule AB, Greenland, saving more than $3 million. Accomplished emergency generator repairs at Concrete AFS, N. D., and saved $50,000. Provided two 500 kW Emergency Power Systems to Buckley ANGB, Colo., saving $990,000 in rental costs.
- Restructured Prime BEEF and Prime RIBS teams, which reduced Prime BEEF team unit type codes from twenty-eight to ten. Developed a concept of operation for squadron-size Prime BEEF teams, under which each team is assigned to and deploys with a flying squadron.
- Conducted Readiness Challenge '86 at Det. 2, Eglin AFB, Fla. This is an annual competition between the best Prime BEEF teams representing each MAJCOM. The competition honed readiness skills of all Prime BEEF forces throughout the Air Force. Readiness Challenge '87 will add Prime RIBS teams to the competition.
- Provided worldwide support to all MAJCOMs through site surveys, hardware implementation, and software implementation for twenty-eight WIMS/SIMS lead bases. Trained MAJCOM implementation teams to field systems at all remaining bases worldwide. Completed contract negotiations on the Air Force Minicomputer Multi-User System contract to purchase more than 100 WIMS/SIMS systems.
- Designed, developed, and tested several new high-tech items of firefighting equipment to improve both efficiency and safety in USAF firefighting mission accomplishment, including: a special "skin penetrator" for discharging fire-suppression agents through structural panels, a combined communications helmet/self-contained breathing apparatus, and a new, lightweight undergarment for chemical agent protection.
- Conducted a demonstration of a process to remove dioxin contamination at a former herbicide storage site at Gulfport, Miss., using a rotary kiln incinerator. The demonstration will aid the Air Force in determining the feasibility of employing these technologies for full-scale remedial actions. ■

Air Force Inspection and Safety Center

The Air Force Inspection and Safety Center (AFISC), Norton AFB, Calif., provides the Secretary of the Air Force, the Chief of Staff, and major command and separate operating agency commanders an assessment of Air Force fighting capability and resource management effectiveness. Maj. Gen. Fred A. Haeffner commands AFISC and is also the Deputy Inspector General for Inspection and Safety, Hq. USAF.

AFISC has an authorized work force of 356 military and 125 civilian personnel who represent 111 Air Force specialties. It is divided into four directorates and two offices.

- *The Directorate of Inspection* determines operational readiness status within the major commands by monitoring their operational readiness inspection (ORI) reports and by conducting assistance and command evaluation (ACE) inspections with command inspector general teams during ORIs. The Directorate also evaluates the effectiveness and efficiency of USAF management systems through functional management inspections (FMIs), system acquisition management inspections (SAMIs), and followup inspections.
- *The Directorate of Aerospace Safety* is the Air Force manager for flight, ground, missile, explosives, and systems safety programs. The Directorate provides guidance and monitors the implementation and effectiveness of mishap-prevention programs. This includes administering the investigation and reporting of mishaps to determine causative factors and positive corrective measures.
- *The Directorate of Nuclear Surety* manages the Air Force Nuclear Weapons Surety Program and ensures that the four DoD Nuclear Weapon System Safety Standards are met during all phases of design, operation, maintenance, modifications, and logistics movement. It accomplishes its worldwide missions through various program elements. These include the Nuclear Safety Inspection System, Accident/Incident/Deficiency Reporting System, Nuclear Safety Certification Programs, Personnel Reliability Program, and the Two-Man Concept.

The Directorate also has the nuclear surety responsibilities for terrestrial nuclear reactor systems and for review procedures for nuclear power systems and space or missile use of radioactive sources. It is located at Kirtland AFB, N. M., because this area is the "hub" of the nuclear community and offers the opportunity to coordinate nuclear-related matters with the Air Force Weapons Laboratory, Defense Nuclear Agency, Department of Energy, Sandia National Laboratories, and the nearby Los Alamos National Laboratory.

- *The Directorate of Medical Inspection* plans and conducts Air Force and Air Reserve Forces Biennial Health Services Management Inspections (HSMIs) and special investigations to ensure effective management of health-care resources and the readiness of Air Force medical units. In addition to the 290 functional areas inspected in each medical facility, Special Interest Items (SIIs), as selected by the Air Force Surgeon General, are given increased emphasis.
- *The Office of Computer Systems* provides the commander and his staff with automatic data processing and data systems support. It designs and develops all computer application software and operates a centrally located computer system to support all aspects of the AFISC mission. It also serves as USAF custodian and repository for flight records of rated individuals that date from the year 1911.
- *The Office of Management Support* manages manpower, personnel, budget, and plans and programs development for the Center and monitors major command and Air Force inspection schedules and activities. ■

Inspectors from all the US armed forces are taught mishap investigation techniques at the Air Force Inspection and Safety Center at Norton AFB, Calif. Here, Maj. Alice A. Fennell looks over an airplane carcass at AFISC's Crash Laboratory. In addition to aerospace safety, the Center also manages USAF's Nuclear Weapon Safety Program and conducts medical inspections of USAF's health-care facilities.

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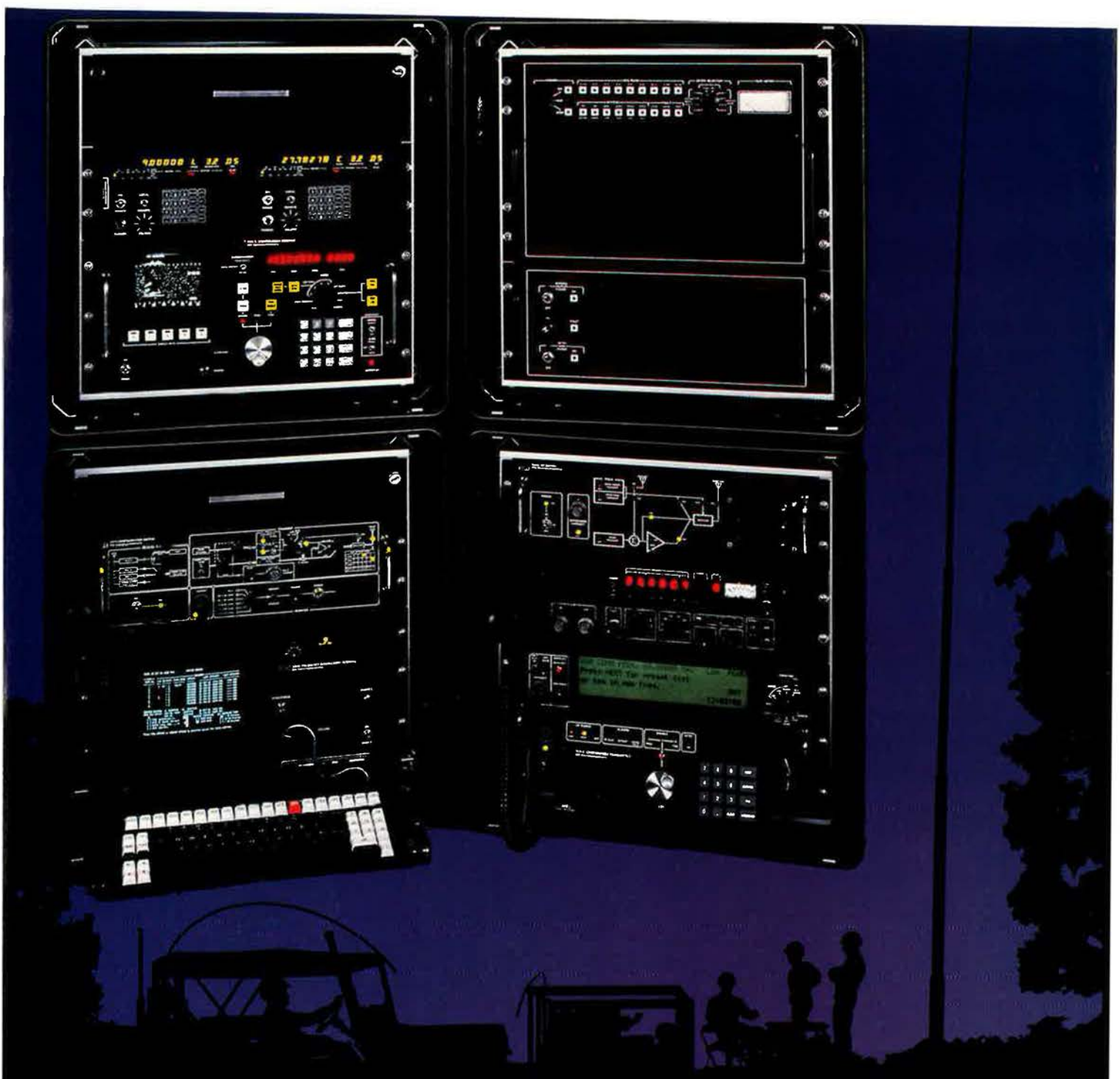

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Air Force Intelligence Service

The Air Force Intelligence Service (AFIS), comprising more than 2,200 active-duty, reserve, and civilian personnel, is completing its fifteenth year as a separate operating agency. The AFIS mission is to provide accurate, timely, and reliable intelligence, trained intelligence personnel, and intelligence support resources to Hq. USAF and combatant commands during peacetime, wartime, and contingency situations.

The Deputy Assistant Chief of Staff, Intelligence, Hq. USAF, serves as the Commander of AFIS. With its headquarters in Washington, D. C., and operational elements at more than forty locations in the CONUS and overseas, AFIS is involved in the full spectrum of intelligence activities. AFIS conducts intelligence collection operations, processes and disseminates intelligence information, and manages programs to provide the Air Force with the intelligence personnel and systems needed to identify and define the threat through the 1990s and beyond.

Air Force Intelligence Service directorates support US Air Force planning and combat operations, responding to changing Air Force intelligence requirements.

- *Operational Intelligence Directorate* ensures that the Secretary of the Air Force, the Chief of Staff, and other key Air Staff officers receive the timely and accurate intelligence necessary for indications and warning, contingency planning, and force deployment and employment. It also provides special intelligence research as required and experts on photo research and signals intelligence (SIGINT) analysis.
- *Target Intelligence Directorate* plans, coordinates, and exercises managerial control of Air Force target intelligence. Responsibilities include weaponeering, target analysis, force application and mission planning, target materials, and mapping, charting, and geodesy (MC&G). The Directorate serves as the program monitor for Air Force support and MC&G to the Defense Mapping Agency.
- *Security and Communications Management Directorate* oversees worldwide Air Force Special Security Offices and ensures compliance with special intelligence and intelligence telecommunications security policies.
- *Intelligence Data Management Directorate* plans, coordinates, and exercises managerial control of worldwide Air Force intelligence data-handling systems.
- *Attaché Affairs Directorate* supports the defense attaché system and monitors all matters concerning Air Force participation in that program.
- *Intelligence Reserve Forces Directorate* manages the Air Force Intelligence Service's Intelligence Reserve program. Responsibilities include the recruitment, administration, readiness, training, and operational utilization of intelligence mobilization augmentees in support of active-duty forces, requirements, and contingency mission requirements during peacetime.
- *Soviet Affairs Directorate* conducts the Air Force's Soviet Awareness Program. Responsibilities include the *Soviet Military Thought* and *Studies in Communist Affairs* series, the *Soviet Press Selected Translations* periodical, Soviet Military Power Week, and the Soviet Military Literature Research facility.
- *Joint Services Support Directorate* provides centralized management and cohesive direction to all aspects of intelligence support for USAF Prisoner of War (POW) matters. The Directorate serves as the action office in the Department of Defense for Code of Conduct training, manages the peacetime Hostage Survival Program, and produces finished intelligence in support of combat survival.
- *Special Studies Division* provides all-source analysis, reporting, and intelligence production on foreign denial and deception activities.
- *Air Force Special Activities Center* provides centralized management of all Air Force activities involved in the collection of information from human resources. Major subordinate units are located in Air Force European and Pacific commands.

The Air Force Intelligence Service participates in joint and Air Force training exercises each year to improve the readiness of active-duty and Air Force Reserve intelligence personnel. ■

Air Force Legal Services Center

The Air Force Legal Services Center is a separate operating agency headquartered in Washington, D. C. The Center helps provide complete civil and military legal services to US Air Force members around the world.

Members of the Center provide independent and specialized legal services to Air Force members in the areas of military justice, claims for and against the Air Force, tort litigation, labor law, environmental law, acquisition law, preventive law, and legal aid. The Center also handles all Air Force patent, copyright, and other intellectual property matters, provides trial officials for general and special courts-martial, and reviews trial results.

The Air Force Judge Advocate General serves in a dual role as Commander of the Air Force Legal Services Center. Approximately 600 people are assigned to the Center, staffing legal offices in Washington, D. C., and at virtually every Air Force installation in the world.

Several divisions of the Air Force Legal Services Center administer or manage a variety of military justice services.

- *The Court of Military Review* reviews all courts-martial resulting in dismissal, confinement of one year or more, or dishonorable or bad-conduct discharges. The Court was established by the Military Justice Act of 1968, which expanded the duties of its predecessor, the Air Force Board of Review, and assigned them to the Court of Military Review. Decisions made by the Court of Military Review may be appealed to the US Court of Military Appeals and the US Supreme Court for limited issues.
- *The Military Justice Division* reviews, for general sufficiency, those records of trial by general courts-mar-

manders and decision-makers various counterintelligence estimates, assessments, reports, and studies to assist them in taking protective countermeasures against hostile intelligence and terrorist activities.

- Providing 6,100 defensive counterespionage awareness briefings to some 263,000 Air Force members.
- Conducting 189 counterintelligence investigations concerning intelligence threats to the Air Force.
- Providing some 3,000 antiterrorism (terrorist threat/personal security) briefings to more than 71,000 Air Force people.
- Conducting about 300 Protective Services Operations for key Air Force, DoD, and other US government officials and foreign dignitaries.
- Providing AFOSI counterintelligence support to Air Force elements involved with systems security, technology transfer, and operations security.
- Taking part in five major US military exercises as well as deploying special agent personnel to provide "real-world" counterintelligence support in five Air Force deployments.

While such criminal acts as homicide, rape, robbery, assault, and drug trafficking account for the majority of AFOSI investigations, the Office has also moved into more complex investigations in such areas as thefts involving large dollar amounts, contracting and procurement irregularities, and computer crime. Drug investigations account for the largest number of investigations.

AFOSI also provides specialized investigative techniques that include technical support, polygraph, forensic science, behavioral science, and computer crime assistance programs. AFOSI conducts more than 6,000 polygraph examinations annually; this represents a 400 percent increase since 1981. The significant increase stems from the more widespread use of the polygraph as a counterintelligence screening tool for persons requiring access to certain special programs.

Under the program called the AFOSI Global Network, a revolutionary upgrade in AFOSI's information processing and dissemination is taking place. During the nearly completed first phase of this long-range endeavor, more than 600 microcomputers were purchased for placement in all field elements in the command. These micros have dramatically improved investigative word processing, provided new analytical tools in complicated fraud and drug abuse investigations, significantly affected maintenance of operational work load data, and improved the management of critical supplies and support functions.

In the second phase of this program, the installation of minicomputers at each AFOSI district office will provide real-time communication of investigative leads and the speedy recovery of existing criminal records pertinent to ongoing investigative efforts. In the final phase, this program will provide instantaneous transfer of terrorist and hostile intelligence information over secure communication channels.

Other ongoing high-technology modernization projects involve the electronic sorting of incoming message traffic to the desk officers charged with analysis, coordination, dissemination, and archiving of vital counterintelligence and antiterrorism data. Another AFOSI automation program uses laser disk technology to provide storage for some 700,000 central investigative files held by AFOSI. When completely installed, this equipment will reduce current space requirements by eighty percent and allow error free access to any file in about twenty seconds.

AFOSI recruits, selects, and trains its own special agents. Selectees attend an eleven-week investigators' course at the US Air Force Special Investigations Academy, collocated with the headquarters. Some 250 agents are scheduled to be trained in 1987.

As a result of AFOSI fraud and criminal investigations, the Air Force realized nearly $50 million in recoveries and savings of assets in 1986 as well as a total of $7 million in fines. ■

Air Force Operational Test and Evaluation Center

The Air Force Operational Test and Evaluation Center is a separate operating agency under Hq. USAF. It is the Air Force independent test agency responsible for testing, under operationally realistic conditions, new systems being developed for Air Force and multiservice use.

The commander of the Operational Test and Evaluation Center reports directly to the Chief of Staff of the Air Force. Results from the Center's tests are used at all levels of the Air Force, the Department of Defense, and Congress in making program decisions leading to the production and fielding of systems. The Center's efforts focus on providing assessments of the operational effectiveness and suitability of the Air Force's future weapon systems and supporting equipment.

The Center is currently testing equipment as diverse as the Joint Tactical Information Distribution System (JTIDS), the Modular Control Element (MCE), and the Advanced Medium-Range Air-to-Air Missile (AMRAAM). In addition to extensive operational tests now being conducted on such strategic systems as the B-1B and Peacekeeper missile, the Center is also conducting tests on the EF-111A Operational Flight Trainer, the high-speed antiradiation missile, and the Precision Location Strike System. The Center recently completed testing of the F-4G/APR-38 performance upgrade program and the TR-1 Tactical Reconnaissance System.

The Center has approximately 500 people assigned to the headquarters at Kirtland AFB, N. M., and an additional 175 at five detachments and two dozen test teams. The Center has detachments at Eglin AFB, Fla., Nellis AFB, Nev., Edwards AFB, Calif., Colorado Springs, Colo., and Kapaun AS, Germany.

The major commands supplement the test teams at the detachments and operating locations, bringing 2,400 people under the Center's operational control. These additional personnel represent the ultimate users of the system—the operators, the maintainers, as well as support and training specialists.

The Center's operational tests ensure that new equipment meets the users' requirements and that Air Force weapon systems can be operated effectively and supported under realistic operational conditions. ■

TI radar guides Tornado to victory in USAF bombing competition, again!

For the second consecutive year, the Royal Air Force, flying Panavia Tornado all-weather aircraft, emerged as winners in the prestigious U.S. Air Force Bombing Competition 1985. In a repeat of the 1984 victories, the RAF crews were guided to and from multiple targets by the Texas Instruments nose radar system.

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TEXAS INSTRUMENTS

Air Force Service Information and News Center

The Air Force Service Information and News Center, headquartered at Kelly AFB, Tex., is a key contributor to Air Force public affairs. The Center helps Air Force leaders provide information on Air Force and defense policies, activities, and people to Air Force members and their families worldwide. AFSINC also supplies individual soldier and airman stories to hometown news media.

The Center reports to the Director of Public Affairs, Secretary of the Air Force. It is commanded by Col. Paul Heye and has seven directorates. There are four basic mission elements: Internal Information, Army and Air Force Hometown News Service, Air Force Broadcasting Service, and the Air Force Office of Youth Relations. Backing the mission elements are three support elements: administration, resources, and communications and computers.

• *Internal Information* produces printed and audiovisual materials to help commanders communicate to the Air Force audience worldwide. Although the Internal Information production unit is at Hq. AFSINC, Kelly AFB, the director of Internal Information is on the SAF/PA staff at the Pentagon.

Products created and distributed by this directorate include such printed material as *Airman* magazine, the Air Force News Service, Policy Letter for Commanders, fact sheets, and a variety of general officer biographies.

The Center also produces such radio and audiovisual products as "Air Force Now" films and Air Force Radio News Service reports. Also part of the Internal program are art and photography products, including the lithograph series and theme posters. The directorate monitors the Commander's Call and base newspaper programs.

• *The Army and Air Force Hometown News Service* presents news of activities and achievements by individual soldiers and airmen to their hometown newspapers and broadcast outlets. In 1986, more than 470,000 individual soldiers and airmen had their stories told.

About 15,000 news media received a record 2,100,000 releases on accomplishments of service members. Feature teams produced radio and television releases that reached a broadcast audience of 167,000,000, while print feature stories with photographs reached a readership of 55,000,000.

• *The Air Force Broadcasting Service* manages the overseas operations of the Armed Forces Radio and Television Service that are assigned to the Air Force. Currently, there are 164 radio and television outlets that bring information and entertainment to DoD personnel and their families around the world. These outlets are managed by three subordinate squadrons: the Arctic Broadcasting Squadron, European Broadcasting Squadron, and Pacific Broadcasting Squadron. AFBS personnel also serve at stations operated by the Navy and Army in West Germany, Italy, Iceland, Panama, Korea, Belgium, and the Netherlands.

• *The Air Force Office of Youth Relations* acts as a liaison between the Air Force and several national youth organizations by conducting special community relations activities that promote aerospace education and provide Air Force mission and career information. The organization offers services to 14,000,000 of the nation's youth.

• *The Resource Management Directorate* administers AFSINC's worldwide resources, including personnel, manpower, logistics, and a multimillion-dollar budget. In addition, the directorate provides budgetary and administrative support for Air Force regional public affairs offices in Chicago, Los Angeles, and New York City and for the Air Force Orientation Group in Dayton, Ohio.

• *The Administration Directorate* provides administrative, information processing, reproduction, and distribution services for AFSINC headquarters. The Center's information products are printed by local base and commercial printing resources. These products are then distributed worldwide through the directorate's postal unit.

• *The Computer and Communications Directorate* provides most of the automated and communication support for Hq. AFSINC as well as for the regional public affairs offices. In addition, the directorate provides word-processing and media research capabilities, story catalogs, and labeling systems.

The directorate processes hundreds of thousands of news releases yearly and maintains production statistics and data storage. This support element keeps current address and release information on 15,000 national media outlets and coordinates the planning and installation for other communication and telephone systems.

As of December 1986, AFSINC was authorized 779 military and 182 civilian employees. ■

Air Reserve Personnel Center

The Air Reserve Personnel Center (ARPC) in Denver, Colo., has the primary mission of peacetime support and mobilization readiness of more than 250,000 Air National Guard and Air Force Reserve members who collectively make up the Air Reserve Forces. Specifically, ARPC's mission has three aspects: assist in mobilization of the reserve forces, provide personnel support to individual members, and maintain master personnel records of all members not on extended active duty.

The Total Force defense policy has increased the ARPC mission both in breadth and significance. ARPC has a staff of 830 military and civilians who provide numerous personnel services to air reservists.

Representative of ARPC peacetime personnel support is the Project Awareness Program. Last year, some 7,300 members at twenty-four Air Na-

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tional Guard units were briefed on participation point accounting, assignments, retirements, promotions, and administration of the Reserve Component Survivor Benefit Plan. Another more specialized initiative—but one with far-reaching impact—was the establishment of the Reserve Officer Personnel Management Act (ROPMA) Task Force. Working directly with the Air Staff, it critically reviews this pending legislation affecting 45,000 reserve officers.

Last year, the Center hosted ten promotion/selection boards. These included promotion of officers to the grade of captain through lieutenant colonel for the Guard and to captain through colonel for the Reserve. ARPC also provides assignment and career-planning assistance for these reservists at many points during their career.

ARPC provides even broader services to Individual Mobilization Augmentee (IMA) reservists. Because IMAs train directly with the active force and thus have no reserve unit assignment, their base-level personnel, administrative, and financial support is provided directly by ARPC. The Consolidated Reserve Personnel Office serves nearly 14,000 IMAs and participating individual ready reservists, mostly by mail and telephone, and is one of the largest base-level personnel offices in the Air Force.

Another special operation within ARPC is the single manager program, which serves the special requirements of nearly 1,600 medical, 900 legal, and 500 chaplain reserve personnel. In addition, ARPC provides this support to some 1,350 students working toward medical degrees under the Health Professional Scholarship Program and to nearly 275 chaplain candidates.

Since timely personnel and administrative support is absolutely critical during a time of national emergency, ARPC maintains more than a quarter of a million reservists' records and monitors personnel data on a like number of retired regular personnel. ARPC would identify and recall these personnel, which could nearly double the size of the active Air Force should full mobilization be directed.

Having completed a major computer and communications systems upgrade, ARPC now serves as the backup for the Air Force Military Personnel Center in those areas. This, along with the growing demands on the Air Reserve Forces, drives Center initiatives to improve responsiveness and efficiency in its mission of reserve personnel administration.

It is a job that has spanned more than three decades, three mobilizations in support of national emergencies, and quantum leaps in the technology of personnel management. Each recall and mobilization exercise has taught invaluable lessons that enable ARPC to do the job better. That process continues. ■

Air Force Reserve

The year 1986 saw the Air Force Reserve continuing to modernize and improve its capabilities while demonstrating the readiness of its people as full partners in today's Total Force.

"In my mind, combat readiness—and warfighting capability—is our only reason for being. And please understand, when I talk of combat readiness, I am referring to all units, not just flying units," explained Maj. Gen. Roger P. Scheer, new Chief of Air Force Reserve and Air Force Reserve (AFRES) Commander. "I believe combat teaches you, whether fighter pilot, airlifter, crew chief, or civil engineer, that you can't let anything that's not absolutely immoral or illegal stand in your way of getting the job done," he added.

Airlift capabilities were increased this year when the 459th Military Airlift Wing, Andrews AFB, Md., became the first unit to be equipped with "AFRES-owned" C-141 StarLifter aircraft.

The last four UC-123K Provider aircraft remaining in the Air Force inventory were retired from Rickenbacker ANGB, Ohio, and C-130s replaced them in the aerial spray role.

The 934th Tactical Airlift Group, Minneapolis-St. Paul IAP, Minn., converted from C-130A to C-130E aircraft, while the 908th TAG, Maxwell AFB, Ala., replaced its C-130Es with new C-130H models.

During 1986, AFRES changed the engines on twenty-four of its KC-135A Stratotankers, making them KC-135E models. The modification increased fuel offload capability and reduced smoke pollution problems and noise levels.

Three new mission support units were activated at Seymour Johnson AFB, N. C. The 916th Air Refueling Group (Associate) became the parent unit for the 77th Air Refueling Squadron, which provides Reserve air crews for KC-10 Extender tanker/cargo aircraft of Strategic Air Command's 68th Air Refueling Group. The new group, under the Reserve's 452d Air Refueling Wing, March AFB, Calif., will also provide command control and managerial support to the newly activated 916th Civil Engineering Squadron and 916th USAF Clinic. Another new civil engineering unit, the 920th CES, was activated at McConnell AFB, Kan.

Strategic associate and tactical airlift units logged more than 217,000 flying hours in FY '86, augmenting the MAC global airlift mission. Nearly 409,000 tons of cargo were airdropped or airlanded during these operations.

Associate C-9 aeromedical evacuation crews, with their MAC counterparts, logged 22,582 flying hours airlifting more than 57,000 patients in the United States.

Supporting other MAC missions, AFRES's 815th Weather Reconnaissance Squadron—the "Storm Trackers"—at Keesler AFB, Miss., flew nearly 3,500 hours conducting weather surveillance, including the tracking of four major hurricanes.

The Reserve's four aerospace rescue and recovery squadrons recorded fifty-two "saves" for the year, including two of a group of hikers who were stranded on Mount Hood, Ore., during a sudden blizzard.

Reserve airlifters transported some 150,000 pounds of goods to Central America under the Denton Amendment to the 1985 Defense Authorization Act, which amounted to nearly seventy-five percent of all humanitarian cargo moved. Richard L. Armitage, Assistant Secretary of Defense (International Security Affairs), attributed much of the success in the first year of the program to the Reserve. "The amendment and AFRES support of it has done much to alleviate suffering in that region of the world and to shore up forces against aggression," he said.

Two Reserve units joined MAC aircrews and aircraft in providing disaster relief for El Salvador, which was devastated by a major earthquake. A C-141 from the 459th MAW airlifted

AIR FORCE RESERVE FLYING WINGS AND ASSIGNED UNITS

Air Force	Wing Hq.	Group	Squadron	Type Aircraft	Location	Gaining Command
Fourth Air Force (Hq. McClellan AFB, Calif.) Maj. Gen. James C. Wahleithner Commander			302d SOS	**	Luke AFB, Ariz.	MAC
		919th SOG	711th SOS	AC-130A	Eglin AFB, Fla. (Aux. 3)	MAC
	349th MAW (Assoc)		301st MAS (Assoc)	C-5A	Travis AFB, Calif.	MAC
			312th MAS (Assoc)	C-5A	Travis AFB, Calif.	MAC
			708th MAS (Assoc)	C-141B	Travis AFB, Calif.	MAC
			710th MAS (Assoc)	C-141B	Travis AFB, Calif.	MAC
	403d RWRW		815th WRS	WC-130H	Keesler AFB, Miss.	MAC
			301st ARRS	HC-130H/N, HH-3E	Homestead AFB, Fla.	MAC
			305th ARRS	HC-130H/N, HH-3E	Selfridge ANGB, Mich.	MAC
		939th ARRG	304th ARRS	UH-1N, UH-1H, HC-130H	Portland IAP, Ore.	MAC
	433d MAW		68th MAS	C-5A	Kelly AFB, Tex.	MAC
	302d TAW		731st TAS	C-130B	Peterson AFB, Colo.	MAC
		934th TAG	96th TAS	C-130A	Minneapolis-St. Paul IAP, Minn.*	MAC
		943d TAG	303d TAS	C-130B	March AFB, Calif.	MAC
	440th TAW		95th TAS	C-130A	Gen. Billy Mitchell IAP, Wis.*	MAC
		927th TAG	63d TAS	C-130A	Selfridge ANGB, Mich.	MAC
		928th TAG	64th TAS	C-130A	O'Hare ARFF, Ill.*	MAC
	445th MAW (Assoc)		728th MAS (Assoc)	C-141B	Norton AFB, Calif.	MAC
			729th MAS (Assoc)	C-141B	Norton AFB, Calif.	MAC
			730th MAS (Assoc)	C-141B	Norton AFB, Calif.	MAC
	446th MAW (Assoc)		97th MAS (Assoc)	C-141B	McChord AFB, Wash.	MAC
			313th MAS (Assoc)	C-141B	McChord AFB, Wash.	MAC
Tenth Air Force (Hq. Bergstrom AFB, Tex.) Brig. Gen. William B. McDaniel Commander	301st TFW		457th TFS	F-4D	Carswell AFB, Tex.	TAC
		924th TFG	704th TFS	F-4D	Bergstrom AFB, Tex.	TAC
	419th TFW		466th TFS	F-16A/B	Hill AFB, Utah	TAC
		507th TFG	465th TFS	F-4D	Tinker AFB, Okla.	TAC
	434th TFW		45th TFS	A-10A	Grissom AFB, Ind.	TAC
		917th TFG	46th TFTS	A-10A	Barksdale AFB, La.	TAC
			47th TFS	A-10A	Barksdale AFB, La.	TAC
	442d TFW		303d TFS	A-10A	Richards-Gebaur AFB, Mo.*	TAC
		926th TFG	706th TFS	A-10A	New Orleans NAS, La.	TAC
	452d AREFW (H)		336th AREFS (H)	KC-135	March AFB, Calif.	SAC
			77th AREFS (H) (Assoc)	KC-10A	Seymour Johnson AFB, N. C.	SAC
			78th AREFS (H) (Assoc)	KC-10A	Barksdale AFB, La.	SAC
			79th AREFS (H) (Assoc)	KC-10A	March AFB, Calif.	SAC
		931st AREFG (H)	72d AREFS (H)	KC-135	Grissom AFB, Ind.	SAC
		940th AREFG (H)	314th AREFS (H)	KC-135	Mather AFB, Calif.	SAC
	482d TFW		93d TFS	F-4D	Homestead AFB, Fla.	TAC
		906th TFG	89th TFS	F-4D	Wright-Patterson AFB, Ohio	TAC
		944th TFG		F-16C/D***	Luke AFB, Ariz.	TAC
Fourteenth Air Force (Hq. Dobbins AFB, Ga.) Maj. Gen. James E. McAdoo Commander		932d AAG (Assoc)	73d AAS (Assoc)	C-9A	Scott AFB, Ill.	MAC
	94th TAW		700th TAS	C-130H	Dobbins AFB, Ga.*	MAC
		907th TAG	356th TAS	C-130A	Rickenbacker ANGB, Ohio	MAC
		908th TAG	357th TAS	C-130H	Maxwell AFB, Ala.	MAC
	315th MAW (Assoc)		300th MAS (Assoc)	C-141B	Charleston AFB, S. C.	MAC
			701st MAS (Assoc)	C-141B	Charleston AFB, S. C.	MAC
			707th MAS (Assoc)	C-141B	Charleston AFB, S. C.	MAC
	439th TAW		337th TAS	C-130E	Westover AFB, Mass.*	MAC
		911th TAG	758th TAS	C-130A	Greater Pittsburgh IAP, Pa.*	MAC
		914th TAG	328th TAS	C-130A	Niagara Falls IAP, N. Y.*	MAC
	459th MAW		756th MAS	C-141B	Andrews AFB, Md.	MAC
		910th TAG	757th TAS	C-130B	Youngstown MAP, Ohio*	MAC
		913th TAG	327th TAS	C-130E	Willow Grove ARF, Pa.*	MAC
	512th MAW (Assoc)		326th MAS (Assoc)	C-5A	Dover AFB, Del.	MAC
			709th MAS (Assoc)	C-5A	Dover AFB, Del.	MAC
	514th MAW (Assoc)		335th MAS (Assoc)	C-141B	McGuire AFB, N. J.	MAC
			702d MAS (Assoc)	C-141B	McGuire AFB, N. J.	MAC
			732d MAS (Assoc)	C-141B	McGuire AFB, N. J.	MAC

AAG (Assoc)	Aeromedical Airlift Group (Assoc)	ARRS	Aerospace Rescue and Recovery Squadron	TAW	Tactical Airlift Wing
AAS (Assoc)	Aeromedical Airlift Squadron (Assoc)	MAS (Assoc)	Military Airlift Squadron (Assoc)	TFG	Tactical Fighter Group
AREFG	Air Refueling Group	MAW (Assoc)	Military Airlift Wing (Assoc)	TFS	Tactical Fighter Squadron
AREFS	Air Refueling Squadron	RWRW	Rescue and Weather Reconnaissance Wing	TFW	Tactical Fighter Wing
AREFW	Air Refueling Wing	SOG	Special Operations Group	WRS	Weather Reconnaissance Squadron
ARF	Air Reserve Facility	SOS	Special Operations Squadron	*	Indicates AFRES base
ARFF	Air Reserve Forces Facility	TAG	Tactical Airlift Group	**	Deactivates July 1, 1987
ARRG	Aerospace Rescue and Recovery Group	TAS	Tactical Airlift Squadron	***	Activates July 1, 1987

A large portion of the airlift mission has been taken over by the Air Force Reserve. Last summer, the 459th Military Airlift Wing at Andrews AFB, Md., became the first Reserve wing to be equipped with Lockheed C-141B StarLifters.

twelve pallets of medical supplies to San Salvador, capital of the small Central American country. The 512th Military Airlift Wing, Dover AFB, Del., delivered tents to the capital on two MAC C-5 missions. In the United States, C-130s participated in the "haylift" to the drought-stricken Southeast.

Reserve KC-10 associate and KC-135 crews logged more than 20,000 flying hours in support of SAC's worldwide aerial refueling mission and provided support for the European, Pacific, and Alaskan Tanker Forces as well as alert duty in Iceland.

AFRES fighter units recorded more than 49,000 flying hours in FY '86, taking part in various exercises and other training activities. The fighters participated in forty-three major exercises, such as Distant Hammer, Air Warrior, Gallant Eagle, Green Flag, Red Flag, and Maple Flag, the Canadian equivalent of USAF's Red Flag.

Throughout the year, aerial port squadrons continued to support and augment the 611th Military Airlift Squadron, Osan AB, Republic of Korea, on a rotational basis and to augment other active duty aerial ports in the CONUS, Europe, and the Pacific.

Seventy-five thousand Reservists participated in exercises during the year, including C-130 missions to Alaska in support of Brim Frost and intratheater airlift in the Pacific as part of Team Spirit. AFRES C-130 crews and support personnel at Howard AFB, Panama, continued to share with the Air National Guard the Volant Oak mission of providing tactical airlift support to the US Southern Command.

The Air Force Reserve met its recruiting goal for the ninth consecutive year, exceeding the congressional end strength with a total strength of more than 77,800 at the end of FY '86.

Nine units earned the Air Force Outstanding Unit Award. They were the 79th Air Refueling Squadron, 94th Tactical Airlift Wing, 419th Tactical Fighter Wing, 439th Weapon System Security Flight, 440th Weapon System Security Flight, 910th Tactical Airlift Group, 919th Special Operations Group, the 924th Tactical Fighter Group, and the 940th Air Refueling Group.

The 94th Tactical Airlift Wing, Dobbins AFB, Ga., tied with the 136th TAW (an Air National Guard unit at Hensley Field, Tex.) for the best C-130 maintenance unit at Volant Rodeo, the 1986 MAC international airdrop competition. The 439th TAW, Westover AFB, Mass., won the aerial delivery competition, and Reserve units took the top three spots in the C-141 maintenance category.

Representing the Reserve in the Air Force-wide Readiness Challenge Prime BEEF competition at Eglin AFB, Fla., the 910th Civil Engineering Squadron, Youngstown MAP, Ohio, placed third overall.

Security Police Reservists won the Chief's Award at the 1986 Peacekeeper Challenge competition. The Noncommissioned Officers Association presented the award to the Reserve team, which consisted of members from several units, for showing the best in leadership, *esprit de corps,* fellowship, and consistent top performance throughout the event.

"I think the Reserve is as good a force as it ever has been, probably better," General Scheer said. "We just need to continue to fine-tune it a little. There are three priorities at the top of my list. One, make sure we maintain our high standards of combat readiness in the Air Force Reserve. Two, move responsibility and decision-making authority to the lowest possible level. And three, do whatever it takes to keep our good people in the Air Force Reserve," he concluded.

Direct management of the Reserve's field units continued to be provided in 1986 by three numbered Air Force headquarters: Fourth Air Force, McClellan AFB, Calif.; Tenth Air Force, Bergstrom AFB, Tex.; and Fourteenth Air Force, Dobbins AFB, Ga., with Hq. Air Force Reserve at Robins AFB, Ga., providing overall unit-program management. ■

Air National Guard

With both a state and federal mission, the Air National Guard (ANG) is unique among the Air Reserve Forces. In 1986, Guardsmen and women proudly celebrated 350 years of service to their communities, states, and nation.

Air National Guard units in a nonmobilized status are commanded by the governors of the fifty states, the Commonwealth of Puerto Rico, the Territories of Guam and the Virgin Islands, and the Commanding General of the District of Columbia. All units in a state are responsible to the governor, who is represented in the state or territory chain of command by the adjutant general.

Units may be called to federal service by the President to enforce federal authority, suppress insurrection, or repel invasion. They may also be ordered to active duty by Congress. During peacetime, all Air National Guard units are assigned to gaining Air Force commands. These commands provide advisory assistance and evaluate unit training, safety, and readiness programs.

The importance of the Air National Guard to the Total Force is evident through both its operational and mission support units. In both areas, the emphasis is on modernization and growth.

The Air National Guard today is providing seventy-three percent of the fighter interceptor force, fifty-seven percent of the reconnaissance force, forty percent of tactical air support, thirty-five percent of tactical airlift, twenty-five percent of tactical fighters, seventeen percent of the air refueling capability, and thirteen percent of the rescue and recovery capability of the Total Air Force.

In 1985, the ANG began flying the world's finest air-superiority fighter, the F-15 Eagle. Two units, one from New Orleans, La., and a second at Dobbins AFB, Ga., are already operational with the F-15. A third Guard unit, the 154th Composite Group at Hickam AFB, Hawaii, will convert from the F-4C to the F-15 this year. It was recently announced that the 102d Fighter Interceptor Wing from the Massachusetts ANG will convert to the F-15A/B sometime in 1988.

In 1986, Guard fighter units in Vermont, Arizona, and Texas converted to the F-16 Fighting Falcon. The 169th Tactical Fighter Group in South Carolina is already operational with the F-16, and this year, the 184th Tactical Fighter Group, Kansas ANG, will switch over to the F-16. In 1988, F-106 units from Florida and Montana and F-4 units from Alabama and Arkansas will convert to the F-16. Two additional fighter units from Oregon are scheduled to convert to the F-16 sometime in 1989.

The ANG is not only receiving the newest aircraft but the biggest as well. The 105th Military Airlift Group in New York began flying the C-5A in 1985 and since that time has proven the Guard a capable new partner in the Air Force's strategic airlift mission. In July 1986, the Air Guard made history when the 172d Military Airlift Group at Jackson, Miss., converted from the C-130H to the C-141 StarLifter.

In September 1986, an Air Guard refueling squadron equipped with four KC-135Es was activated in Fairbanks, Alaska. Later this year, air refueling units from Kansas, Illinois, Maine, Wisconsin, and New Hampshire will each receive additional KC-135Es.

In addition to receiving new aircraft, the Air Guard is also modernizing its existing fleet. The KC-135 reengining program was completed in 1986. This upgrade, which replaces older J57 engines with reconditioned JT3D engines, greatly improves the reliability of the ANG's KC-135s, resulting in a sixty percent reduction in noise, a ninety percent reduction in smoke, and a twelve to fourteen percent increase in fuel efficiency.

The Air Guard's primary tactical fighter, the F-4 Phantom II, is also undergoing modifications to increase its capability. All of the Air Guard's F-4D and F-4E squadrons will be modified to allow carriage of the AIM-9L and M missiles. A low-smoke modification is also scheduled for completion.

The ANG's A-7 fleet is also being modernized. Three of fourteen units will be equipped with a forward-looking infrared system that will enhance the night capability of this aircraft.

On the airlift side, the ANG continues to receive new C-130H models to replace older aircraft. Seven units are already flying this latest model, with another unit at St. Joseph, Mo., scheduled for conversion in 1987.

Like their flying counterparts, the ANG mission support units play a key role in the Total Force.

At this time, there are approximately 244 units heavily concentrated in the areas of base fixed communications and computers, combat information systems, weather, tactical control, engineering installation, civil engineering, medical support, and air base ground defense.

A total of 159 ANG units provides combat and fixed communications support and engineering installation support to USAF. The combat communications units are being continually upgraded with state-of-the-art electronics equipment, including satellite communications capabilities. ANG combat communications units provide sixty-five percent of the

The Air National Guard now supplies twenty-five percent of the total force's tactical fighters. Here, an ANG A-7D from the 185th Tactical Fighter Group based at Sioux City, Iowa, lands in Korea after a mission in support of the joint exercise Team Spirit '86.

THE AIR NATIONAL GUARD BY MAJOR COMMAND ASSIGNMENT

(As of January 1, 1987)

STRATEGIC AIR COMMAND

KC-135E Stratotanker

101st Air Refueling Wing	Bangor, Me.
126th Air Refueling Wing	Chicago, Ill.
141st Air Refueling Wing	Fairchild AFB, Wash.
171st Air Refueling Wing	Pittsburgh, Pa.
128th Air Refueling Group	Milwaukee, Wis.
134th Air Refueling Group	Knoxville, Tenn.
151st Air Refueling Group	Salt Lake City, Utah
157th Air Refueling Group	Pease AFB, N. H.
160th Air Refueling Group	Rickenbacker ANG Base, Ohio
161st Air Refueling Group	Phoenix, Ariz.
170th Air Refueling Group	McGuire AFB, N. J.
190th Air Refueling Group	Forbes Field, Kan.
168th Air Refueling Squadron	Fairbanks, Alaska

TACTICAL AIR COMMAND

A-7D/K Corsair II

121st Tactical Fighter Wing	Rickenbacker ANG Base, Ohio
127th Tactical Fighter Wing	Selfridge ANG Base, Mich.
132d Tactical Fighter Wing	Des Moines, Iowa
140th Tactical Fighter Wing	Buckley ANG Base, Colo.
112th Tactical Fighter Group	Pittsburgh, Pa.
114th Tactical Fighter Group	Sioux Falls, S. D.
138th Tactical Fighter Group	Tulsa, Okla.
150th Tactical Fighter Group	Kirtland AFB, N. M.
156th Tactical Fighter Group	San Juan, Puerto Rico
162d Tactical Fighter Group*	Tucson, Ariz.
178th Tactical Fighter Group	Springfield, Ohio
180th Tactical Fighter Group	Toledo, Ohio
185th Tactical Fighter Group	Sioux City, Iowa
192d Tactical Fighter Group	Richmond, Va.

F-16A/B Fighting Falcon

149th Tactical Fighter Group	Kelly AFB, Tex.
158th Tactical Fighter Group	Burlington, Vt.
162d Tactical Fighter Group	Tucson, Ariz.
169th Tactical Fighter Group	McEntire ANG Base, S. C.

A-10A Thunderbolt II

128th Tactical Fighter Wing	Truax Field, Wis.
174th Tactical Fighter Wing	Syracuse, N. Y.
103d Tactical Fighter Group	Bradley, Conn.
104th Tactical Fighter Group	Barnes, Mass.
175th Tactical Fighter Group	Baltimore, Md.

F-4C Phantom II

163d Tactical Fighter Group	March AFB, Calif.
181st Tactical Fighter Group	Terre Haute, Ind.
188th Tactical Fighter Group	Fort Smith, Ark.
154th Composite Group	Hickam AFB, Hawaii

F-4D Phantom II

113th Tactical Fighter Wing	Andrews AFB, Md.
183d Tactical Fighter Group	Springfield, Ill.
184th Tactical Fighter Group*	McConnell AFB, Kan.
187th Tactical Fighter Group	Montgomery, Ala.

F-4E Phantom II

108th Tactical Fighter Wing	McGuire AFB, N. J.
122d Tactical Fighter Wing	Fort Wayne, Ind.
131st Tactical Fighter Wing	St. Louis, Mo.

RF-4C Phantom II

117th Tactical Reconnaissance Wing	Birmingham, Ala.
123d Tactical Reconnaissance Wing	Louisville, Ky.
124th Tactical Reconnaissance Group	Boise, Idaho
152d Tactical Reconnaissance Group	Reno, Nev.
155th Tactical Reconnaissance Group	Lincoln, Neb.
186th Tactical Reconnaissance Group	Meridian, Miss.

*Replacement Training Unit (RTU).

OA-37 Dragonfly

110th Tactical Air Support Group	Battle Creek ANG Base, Mich.
111th Tactical Air Support Group	Willow Grove ARF, Pa.
182d Tactical Air Support Group	Peoria, Ill.

F-15A/B Eagle

116th Tactical Fighter Wing	Dobbins AFB, Ga.
159th Tactical Fighter Group	NAS New Orleans, La.

AIR DEFENSE UNITS (TAC)

F-106A/B Delta Dart

102d Fighter Interceptor Wing	Otis ANG Base, Mass.
120th Fighter Interceptor Group	Great Falls, Mont.
125th Fighter Interceptor Group	Jacksonville, Fla.
177th Fighter Interceptor Group	Atlantic City, N. J.

F-4C Phantom II

142d Fighter Interceptor Group	Portland, Ore.
114th Tactical Fighter Training Squadron*	Kingsley, Ore.

F-4D Phantom II

144th Fighter Interceptor Wing	Fresno, Calif.
107th Fighter Interceptor Group	Niagara Falls, N. Y.
119th Fighter Interceptor Group	Fargo, N. D.
147th Fighter Interceptor Group	Ellington ANG Base, Tex.
148th Fighter Interceptor Group	Duluth, Minn.
191st Fighter Interceptor Group	Selfridge ANG Base, Mich.

MILITARY AIRLIFT COMMAND

C-130 Hercules

118th Tactical Airlift Wing	Nashville, Tenn.
133d Tactical Airlift Wing	Minneapolis/St. Paul, Minn.
136th Tactical Airlift Wing	Dallas, Tex.
137th Tactical Airlift Wing	Oklahoma City, Okla.
146th Tactical Airlift Wing	Van Nuys, Calif.
109th Tactical Airlift Group	Schenectady, N. Y.
130th Tactical Airlift Group	Charleston, W. Va.
135th Tactical Airlift Group	Baltimore, Md.
139th Tactical Airlift Group	St. Joseph, Mo.
143d Tactical Airlift Group	Quonset Point, R. I.
145th Tactical Airlift Group	Charlotte, N. C.
153d Tactical Airlift Group	Cheyenne, Wyo.
164th Tactical Airlift Group	Memphis, Tenn.
165th Tactical Airlift Group	Savannah, Ga.
166th Tactical Airlift Group	Wilmington, Del.
167th Tactical Airlift Group	Martinsburg, W. Va.
176th Composite Group	Anchorage, Alaska
179th Tactical Airlift Group	Mansfield, Ohio
189th Tactical Airlift Group	Little Rock AFB, Ark.

HC-130 Hercules/HH-3 Jolly Green Giant

106th Aerospace Rescue & Recovery Group	Suffolk, N. Y.
129th Aerospace Rescue & Recovery Group	NAS Moffett, Calif.

C-141B StarLifter

172d Military Aircraft Group	Jackson, Miss.

C-5A Galaxy

105th Military Airlift Group	Newburgh, N. Y.

EC-130E

193d Special Operations Group	Middletown, Pa.

PACIFIC AIR FORCES

F-4C Phantom II

154th Composite Group	Hickam AFB, Hawaii

people and equipment used in Air Force combat communications and air traffic services. Also, Guard engineering and installation units represent fifty-five percent of the total Air Force E&I capability.

Civil engineering and services is a growing part of the Air National Guard. Air Guard Prime RIBS (Readiness in Base Services) units contribute a substantial portion of the total Air Force wartime requirement for food service and base services personnel.

Air National Guard Prime BEEF (Base Engineer Emergency Force) units were reorganized late in FY '84 to meet the needs of the Air Force better. Prime BEEF units currently constitute approximately one-third of worldwide construction and fire protection mobility resources. In FY '85, another Red Horse engineering squadron was activated, with headquarters at Camp Blanding, Fla. Two of the total Air Force's seven Red Horse squadrons are Guard units.

Readiness is the watchword for the 1980s. Overseas training and deployments have been key to attaining and maintaining the highest state of readiness for the Air National Guard.

Air Guard C-130 Hercules aircraft provide more than six months of support annually to the US Southern Command. This JCS-directed deployment, called Volant Oak, positions six C-130s at Howard AFB, Panama, on a rotational basis with Air Force Reserve C-130 units. Also, ANG A-7 units share a continuous rotational air defense commitment, named Coronet Cove, in Panama.

One of the larger deployments in 1986 was "Coronet Miami," which took a combined force of twenty-four A-7s and an initial staff of 300 personnel to RAF Skulthorpe, England. By the end of the six-week deployment, more than 900 personnel from three units of the Ohio ANG had the opportunity to train in theater operations alongside their British counterparts.

Starting in April 1986, the Air Guard picked up a new defense alert mission at Ramstein AB, Germany. The mission, named Creek Klaxon, was initiated at the request of Hq. USAFE and will continue through April 1987. A composite group from as many as twenty-three F-4 units has been supporting Creek Klaxon. By the end of the mission, close to 1,000 Guardsmen and women will have served NATO's defense by performing this vital, real-world alert mission.

Closer to home, ANG F-106 and F-4 air defense units perform a twenty-four-hour alert mission along the coasts of the United States. Units in Hawaii are responsible for the entire air defense of that state.

The ANG mission support units are also doing their fair share to help the Guard meet its worldwide readiness commitments.

In FY '86, approximately 3,000 Guardsmen from combat communications, engineering installation, and information systems were involved in more than forty deployments to Europe, Korea, Central America, the Caribbean, and CONUS locations in support of JCS and NATO exercises.

ANG communications units in Rhode Island and Georgia were asked to convert to a new mission in FY '86. These units are fulfilling the USAF portion of the Defense Communications System in the US Central Command.

Last year saw many "firsts" for ANG communications. The first "outstanding" rating in an Operational Readiness Inspection (ORI) for a combat communications unit, active or Guard, was awarded to the 263d Combat Communications Squadron of the North Carolina ANG.

The first Total Force competition for combat communications units, Combat Challenge '86, was held at Patrick AFB, Fla., in September 1986. The 162d Combat Communications Group from the California ANG placed first in four of nine categories and won overall first place in the competition.

The Air National Guard continues to prove its readiness in the competition arena. During Volant Rodeo '86, the 145th Tactical Airlift Group (TAG) from Charlotte, N. C., captured the title of best overall tactical airlift unit in the entire free world. In this competition, Air Guard members not only compete against their active and reserve counterparts but against top teams from around the globe. During Volant Rodeo '86, another Guard unit, the 167th TAG from Martinsburg, W. Va., took third place overall, and the 145th TAG was named "best" again, this time in the C-130 maintenance category.

In Reconnaissance Air Meet '86, an Air Force-sponsored worldwide competition, the 152d Tactical Reconnaissance Group from Reno, Nev., was named best overall tactical reconnaissance unit. The top aircrew award went to another Guard unit, the 124th Tactical Reconnaissance Group from Boise, Idaho.

The ANG set another record in FY '86 by reaching an all-time high of 112,000 members, meeting its programmed end strength for the eighth straight year.

Emphasis is also being placed on professional military education to increase the quality of leadership in the Air National Guard. Air National Guard members receive professional military education at the I. G. Brown ANG Professional Military Education Center at McGhee Tyson Airport near Knoxville, Tenn.

On July 1, 1985, the Educational Assistance Act—referred to as "The New GI Bill"—was implemented, entitling all qualifying members to tuition assistance for undergraduate study.

New missions, equipment modernization, significant participation in worldwide exercises and deployments, and exemplary performance in inspections and competitions have helped make today's Air National Guard a proud, prepared, professional, and vital component of the Total Force. ■

Civilian Personnel Management Center

The Air Force Civilian Personnel Management Center's mission is to manage and operate Air Force civilian personnel data and information systems, recruitment and training programs, and career management, development, and placement programs. These programs affect more than 250,000 civilian employees, including foreign nationals, at Air Force installations worldwide.

The Air Force Civilian Personnel Management Center was established as a direct reporting unit of the Air Force Director of Civilian Personnel on January 1, 1986. Its forerunner, the Office of Civilian Personnel Operations, had been in existence at Randolph AFB, Tex., since July 1, 1976.

The Center is organized into three divisions: Integrated Systems Man-

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agement, Recruiting and Training, and Career Management. Each plays an integral role in the personnel life-cycle management of the civilian resource.

• *The Integrated Systems Management Division* is the Air Force focal point for civilian personnel data and information systems management. It provides the personnel community with training and consultation services on automated and integrated systems. In conjunction with field activities, the division develops a system approach for implementing civilian policies. It also keeps abreast of changing technology to improve those systems.

• *The Recruitment and Training Division* is responsible for a variety of civilian recruitment programs geared to the Air Force demand for skilled individuals in many technical or professional career fields. The staff also conducts quality-of-worklife studies and performs research in performance appraisal and selection improvements. Additionally, the division is responsible for developing and administering the Air Force-wide civilian education and training budget. It helps civilian personnel managers find the right school or course for employees' educational needs.

• *The Career Management Division* helps identify civilian executive positions that need to be managed centrally for job referral and training. The goal is to satisfy Air Force needs by providing a pool of career employees with strong skills in professional, technical, management, and administrative fields.

Ten career programs are now in effect, including comptroller; engineering and services; historian; logistics; manpower and personnel, which encompasses education, technical training, and morale, welfare, and recreation; acquisition; information systems; safety, security, and special investigations; commissary; and administration. Civilians involved in the program can receive a combination of government, academic, and industry training. They have the opportunity to attend armed forces college programs, participate in courses in executive development, and may be selected for Education With Industry assignments.

The Air Force Civilian Personnel Management Center serves as a landmark organization for the Department of Defense and federal government commitment to effective and efficient personnel life-cycle management of the Air Force's valued civilian resources. ■

Air Force District of Washington

The Air Force District of Washington is the single manager for support of Air Force activities in the National Capital Region. Although its headquarters is located at historic Bolling AFB, D. C., the AFDW covers a much broader area. Subordinate units, detachments, and operating locations are at the Pentagon, Andrews AFB, Md., and Fort Meade, Md.

Two major units form the majority of the AFDW. They are the 1100th Air Base Group and the 1100th Resource Management Group.

The 1100th ABG is the host unit for Bolling AFB. It has the typical squadrons and support agencies usually found at the base level. These support functions serve numerous tenant units on Bolling, such as the Air Force Office of Scientific Research and Hq. Air Force Office of Special Investigations. Among Bolling's Air Staff tenants are the Surgeon General, the Office of Air Force History, and the Chief of Chaplains.

The 1100th RMG has many personnel activities, including command personnel, education office programs, and military personnel offices at Bolling, Fort Meade, and the Pentagon.

Another major branch of the 1100th RMG is plans and operations. This includes a diverse group of responsibilities, including engineering services, audiovisual production, television services for the Air Staff, and management of more than 800 Pentagon parking spaces and 1,500,000 square feet of leased building space.

Contracting and financial services for all Air Force activities in the Washington area are provided by two 1100th RMG units, the 1100th Contracting Squadron and the AFDW Accounting and Finance Office. With 43,977 military and civilian customers, it constitutes the Air Force's largest base-level accounting and finance office.

Air Force ceremonial events in the nation's capital are the responsibility of the AFDW. Two of the Air Force's most visible ambassadors are the US Air Force Honor Guard and the US Air Force Band, both based at Bolling.

The Honor Guard represents the Air Force at arrival and departure ceremonies for visiting dignitaries at the White House, Pentagon, and Andrews AFB as well as other ceremonial functions. They also participate in military funerals at Arlington National Cemetery as well as memorial ceremonies at the Tomb of the Unknowns. The Honor Guard Drill Team is an elite component that performs nationwide.

Some of the nation's best musicians make up the Air Force Band. Its varied components provide quality entertainment for many different events. The Concert Band, String Orchestra, Singing Sergeants, Airmen of Note jazz ensemble, Spectrum pop band, and Ceremonial Brass make up the band. ■

Air Force Technical Applications Center

The Air Force Technical Applications Center (AFTAC), a direct reporting unit, operates and maintains the US Atomic Energy Detection System (AEDS). AEDS is a worldwide system with operations in more than thirty-five countries. In operating AEDS, AFTAC is responsible for detecting nuclear events in the atmosphere, underwater, underground, and in space, determining if the events are nuclear, and reporting the events to national command authorities through Hq. USAF.

Specific responsibilities assigned to AFTAC include implementing Safeguard (d) of the 1963 Limited Test Ban Treaty and monitoring the Threshold

Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of 1976.

AFTAC also conducts an active research and development program to contribute to the nation's ability to monitor international test-ban agreements. Because of its capabilities, from time to time AFTAC is also tasked with unique missions in response to world events.

AFTAC was responsible for tracking debris from the Soviet reactor accident at Chernobyl in 1986. The command worked closely with the Environmental Protection Agency, the Federal Aviation Administration, and other executive agencies to document the radiological health hazard to Americans overseas and at home.

The concept of AEDS originated in the minds of several senior government leaders, including Gen. Hoyt S. Vandenberg and Adm. Lewis L. Strauss, after World War II, when it became apparent that other nations would develop a nuclear weapons capability and that it was in the best interest of the US to be aware of these developments. A committee of experts subsequently endorsed the concept of a detection system, and in September 1947, Gen. Dwight D. Eisenhower directed the Army Air Forces to "detect atomic explosions anywhere in the world."

The mission remained with the Air Force when it became a separate service, and AFTAC proved its value when an AFTAC sensor aboard a B-29 flying between Alaska and Japan detected debris from the first Russian atomic test in September 1949. The detection was considered particularly noteworthy since most experts predicted that the first Russian atomic test could not occur until the mid-1950s.

During subsequent years, new detection systems were developed, and older systems were improved. When the Limited Test Ban Treaty was signed in 1963, the primary role of monitoring certain provisions was assigned to AFTAC. The treaty prohibits the signatory states from testing nuclear weapons in the atmosphere, underwater, or in space. It also prohibits the venting across international boundaries of nuclear debris from underground tests.

To accomplish its mission, approximately 1,400 AFTAC men and women operate and maintain a worldwide system of satellite, electromagnetic pulse, hydroacoustic, seismic, laboratory, sampling, and airborne operations facilities.

AFTAC headquarters is located at Patrick AFB, Fla., and includes a complex of operations centers to monitor the AEDS network and receive data twenty-four hours a day. These centers are primarily responsible for the detection and identification of nuclear events occurring anywhere in the world.

To manage the AEDS properly, AFTAC has three intermediate headquarters units that supervise and support the Center's more than seventeen manned detachments, five operating locations, and seventy equipment locations.

The largest subordinate is the Technical Operations Division, McClellan AFB, Calif. This major complex contains the McClellan Central Laboratory, the central analysis facility for AEDS, as well as a centralized logistics depot for the engineering, maintenance, and provisioning of the AEDS network. In addition, an airborne operations directorate trains and provides airborne special equipment operators for the AEDS mission.

Hq. Pacific Technical Operations Area, located at Wheeler AFB, Hawaii, and Hq. European Technical Operations Area, Lindsey AS, Germany, provide logistics and administrative support to subordinate activities in their geographic areas.

AFTAC's people possess a wide range of technical expertise, and many hold advanced degrees in chemistry, physics, nuclear engineering, and electrical engineering. Complementing an impressive scientific capability is an experienced and talented operational force of skilled, handpicked technicians. ■

USAF Historical Research Center

The USAF Historical Research Center is the repository for Air Force historical documents. The Center's collection, begun in Washington during World War II, moved to Maxwell AFB, Ala., in 1949. It consists today of nearly 50,000,000 pages devoted to the history of the service and constitutes the largest and most valuable organized collection of documents on US military aviation in the world.

In 1979, the Center became a direct reporting unit of the Air Force, receiving technical direction and guidance from the Chief, Office of Air Force History. It is collocated with the Air University Library and provides research facilities for professional military education students, the faculty, and visiting scholars. More than eighty-five percent of the Center's pre-1955 holdings are declassified. Almost the entire collection is recorded on 16-mm microfilm, with copies deposited at the National Archives and Record Administration, Washington, D. C., and the Office of Air Force History, Bolling AFB, D. C.

Center holdings consist largely of periodic unit histories prepared by the major commands, numbered air forces, and other subordinate organizations. These histories provide comprehensive coverage of Air Force activities beginning in 1942, when the President authorized the program. Extensive primary source material is attached to the histories, greatly enhancing their value.

Special collections complement the unit histories. Among them are historical monographs, end-of-tour reports, joint and combined command documents, aircraft record cards, and materials from the US Army, British Air Ministry, and German Air Force. The Center also houses the personal papers of key retired Air Force leaders and a substantial collection of their oral history interviews. About 6,000 documents and collections of all types are accessioned annually.

In 1974, the Center adopted automated data processing as a finding aid and began in 1980 to enter abstracts of the documents into a computer. The Inferential Retrieval Index System, or IRIS, became operational in 1983 when the Center acquired an IBM 4341 computer. Plans call for the collection to become accessible in early 1987 to the Air Force MAJCOM and field history program through remote terminals.

The Center is organized in four divisions.

- *Reference.* Maintains documents and microfilm, answers inquiries about holdings, produces bibliographies, collects personal papers, reviews records for possible downgrading or declassification, and provides other reference services to users.

• *Research.* Writes books and papers; prepares lineage and honors of Air Force units; maintains records of the Air Force seal and flag, the records of unit and establishment emblems and flags, and the records of Air Force organizations; determines aerial victory credits; and performs various other research and teaching services.

• *Oral History.* Conducts oral history interviews, monitors the USAF end-of-tour report program, and provides a training course for oral historians.

• *Technical Services.* Accessions, catalogs, abstracts, and indexes documents; conducts automated data processing and microfilming for the Center; and coordinates computer applications for the Air Force history program. ■

United States Air Force Academy

The mission of the United States Air Force Academy is "to provide instruction and experience to all cadets so they graduate with the knowledge and character essential to leadership and the motivation to become career officers in the United States Air Force." A Department of the Air Force agency, the Academy stands on an 18,000-acre site in the foothills of the Rocky Mountains near Colorado Springs, Colo. It's the largest of the service academies in land area.

Air Force Academy cadets take four years of academic studies toward a Bachelor of Science degree. They also take professional military training to earn regular commissions in the United States Air Force. When cadets enter the Academy, they agree to serve four years as a cadet and, upon graduation, serve five years or longer as an active-duty Air Force officer, depending on their career fields. While at the Academy, the United States government provides for their food, housing, and medical care. In addition, cadets receive a monthly salary to pay for uniforms, textbooks, and personal expenses.

In 1947, with the establishment of a separate Air Force, the issue of educating Air Force professionals became crucial. In 1949, the Secretary of Defense appointed a service academy board to study the need for another academy. After traveling 21,000 miles and considering 580 proposed sites in forty-five states, the board recommended three locations. These were Alton, Ill., Lake Geneva, Wis., and Colorado Springs, Colo. Colorado Springs was selected, and the state of Colorado contributed $1 million toward the purchase of the property.

Congress authorized creation of the Air Force Academy in 1954. The first class entered in July 1955 at temporary facilities at Lowry AFB, Denver, Colo., with 306 cadets. Meanwhile, construction of the new facility began in Colorado Springs. The cadet wing moved into this permanent site in August 1958. Nine months later, 207 cadets graduated.

Initial plans called for just over 2,500 cadets in the wing. In 1964, President Lyndon B. Johnson signed the legislation that increased the Academy's strength to its present size of 4,417 cadets. Women first entered the Academy in 1976 and graduated in 1980.

The four-year program of instruction averages 186 semester hours and consists of military training, academics, athletics, and moral and spiritual development.

The Academy prepares cadets for roles of leadership through military training that provides the basic military knowledge required by Air Force officers. This training includes flying instruction and field trips. All cadets, even those who don't plan to fly, take required aviation and navigation courses.

Academics include studies in the basic sciences, engineering, humanities, and the social sciences. Within this framework, all cadets complete a core curriculum with a balance from these four areas. They also select additional courses in one of the available majors. In addition, cadets may visit other Air Force or government installations to participate in various research projects. Cadets can compete with students from other universities for fellowships and scholarships.

Athletics consist of physical education classes and intramural and intercollegiate sports. With few exceptions, all cadets must participate in one or more of the twenty-one intramural sports or in intercollegiate sports throughout their entire Academy careers. To remain eligible for intercollegiate sports, a cadet should maintain an average of seventy percent in each academic subject. In addition, they participate in athletic periods as well as in their physical education classes.

The Cadet Honor Code is the centerpiece of moral and spiritual development. Cadets pledge: "We will not lie, steal, or cheat, nor tolerate among us anyone who does." All cadets take a formal course in ethics and receive honor and ethics instruction. In addition, they are encouraged to participate in voluntary religious services and programs offered at the Academy.

Cadets live in dormitories located in the Cadet Area. The normal weekday begins with reveille at 6:30 a.m., followed by room inspection and breakfast. Classes are held from 8:00 a.m. until noon and then from 1:00 p.m. to 4:00 p.m. The majority of classes are held in small classrooms and laboratories. After classes, cadets participate in sports and extracurricular activities. The evening meal is followed by an allocated study period from 8:00 p.m. until 11:00 p.m. in the dormitories or Academy library. Taps is sounded at 11:00 p.m.

Social activities for the cadets are held every weekend at the Academy, and there are approximately seventy-five clubs in which they can pursue their interests. These include skiing, flying, photography, scuba diving, and falconry. Privileges to leave the campus on weekends increase as the cadet progresses through the Academy. Each year, all cadets receive a Christmas leave (vacation), a spring break, and a summer vacation.

There are many different ways of being appointed to the Academy. Most are appointed by Members of Congress. However, there are other provisions for personnel on active duty and children of military service members.

Candidates for appointment to the Academy must be citizens of the United States, at least seventeen and not yet twenty-two years old on July 1 of the year of entry, unmarried with no legal dependents, and of good moral character.

They must also pass qualifying medical examinations, the candidate fitness test, and college entrance examinations to qualify for appointment.

Full information, including preparation and admission procedures, can be obtained from the Director of Admissions, United States Air Force Academy, Colo. 80840-5651. ■

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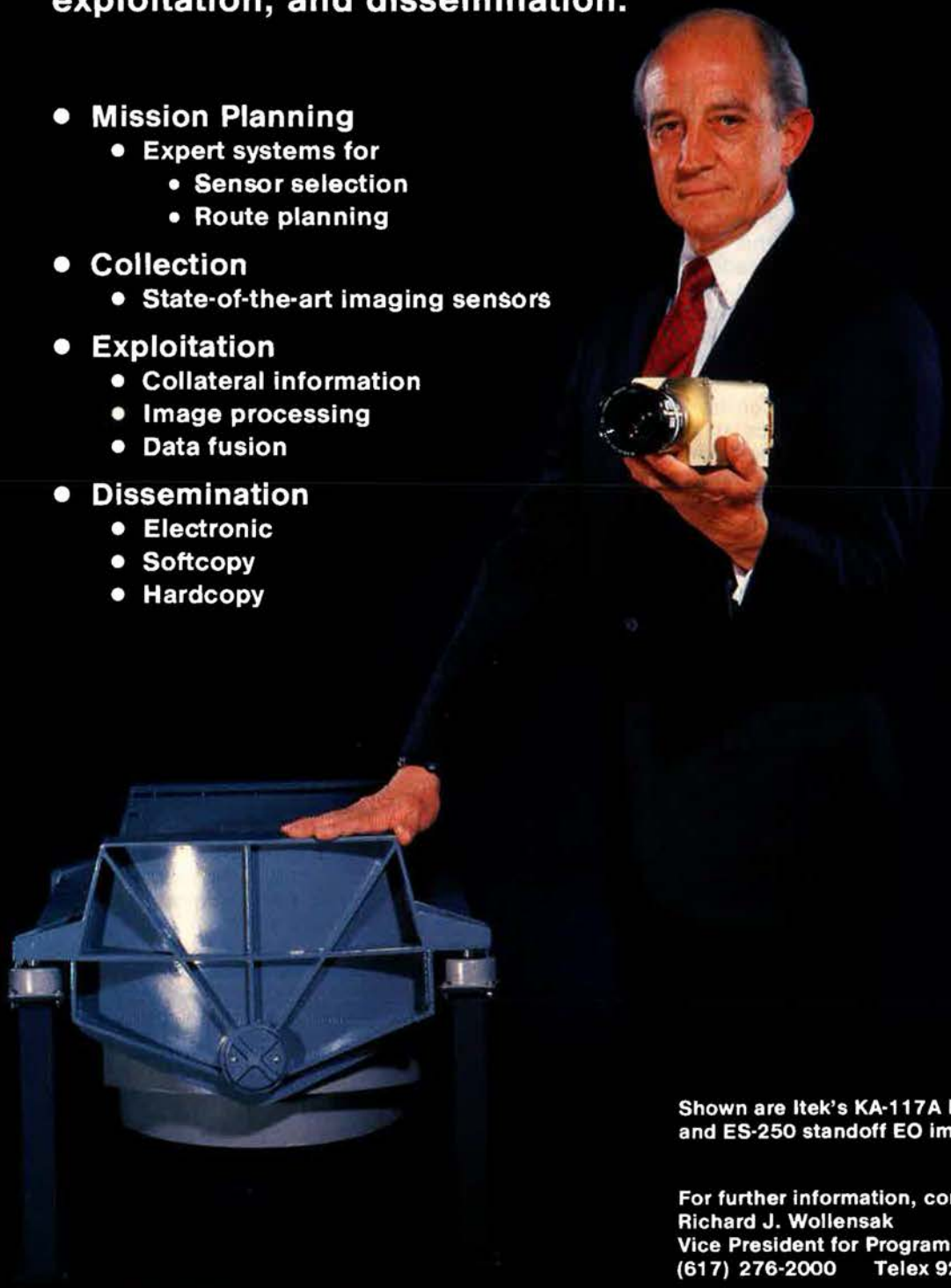

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Gallery of USAF Weapons

BY SUSAN H. H. YOUNG, ASSOCIATE COMPILER, JANE'S ALL THE WORLD'S AIRCRAFT
EDITED BY JOHN W. R. TAYLOR, EDITOR IN CHIEF, JANE'S ALL THE WORLD'S AIRCRAFT

Bombers

ATB

Now in an advanced stage of engineering development, the Advanced Technology Bomber (ATB) program is fully funded and described as being "on schedule," with "the technology . . . well understood and working." Initial operational capability is expected in the early 1990s, with the ATB assuming the high-threat penetration role of the B-1B during the final years of that decade. Sophisticated technologies, in particular the use of low-observable (stealth) techniques, provide a low probability of engagement by projected Soviet air defenses, ensuring the system's effectiveness well into the next century. The Air Force plans to deploy 132 ATBs in the 1990s at a program cost of $36.6 billion (FY '81 dollars), with first deliveries to Whiteman AFB, Mo.

In early 1986, Northrop's Advanced Systems Division completed a full-scale engineering mock-up of the ATB. First flight of an ATB is reportedly scheduled for November of this year.

Prime Contractor: Northrop Corporation Aircraft Group, with Boeing Aerospace and LTV (Vought) as key members of the development team.

Power Plant: to be provided by General Electric Engine Group.

B-1B

The long-awaited reequipment of SAC began in July 1985, when the first operational B-1B long-range penetrating bomber was delivered to Dyess AFB, Tex. Described as "essentially a large computer system surrounded by fuel and engines," this highly survivable system is smaller than the B-52, but carries a considerably greater weapons load because of improved engine performance and advanced aerodynamic technology. Up to 90 of the 100 B-1Bs will be assigned to a dual-role nuclear/theater mission, each with three weapons bays providing the flexibility to carry long- and short-range nuclear air-to-surface missiles, nuclear or conventional gravity bombs, mines, other weapons, or fuel, as required. A movable bulkhead in the forward weapons bay, to allow for the carriage of a wide range of different-size weapons, including the ALCM, is incorporated from the ninth production airframe onwards and is being retrofitted to earlier aircraft.

The B-1B is equipped with electronic jamming equipment, infrared countermeasures, radar location and warning systems, and other devices necessary to defeat enemy defensive systems. To facilitate very low-level penetration of hostile territory, it has a radar system that allows it to follow "the nap of the earth" at near supersonic speeds. This would make it extremely difficult for enemy radar systems to track the B-1B, as hills, mountains, towers, buildings, and even trees would clutter the radar screen. The use of radar-absorption materials reduces further the aircraft's radar cross section. Flying low at high speeds also negates the effectiveness of enemy interceptors because it is difficult to acquire and track B-1Bs flying close to the ground. This would enable the B-1B to penetrate sophisticated enemy defenses well into the 1990s and to operate within less heavily defended areas into the next century.

Developed from the original B-1A design, the blended wing/body B-1B is outwardly generally similar to prototype No. 4 of the earlier aircraft. The variable-geometry wing of the B-1A is retained, its unswept setting permitting rapid takeoff from a base threatened by imminent attack or operation from shorter runways and less-sophisticated airfields; the fully swept position is used in supersonic flight and for the primary role of high-subsonic, low-level penetration. Structural strengthening has facilitated an increase in gross T-O weight from 395,000 lb to 477,000 lb. Empty weight of the B-1B is only 8,000 lb above that of the B-1A, but a 75,000 lb increase in fuel/payload is achieved. Ejection seats replace the crew ejection capsule. Fixed engine inlets replace variable inlets, and new engine nacelles and simplified overwing fairings have been introduced.

Offensive and defensive electronics systems are much improved over the B-1A. The offensive avionics include modern forward-looking and terrain-following radars, an extremely accurate inertial navigation system, a link to the Air Force Satellite Communications (AFSATCOM) system, and much of the new Offensive Avionics System (OAS) package installed in B-52Gs and Hs (strategic Doppler radar and radar altimeter). The defensive avionics package is built around the ALQ-161 electronic countermeasures (ECM) system with an extended frequency coverage. This flexible, reprogrammable system automatically detects and analyzes radars illuminating the aircraft. A central computer then selects an appropriate countermeasure and applies the best ECM technique at precisely the right time, with the right power and optimal angle to protect the aircraft from the probing radar. The defensive avionics package also includes a tail warning function using the ALQ-161 system and such expendables as chaff and flares. Expectations are high that the continuing development problems affecting the new systems will be largely corrected by 1988.

Dyess AFB achieved IOC in September 1986, following delivery of 15 of its scheduled 29 B-1Bs. Deliveries are continuing at the rate of approximately four aircraft per month to Ellsworth AFB, S. D. (35 aircraft), Grand Forks AFB, N. D. (17 aircraft), and McConnell AFB, Kan. (17 aircraft). Each base will also deploy supporting in-flight refueling tankers. Deliveries will be completed in 1988.

Contractors: Rockwell International, North American Aircraft Operations; Eaton Corporation, AIL Division; Boeing Military Airplane Company; and General Electric.

Power Plant: four General Electric F101-GE-102 turbofan engines, each 30,000 lb thrust class.

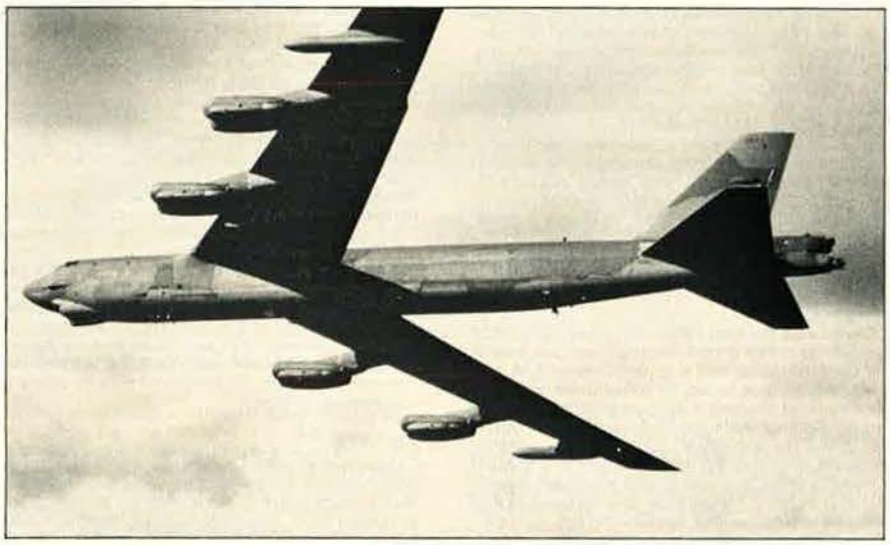
Accommodation: four: pilot, copilot, and two systems operators (offensive and defensive).

Dimensions: span spread 136 ft 8½ in, fully swept 78 ft 2½ in, length 147 ft, height 34 ft.

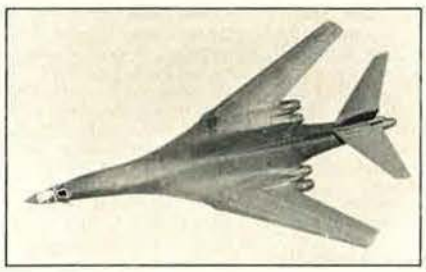
Weight: max T-O weight 477,000 lb.

Performance: max speed at low level high subsonic (supersonic at altitude); range intercontinental.

Armament: three internal weapons bays capable of accommodating in a nuclear role eight advanced cruise missiles, 24 AGM-69 SRAMs, 12 B-28 or 24 B-61 or B-83 free-fall nuclear bombs; in a nonnuclear role up to 84 Mk 82 (500 lb) or 24 Mk 84 (2,000 lb) bombs. Eight underfuselage stores stations can carry an additional 14 ACMs or SRAMs, 8 B-28s, 14 B-43/B-61/B-83s, 14 Mk 84s, or 44 Mk 82s.



Boeing B-52G Stratofortress



Rockwell B-1B

B-52 Stratofortress

Although the next decade will see a radical change in the composition of SAC's piloted force, USAF is not planning to retire any more of its remaining B-52s until most of the B-1Bs and at least some of the ATBs are operational. The 264 B-52s currently operational are capable of delivering a wide range of weapons, including

X-29 Forward Swept Wing Demonstrator

Flight testing of the unique X-29 Forward Swept Wing (FSW) multitechnology demonstrator has been under way at NASA's Dryden Flight Research Center at Edwards AFB, Calif., since December 1984. First supersonic flight took place in December 1985 when preliminary data showed Mach 1.03 airspeed at an altitude of 40,000 ft. Day-to-day management of the program was handed over to NASA following acceptance of the aircraft by USAF's Aeronautical Systems Division in March 1985. USAF manages flight-test support.

The two X-29 demonstrators were built by Grumman. A standard Northrop F-5A forward fuselage and nose landing gear and many off-the-shelf components, such as F-16 main landing gear and control surface actuators, were utilized on each aircraft to reduce costs. Integrated with a "triplex" fly-by-wire flight-control system, the X-29's forward-swept wings, made of strong, lightweight graphite composites, and its stubby canards, which act as its main control surfaces, combine to enhance lift and reduce drag. In flight, the wings' trailing-edges change shape continuously to match flight conditions. The canards, flaperons, and strake flaps at the tail work together to enhance maneuverability.

The current phase of the flight program, following the installation of an improved backup flight-control system in the fall of 1985, is testing stability and control, loads, flutter, and wing divergence up to 40,000 ft and at speeds up to Mach 1.5 during a planned total of 100 flights. Funding has been approved for preparation of the second X-29 to explore the low-speed, high-angle-of-attack side of the envelope. The first of some 45–60 flights is expected to take place in July.

Contractor: Grumman Corporation.
Power Plant: one General Electric F404-GE-400 turbofan engine; 16,000 lb st class.
Accommodation: pilot only.
Dimensions: span 27 ft 2½ in, length overall 53 ft 11¼ in, height 14 ft 3½ in.
Weights: empty 13,800 lb, gross 17,800 lb.
Performance: max level speed approx Mach 1.6.

Transports and Tankers

C-5 Galaxy

This air-refuelable, long-range, heavy logistics transport flew for the first time in June 1968. Deliveries of the basic **C-5A** to MAC began in December 1969, and all 81 of these aircraft had been received by May 1973. Each is capable of airlifting loads up to 291,000 lb, such as two M60 tanks or three CH-47 Chinook helicopters, over transoceanic ranges. Under a major modification program, Lockheed is producing kits of components to extend the service life of the C-5A's wings by 30,000 flight hours, without load restrictions. These kits replace only the five main load-carrying wing boxes, to which other existing components are transferred. The use of 7175-T73511 aluminum alloy provides greater strength and resistance to corrosion. Flight testing of a prototype installation was completed successfully during 1980, the converted C-5A being redelivered to USAF early in 1981.

McDonnell Douglas C-9A Nightingale

McDonnell Douglas C-17 (artist's concept)

Installation of production kits began in 1982, and all 77 aircraft now in the inventory should have been modified by the end of FY '87. In December 1984, the 433d MAW at Kelly AFB, Tex., became the first AFRES unit to be equipped with "AFRES-owned" C-5As. ANG's 105th MAG at Newburgh, N. Y., received its first C-5As in July 1985. AFRES's 439th TAW at Westover AFB, Mass., is also scheduled to replace its C-130s with C-5As.

To meet an urgent need for additional heavy airlift capacity, USAF is acquiring 50 **C-5Bs,** generally similar to the C-5A, but embodying all the improvements that have been introduced since completion of C-5A production. These include the strengthened wings, General Electric TF39-GE-1C turbofans, and updated avionics, including Bendix color weather radar and Delco triple INS. The original MADAR (MAlfunction Detection Analysis and Recording instrument) units are replaced by the more advanced MADAR II. The first C-5B flew for the first time on September 10, 1985, and was delivered to Altus AFB, Okla., on January 8, 1986. Funding for the final 21 aircraft was sought in the FY '87 budget. Deliveries are scheduled for completion in mid-1989. (Data for C-5B.)

Power Plant: four General Electric TF39-GE-1C turbofan engines; each 41,100 lb thrust.
Accommodation: crew of five, rest area for 15 (relief crew, etc.); 75 troops and 36 standard 463L pallets or assorted vehicles, or additional 270 troops.
Dimensions: span 222 ft 8½ in, length 247 ft 10 in, height 65 ft 1½ in.
Weights: empty 374,000 lb, max operational payload 291,000 lb, gross (for 2.0*g*) 837,000 lb.
Performance: max speed at 25,000 ft 571 mph, service ceiling (at 615,000 lb) 35,750 ft, range with 200,000 lb payload 2,700 miles, range with max payload 830 miles.

Lockheed C-5B Galaxy

C-9A Nightingale and C-9C

Derived from the DC-9 Srs 30 commercial airliner, the **C-9A** is an aeromedical airlift transport, in service since August 1968. Modifications include a special-care compartment with separate atmospheric and ventilation controls. Delivery of 21 to MAC's 375th Aeromedical Airlift Wing was completed by February 1973; this unit is now augmented by the 73d AAS (Assoc) of AFRES, co-located at Scott AFB, Ill. The Nightingale also performs overseas theater aeromedical evacuation missions in Europe and the Pacific. Three specially configured **C-9Cs** were delivered to the 89th Military Airlift Wing at Andrews AFB, Md., in 1975 for Presidential and other US governmental duties. (Data for C-9A.)

Contractor: Douglas Aircraft Company, Division of McDonnell Douglas Corporation.
Power Plant: two Pratt & Whitney JT8D-9 turbofan engines; each 14,500 lb thrust.
Accommodation: crew of three; 40 litter patients or 40 ambulatory patients, or a combination of both, plus five medical staff.
Dimensions: span 93 ft 3 in, length 119 ft 3 in, height 27 ft 6 in.
Weight: gross 108,000 lb.
Performance: max cruising speed at 25,000 ft 565 mph, ceiling 35,000 ft, range more than 2,000 miles.

C-12 Huron

Thirty military versions of the Beechcraft Super King Air 200 were delivered to USAF under the designation **C-12A.** Their role is to support attaché and military assistance advisory missions throughout the world. MAC uses two C-12As to train aircrews and to supplement support airlift. C-12As refitted with PT6A-42 engines are redesignated **C-12E.** Additionally, MAC uses 40 passenger/cargo-capable Super King Air B200Cs **(C-12Fs)** to provide operational support airlift for the time-sensitive, critical movement of people and cargo at eleven bases throughout the CONUS, PACAF, and USAFE. The C-12Fs, along with the C-21A aircraft, replaced the aging and fuel-inefficient CT-39 fleet. The ANG ordered six C-12Fs under FY '84 funding and six **C-12Js** (military versions of the 19-passenger Beechcraft 1900C) in FY '85. A competition for six more twin-engine turboprop aircraft in the C-12J class was planned for FY '87. (Data for C-12A.)

Contractor: Beech Aircraft Corporation.
Power Plant: two Pratt & Whitney Canada PT6A-38 turboprop engines; each 750 shp. (C-12F; 850 shp PT6A-42s.)
Accommodation: crew of two; up to eight passengers or 4,764 lb of cargo. Convertible to aeromedical evacuation configuration.
Dimensions: span 54 ft 6 in, length 43 ft 9 in, height 15 ft 0 in.
Weight: gross 12,500 lb.
Performance: max speed at 14,000 ft 301 mph, service ceiling 31,000 ft, range at max cruising speed 1,824 miles.

C-17

The C-17 is being developed to meet US force projection requirements for a heavy-lift, air-refuelable cargo transport able to provide intertheater and intratheater airlift of all classes of military cargo, including outsize. The C-17 will be able to operate routinely into small, austere airfields (3,000 ft × 90 ft) previously restricted to C-130s and provides the first capability to airland or airdrop/extract outsize cargo in the tactical environment. The C-17 will not only enhance US airlift capability across the board but will provide much needed force structure modernization. The C-17 will be based at active-duty locations as well as Air Force Reserve and Air National Guard bases.

McDonnell Douglas was announced as the selected prime contractor in August 1981 and received a low-level research and development contract in the following July. This was intended to cover C-17 technologies that would also benefit other airlift programs while preserving the option to proceed to full-scale development (FSD) work on the C-17. FSD was approved in February 1985, and the program is entering its third year of development. Initial procurement funding was authorized in the FY '87 budget, together with continued R&D. The FY '88 budget requests include continued FSD aimed at initiating assembly of the RDT&E flight-test aircraft in 1988 and procuring the first two production aircraft, plus long lead for the FY '89 buy of four aircraft. Current plans envisage first flight in FY '90, with IOC for 12 aircraft in FY '92. Delivery of the planned buy of 210 C-17s would be completed in the year 2000.

Contractor: Douglas Aircraft Company, Division of McDonnell Douglas Corporation.
Power Plant: four Pratt & Whitney F117-PW-100 turbofan engines; each 37,600 lb thrust.
Accommodation: normal flight crew of two, plus loadmaster. Provisions for the full range of military airlift missions.
Dimensions: span 165 ft, length 175 ft 2.4 in, height 55 ft 3.6 in.

Weights: max payload (2.25g) 172,200 lb, gross 570,000 lb.
Performance (estimated); normal cruising speed at height 518 mph (Mach 0.77), range with 167,000 lb payload 2,765 miles.

C-20 Gulfstream

USAF has acquired eleven off-the-shelf Gulfstream III transports, each with accommodation for five crew and 14 passengers, for VIP duties, to replace aging, fuel-inefficient C-140Bs. Three **C-20As** and one **C-20B,** delivered to the 89th Military Airlift Wing in FY '83 and FY '84 under a lease/purchase agreement, were subsequently purchased. Another seven **C-20Bs,** with advanced mission communications equipment and revised interior, are scheduled to be purchased. As these are delivered to Andrews AFB, the original three C-20As are being transferred to Ramstein AB, West Germany. The C-20s provide the Special Airlift Mission (SAM) fleet with intercontinental range and ability to operate from short runways.
Contractor: Gulfstream Aerospace Corporation.
Power Plant: two Rolls-Royce F113-RR-100 turbofan engines, each 11,400 lb thrust.
Accommodation: crew of five; 14–18 passengers.
Dimensions: span 77 ft 10 in, length 83 ft 1 in, height 24 ft 4½ in.
Weight: gross 69,700 lb.
Performance: max cruising speed 577 mph, service ceiling 45,000 ft, range 4,050 miles.

C-21A

USAF operates 80 C-21A aircraft (military versions of the Learjet 35A). These aircraft, together with the C-12Fs, replaced the CT-39 fleet and are used to provide operational support airlift from 16 bases for the time-sensitive, critical movement of people and cargo throughout the United States and the Pacific and European theaters. ANG will also replace its four Andrews-based T-39s with four C-21As, using FY '86 funds.
Contractor: Gates Learjet Corporation.
Power Plant: two Garrett TFE731-2A turbofan engines; each 3,500 lb thrust.
Accommodation: crew of two and up to eight passengers or 3,153 lb cargo. Convertible to aeromedical evacuation configuration.
Dimensions: span 39 ft 6 in, length 48 ft 8 in, height 12 ft 4 in.
Weight: gross 18,500 lb.
Performance: cruising speed Mach 0.81, service ceiling 45,000 ft, range with maximum passenger load 2,420 miles, with maximum cargo load 1,653 miles.

C-22B

Under the designation C-22B, four Boeing 727 commercial transports have been purchased and are being modified for use by ANG on operational support airlift missions.

C-23 Sherpa

Eighteeen Sherpa light transports were delivered to USAF between November 1984 and December 1985. They are operated by MAC and controlled by CINC USAFE, primarily to ferry aircraft spares and complete engines to bases throughout Europe. The contract includes options for 48 more Sherpas.

First flown on December 23, 1982, the Sherpa is an all-freight version of the Shorts 330 regional airliner, with a 6 ft 6 in square cabin section over an unimpeded hold length of 29 ft. Through loading is provided via a large forward freight door, a full-width hydraulically operated rear ramp door, and removable roller conveyors. The USAF aircraft are used in the European Distribution System Aircraft (EDSA) program, centered on Zweibrücken, in Germany, with main warehousing facilities at RAF Kemble in the UK and Torrejon AB in Spain. In peacetime, the Sherpas service at least 20 USAF bases, in a system analogous with the civil air freight operation carried out by Federal Express in the US. They have reduced transit time on delivery of parts from as much as a week to only one to four days.
Contractor: Short Brothers PLC.
Power Plant: two Pratt & Whitney Canada PT6A-45R turboprop engines; each 1,198 shp.
Accommodation: crew of three; up to 7,000 lb of freight, including four LD3 containers, and engines the size of the F100 series.
Dimensions: span 74 ft 8 in, length 58 ft 0½ in, height 16 ft 3 in.
Weight: gross 22,900 lb.
Performance: max cruising speed at 10,000 ft 218 mph, range 770 miles with 4,400 lb payload.

VC-25A

USAF has assigned the military designation VC-25A to the two Air Force One replacement aircraft, based on Boeing 747-200B airframes. These aircraft will replace the current primary and backup Air Force One aircraft (C-137Cs) and will be delivered to Andrews AFB in November 1988 and May 1989 respectively.

Gulfstream C-20B Gulfstream

Gates Learjet C-21A

Short Brothers C-23 Sherpa

Lockheed HC-130H

Contractor: Boeing Military Airplane Company.
Power Plant: four General Electric CF6-80C2-B1 turbofan engines; each 56,700 lb thrust.
Accommodation: crew of 23; up to 70 passengers.
Dimensions: span 195 ft 8 in, length 231 ft 10 in, height 64 ft 3 in.
Weight: gross 814,000 lb.
Performance: max cruising speed Mach 0.91, normal cruising speed Mach 0.84, service ceiling 45,000 ft, unrefueled range 7,215 miles.

C-27

A C-STOL System Program Office was established on September 1, 1986, to procure and deploy 10 new off-the-shelf STOL intratheater transports to ensure appropriate response to low-intensity conflict worldwide. Now designated C-27, the aircraft is envisaged as rugged, simple, maneuverable, smaller than a C-130, but with the versatility of a light passenger/cargo STOL transport. A full competition is planned for late FY '87, with contract award at the beginning of FY '88 and first aircraft delivery in the last quarter of FY '88. The FY '88 budget includes a request for $65.9 million to procure the first five C-27s.

CT-39 Sabreliner

Acquired in the late 1950s and early 1960s, the CT-39 Sabreliner became increasingly less cost-effective and has been replaced in MAC by the C-12F and C-21A. The few **CT-39A/B** basic utility and training aircraft still in the inventory are in service with AFSC and with AFCC facility checking squadrons, which use two Sabreliners, together with four C-140As, to evaluate communications and navigation aids at Air Force bases. In addition, ATC has acquired CT-39As in support of the Air Force Instrument Flight Center.
Contractor: Sabreliner Division of Rockwell International Corporation.
Power Plant: two Pratt & Whitney J60-P-3 turbojet engines, each 3,000 lb thrust.
Accommodation: crew of two; four to seven passengers.
Dimensions: span 44 ft 5 in, length 43 ft 9 in, height 16 ft 0 in.
Weights: empty 9,300 lb, gross 17,760 lb.
Performance: max speed at 36,000 ft 595 mph, service ceiling 39,000 ft, range 1,950 miles.

C-130 Hercules

Designed originally to a specification issued by TAC some 36 years ago, the remarkable C-130 remains in production, with basic and specialized versions continuing to perform a diversity of roles worldwide, including airlift support, DEW Line and Arctic ice cap resupply, aeromedical missions, aerial spray missions, and fire fighting duties for the US Forest Service. The initial production model was the **C-130A,** first flown in April 1955, with 3,750 ehp Allison T56-A-11 or -9 turboprops; 219 were ordered, and deliveries began in December 1956. Two **DC-130As** (originally GC-130As) were built as drone launchers/directors for ARDC (now AFSC), carrying up to four drones on underwing pylons. All special equipment was removable, permitting the aircraft to be used as freighters, assault transports, or ambulances, as required. The **C-130B** introduced 4,050 ehp Allison T56-A-7 turboprops; the first of 134 entered USAF service in April 1959. Six C-130Bs were modified in 1961 for airsnatch recovery of classified USAF satellites by the 6593d Test Squadron at Hickam AFB. Twelve **C-130Ds** were modified C-130As for use in the Arctic, with wheel-ski landing gear, increased fuel capacity, and provision for JATO. The **C-130E** is an extended-range development of the C-130B, with large underwing fuel tanks; 389 were ordered for MAC and TAC, with deliveries beginning in April 1962. Wing modification presently under way to correct fatigue and corrosion on USAF's current force of 492 C-130B/Es will extend the life of the aircraft well into the next century. C-130A wing repairs will allow operation into the 1990s. Fourteen C-130Es were modified to **MC-130E (Combat Talon I)** standard and equipped for use in low-level deep-penetration tactical missions by the 1st, 7th, and 8th Special Operations Squadrons based in the Philippines, West Germany, and Florida, respectively. This version is being supplemented by the **MC-130H (Combat Talon II),** of which seven were funded in FY '87, with seven more requested in FY '88. By 1992, the inventory is expected to include 24 of these aircraft, equipped with terrain-following radar, precision navigation/airdrop, in-flight refueling, the Fulton STAR midair recovery system, and self-protection systems. Generally similar to the E, the basic **C-130H** has uprated T56-A-15 turboprop engines, a redesigned outer wing, updated avionics, and other, minor improvements; delivery began in April 1975. C-130s are currently active in USAF regular, Reserve, and ANG airlift squadrons. Other variants include **HC-130H/N/P** for MAC's 23d Air Force and MAC-gained units of the ANG and Reserve, and the **AC-130A/H** and **WC-130E/H,** described separately. (Data for C-130H.)
Contractor: Lockheed-Georgia Company.
Power Plant: four Allison T56-A-15 turboprop engines; each 4,508 ehp.
Accommodation: crew of five; up to 92 troops, 64 paratroops, 74 litter patients, or up to five 463L standard freight pallets, etc.
Dimensions: span 132 ft 7 in, length 97 ft 9 in, height 38 ft 3 in.
Weights: operating 80,000 lb, max payload 50,000 lb, gross 175,000 lb.
Performance: max speed at 20,000 ft 345 mph, service ceiling (at 175,000 lb) 23,000 ft, range with max payload 840 miles.

HC-130

Constituting a major element of MAC's 23d Air Force, the **HC-130H** is an extended-range version of the C-130, ordered in 1963, with uprated T56-A-15 engines and specialized search and rescue equipment for the recovery of aircrews and retrieval of space hardware. This includes advanced direction-finding equipment and air-to-air recovery (ATAR) systems. Initial flight was made in December 1964, and 43 were delivered. Crew complement is ten to 12. Twenty **HC-130Ps** are similar, but adapted to refuel helicopters in flight. Four **JHC-130H** conversions were fitted with equipment for aerial recovery of reentering space capsules. Under a 1974 USAF contract, another HC-130H was modified by LAS to **DC-130H** standard, with four pylons each capable of carrying a 10,000 lb new-generation RPV. Fifteen **HC-130Ns,** a search-and-rescue version of the HC-130P with advanced direction-finding equipment, were ordered in 1969; these aircraft are also capable of in-flight refueling of helicopters. (Other data similar to C-130.)

C-131 Samaritan

Eighteen Convair C-131 twin-engine transports, with an average age of around 30 years, remain in service with the ANG for support airlift.

Boeing KC-135R Stratotanker

KC-135 Stratotanker

As single manager of all USAF KC-135 tanker aircraft, SAC supports its own refueling requirements as well as aerial refueling requirements of other Air Force commands, the US Navy and Marines, and other nations. Although similar in size and appearance to commercial 707 aircraft, the KC-135 was designed to military specifications, incorporates different structural details and materials, and was designed to operate at high gross weights. The KC-135 fuel tankage is located in the "wet wings" and in fuel tanks below the floor in the fuselage. The first flight of the **KC-135A** was in August 1956, and by 1966 a total of 732 had been built. Five hundred ninety-five remain in operational service, though many have been modified to later standards in three programs initiated to enhance the KC-135's capability and extend its operational utility beyond the year 2000. First, the selection of 22,000 lb thrust General Electric/SNECMA F108-CF-100 (CFM56) fuel-efficient engines for retrofit of the KC-135 fleet was announced in 1980. Reengined aircraft are designated **KC-135R** and have a gross weight of 322,500 lb. They embody modifications to 25 major systems/subsystems and not only carry more fuel farther but also have reduced maintenance costs, are able to operate from shorter runways, and are less pollution-prone. The first of them made its first flight in August 1982 and was delivered to SAC in July 1984; USAF plans to acquire 389 modification kits by FY '90. Second, the JT3D reengining program, scheduled for completion at the end of last year, upgraded the 128 KC-135As serving in thirteen ANG and three AFRES units to **KC-135E** standard; the JT3D turbofan engines, removed from surplus commercial 707s, permit an increased gross weight of 299,000 lb. Finally, the Life Extension Structural Modification provides for renewal of the lower wing skin, which eliminates peacetime airframe restrictions by ensuring the structural integrity of the aircraft. Development of new and improved aerial refueling systems is also under way. (Data for KC-135A.)

Contractor: Boeing Military Airplane Company.
Power Plant: four Pratt & Whitney J57-P-59W turbojet engines; each 13,750 lb thrust.
Accommodation: crew of four or five; up to 80 passengers.
Dimensions: span 130 ft 10 in, length 136 ft 3 in, height 38 ft 4 in.
Weights: empty 98,466 lb, gross 297,000 lb.
Performance: max speed at 30,000 ft 585 mph, service ceiling 50,000 ft, range with 120,000 lb of transfer fuel 1,150 miles, ferry mission 9,200 miles.

C-135 Stratolifter

Thirteen C-135 transports and variants, without the KC-135's refueling equipment, remain operational with MAC. They were ordered originally to serve as interim jet passenger/cargo transports, pending delivery of C-141s. Three converted KC-135s were followed by 45 production Stratolifters in two versions: the **C-135A** with J57-P-59W turbojet engines and **C-135B** with Pratt & Whitney TF33-P-5 turbofans. Eleven Bs were retrofitted with revised interior for VIP transportation; others became **WC-135B** and **RC-135E/M.** Additionally, a C-135 belonging to ASD's 4950th Test Wing is to be permanently modified to become a Laser Communications Airborne Test-bed. Data similar to KC-135, except:

Dimension: length 134 ft 6 in.
Weights (C-135B): operating weight empty 102,300 lb, gross 275,500 lb.
Accommodation (C-135B): 60 passengers.
Performance (C-135B): max speed 600 mph, range with 54,000 lb payload 4,625 miles.

C-137 Stratoliner

Five specially modified Boeing 707 transports are operated by MAC's 89th Military Airlift Wing from Andrews AFB, Md., for VIP duties. Best known is "Air Force One," a **C-137C** for use by the President. It is basically a

Boeing C-137C

707-320B with a special VIP interior. A second C-137C is also operated, together with three smaller 707-120s, originally designated VC-137As but later modified to **C-137B** standard by the installation of turbofan engines. Both "Air Force One" and its backup are to be replaced within the next two years by modified Boeing 747-200Bs (VC-25As).

Contractor: The Boeing Company.
Power Plant: four Pratt & Whitney JT3D-3 turbofan engines; each 18,000 lb thrust.
Dimensions: C-137B span 130 ft 10 in, length 144 ft 6 in, height 42 ft 0 in; C-137C span 145 ft 9 in, length 152 ft 11 in, height 42 ft 5 in.
Weights: C-137B gross 258,000 lb; C-137C gross 322,000 lb.
Performance (C-137C): max speed 627 mph, service ceiling 42,000 ft, range 5,150 miles.

C-140 JetStar

JetStars entered USAF service in 1961. Four **C-140As** are used by Air Force Communications Command (AFCC) to evaluate landing systems, navigational aids, radar approach control equipment, and controllers and tower operators. Scheduled for replacement by the C-20A, MAC has eight **C-140B** transport versions, four of which serve with the 89th Military Airlift Wing, operating from Andrews AFB, Md. The other four are used by USAFE for operational support airlift.

Contractor: Lockheed-Georgia Company.
Power Plant: four Pratt & Whitney J60-P-5A turbojet engines; each 3,000 lb thrust.
Accommodation: C-140A crew of five; C-140B crew of four and eight passengers.
Dimensions: span 54 ft 11 in, length 60 ft 5 in, height 20 ft 5 in.
Weight: gross 40,920 lb
Performance: max cruising speed at 20,000 ft 550 mph, ceiling above 45,000 ft, range with reserves 2,280 miles.

C-141 StarLifter

The **C-141A** began operations with MAC in April 1965. Two hundred and eighty-five were built, some of which were structurally modified to accommodate the 82,207 lb Minuteman ICBM. During operational use it became

Lockheed C-141B StarLifter

clear that the cargo compartment was often fully loaded without the aircraft's maximum payload capability being utilized. In order to realize the C-141's full potential, USAF funded modification of the entire force of 270 (now 267) aircraft to **C-141B** standard, except for four AFSC aircraft used for test purposes. The fuselage was lengthened by 23 ft 4 in, and an in-flight refueling capability was added. The first production C-141B was delivered to USAF in December 1979, and the final modified StarLifter was obtained in June 1982, ahead of schedule and below projected cost. The modification significantly increased MAC's airlift capability, giving USAF the equivalent of 90 additional C-141A aircraft. Latest C-141 modifications include the installation of new digital flight data recorders, enhanced station keeping equipment capability, 50 kHz VOR/ILS receivers, and secure voice capability on UHF and HF radios. In addition, 13 437th MAW C-141Bs will have electroluminescent (EL) light panels installed on the flight deck for use in the wing's Special Operations Low Level (SOLL) mission.

Two C-141s are being used in ASD's Mark XV IFF program to test the US and NATO services' next generation of IFF equipment.

Last year, 16 C-141s were transferred from the active force, eight to AFRES's 459th TAW at Andrews AFB, Md., and eight to ANG's 172d TAG at Jackson MAP, Miss. A total of 80 aircraft will be transferred by 1997. (Data for C-141B.)

Contractor: Lockheed-Georgia Company.
Power Plant: four Pratt & Whitney TF33-P-7 turbofan engines; each 21,000 lb thrust.
Accommodation: crew of five; cargo on 13 standard 463L pallets. Alternative freight or vehicle payloads, 200 fully equipped troops, 155 paratroops, or 103 litter patients plus attendants.
Dimensions: span 159 ft 11 in, length 168 ft 3½ in, height 39 ft 3 in.
Weights: operating 149,000 lb, max payload 89,000 lb, gross 343,000 lb.
Performance: max cruising speed 566 mph, range with max payload 2,293 miles (range significantly increased if air refueling used).

KC-10A Extender

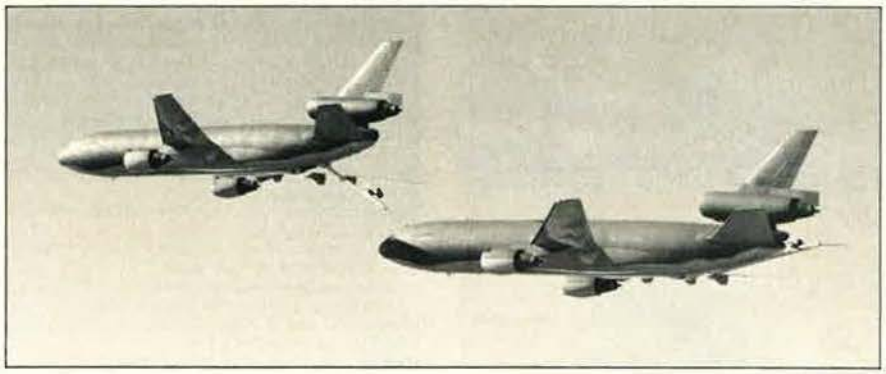
Sixty KC-10As have been funded by USAF, 48 of which had been delivered by last fall, with final delivery anticipated for the end of this year.

The KC-10 was conceived to meet specific USAF requirements for an Advanced Tanker/Cargo Aircraft (ATCA); it is based on the commercial DC-10 Series 30CF, modified to include body bladder fuel cells in the lower cargo compartments, a boom operator's station, an aerial refueling boom, a refueling receptacle, and military avionics. In its primary role of increasing US air mobility on a worldwide scale, a single KC-10A is able to combine the tasks of tanker and cargo aircraft by refueling fighters and simultaneously carrying the fighters' support equipment and support personnel on overseas missions. It can refuel strategic transports, such as the C-5 and C-141, nearly doubling, for example, the nonstop range of a fully loaded C-5. It can refuel strategic offensive and reconnaissance aircraft during long-range conventional operations, and it can augment cargo-carrying capability on a selected basis. The range of refueling equipment installed also enables the KC-10A to service USN, USMC, and NATO aircraft. In terms of active deployment, the KC-10A's refueling capabilities and long range will, in many situations, dispense with the need for forward bases, while also leaving vital fuel supplies in the theater of operations untouched. In addition, similarity to the civilian DC-10 has led to a system whereby the Extender can use commercial facilities for most maintenance. The manufacturer orders parts and handles heavy repairs; only routine and flight-line maintenance is done by the Air Force.

The first KC-10A made its maiden flight in July 1980, and delivery of the first KC-10A to enter service took place in March 1981 for operation by SAC. USAF units equipped with KC-10As include the 9th ARS at March AFB, Calif., the 32d ARS at Barksdale AFB, La., and the 344th ARS and 911th ARS at Seymour Johnson AFB, N. C.; AFRES's 79th ARS (Associate) at March AFB, 78th ARS (Associate) at Barksdale, and 77th ARS (Associate) at Seymour Johnson AFB share the aircraft with the active-duty squadrons at their respective bases.

A KC-10A demonstrated its capability in February 1985 by making a nonstop unrefueled flight of 8,982 miles from Riyadh, Saudi Arabia, to March AFB, Calif., in 17.8 hours.

Contractor: Douglas Aircraft Company, Division of McDonnell Douglas Corporation.
Power Plant: three General Electric CF6-50C2 turbofan engines, each 52,500 lb thrust. Design fuel capacity 356,065 lb.
Accommodation: crew of three on flight deck; seating for limited number of essential support personnel; max 25/27 pallets; max cargo payload is 169,409 lb.
Dimensions: span 165 ft 4.4 in, length 181 ft 7 in, height 58 ft 1 in.
Weight: gross 590,000 lb.



Boeing KC-10A Extenders

Performance: max speed at 42,000 ft 528 mph, service ceiling 42,000 ft, max range with max cargo 4,370 miles; or delivery of 200,000 lb of transfer fuel to a receiver 2,200 miles from its home base and return.

Trainers

T-33A Shooting Star

Derived from the F-80 Shooting Star jet fighter, those T-33s still in service are used for combat support missions and for proficiency and radar target evaluation training. Combat armament is replaced by an all-weather "navigational nose." The T-33 will be phased out in FY '88.

Contractor: Lockheed Aircraft Corporation.
Power Plant: one Allison J33-A-35 turbojet engine; 4,600 lb thrust.
Accommodation: crew of two in tandem.
Dimensions: span 38 ft 10½ in, length 37 ft 9 in, height 11 ft 4 in.
Weights: empty 8,084 lb, gross 15,100 lb.
Performance: max speed at 25,000 ft 543 mph, service ceiling 47,500 ft.
Armament: two 0.50-caliber machine guns on some early aircraft only.

Lockheed T-33A Shooting Star

Cessna T-37B Tweet

T-37B Tweet

USAF's first purpose-built jet trainer, the T-37 is Air Training Command's standard two-seat primary trainer. The original T-37A was superseded in November 1959 by the T-37B, and all A models were converted subsequently to B standard. Well over 1,000 T-37s were built, of which more than 600 remain in USAF's inventory.

Modified T-37s were expected to take part in a competitive fly-off in late FY '87, together with the T-46 and any other candidates for USAF's next-generation primary trainer. Whether or not this will happen, following termination of the T-46 program, is uncertain.

Contractor: Cessna Aircraft Company.
Power Plant: two Continental J69-T-25 turbojet engines; each 1,025 lb thrust.
Accommodation: two, side-by-side.
Dimensions: span 33 ft 9.3 in, length 29 ft 3 in, height 9 ft 2.3 in.
Weights: empty 3,870 lb, gross 6,600 lb.
Performance: max speed at 25,000 ft 426 mph, service ceiling 35,100 ft, range at 360 mph with standard tankage 870 miles.

T-38A Talon and AT-38B

Almost identical in structure to the F-5A export tactical fighter, the **T-38A** lightweight twin-jet advanced trainer is capable of flying well above supersonic speed in level flight. First flown in April 1959, it was in continuous production from 1956 to 1972 and entered operational service in March 1961. Of 1,187 T-38s built, more than 1,100 were delivered to USAF, and about 850 remain in service throughout the Air Force. Most are used by ATC; others fly with SAC and with the 479th Tactical Training Wing at Holloman AFB, N. M., where a slightly different version designated **AT-38B,** with a gunsight and practice bomb dispensers, is used for Fighter Lead-In Training (FLIT). A contract currently under way to rewing the Talon will allow the aircraft to fly well into the next century.

Contractor: Northrop Corporation.
Power Plant: two General Electric J85-GE-5 turbojet engines; each 2,680 lb thrust dry, 3,850 lb thrust with afterburning.
Accommodation: student and instructor, in tandem.
Dimensions: span 25 ft 3 in, length 46 ft 4½ in, height 12 ft 10½ in.
Weights: empty 7,164 lb, gross 12,093 lb.

Northrop T-38A Talon

Boeing T-43A

Performance: max level speed at 36,000 ft more than Mach 1.23 (812 mph), ceiling above 55,000 ft, range, with reserves, 1,093 miles.

T-41 Mescalero

The **T-41A** trainer is a standard Cessna Model 172 light aircraft acquired by USAF for use in a preliminary flight screening program for USAF pilot candidates. An initial order for 170 aircraft in 1964 was supplemented by a further 34 in July 1967. More powerful **T-41Cs,** based on the Cessna Model R172E, are used for cadet flight training at the USAF Academy. (Data for T-41A.)

Contractor: Cessna Aircraft Company.
Power Plant: one Continental O-300-C piston engine; 145 hp. (210 hp Continental O-360-D in T-41C.)
Accommodation: crew of two, side-by-side.
Dimensions: span 35 ft 10 in, length 26 ft 11 in, height 8 ft 9½ in.
Weights: empty 1,285 lb, gross 2,300 lb.
Performance: max speed at S/L 139 mph, service ceiling 13,100 ft, range 720 miles.

T-43A

Derived from the commercial Boeing Model 737-200, the T-43A navigation trainer made its first flight in April 1973. It was developed as a replacement for the piston-engine T-29 and was equipped with the same on-board avionics as the most advanced USAF operational aircraft of that time, including celestial, radar, and inertial navigation systems, LORAN, and other radio systems. Deliveries of the 18 aircraft ordered for ATC were completed in July 1974. Fourteen remain in the ATC inventory; the other four are assigned to the ANG.

Contractor: Boeing Aerospace Company.
Power Plant: two Pratt & Whitney JT8D-9 turbofan engines, each 14,500 lb thrust.
Accommodation: crew of two, 12 students, five advanced students, and three instructors.
Dimensions: span 93 ft 0 in, length 100 ft 0 in, height 37 ft 0 in.
Weight: gross 115,500 lb.
Performance: econ cruising speed at 35,000 ft Mach 0.7, operational range 2,995 miles.

T-46A

Choice of a next-generation primary trainer for USAF seems no nearer than it was at this time last year. Fairchild Republic has built and flown both full-scale development examples of the T-46A, which was intended to replace the T-37, along with one production aircraft. However, USAF terminated the program after the production T-46 was delivered. The original Lot 1 production contract called for delivery of ten aircraft. The future of the congressionally mandated flyoff between the T-46, a modified T-37, a so-called "new technology" T-37, and others is still cloudy, however, since Fairchild Republic has decided to close its Long Island, N. Y., plant and is apparently out of the military airplane-building business, thus seemingly disqualifying the T-46A as a contender.

The T-46A retained the twin-engine and side-by-side seating features of the T-37, but added pressurization, increased range, and greatly improved adverse weather capability. The combination of pressurization and the greater thrust of the engines would have enabled the aircraft to utilize training airspace up to 35,000 ft.

Contractor: Fairchild Republic Company.
Power Plant: two Garrett F109-GA-100 turbofan engines; each 1,330 lb thrust.
Accommodation: pupil and instructor, side-by-side.
Dimensions: span 38 ft 7¾ in, length 29 ft 6 in, height 9 ft 11¾ in.
Weights: empty 5,590 lb, gross 7,295 lb.
Performance: max level speed at 30,000 ft 450 mph, service ceiling 45,700 ft, range with max fuel 1,080 miles.

UV-18B Twin Otter

The UV-18B is a military version of the DHC-6 Twin Otter STOL utility transport. Two were procured in FY '77 for use as parachute jump training aircraft at the Air Force Academy.

Contractor: The de Havilland Aircraft of Canada Ltd.
Power Plant: two Pratt & Whitney Canada PT6A-27 turboprop engines; each 620 ehp.
Accommodation: crew of two and up to 20 passengers.
Dimensions: span 65 ft 0 in, length 51 ft 9 in, height 19 ft 6 in.
Weight: gross 12,500 lb.
Performance: max cruising speed 210 mph, service ceiling 26,700 ft, range with 2,500 lb payload 806 miles.

Helicopters

TH/UH-1F, UH-1P, and HH-1H Iroquois

Basically a military version of the Bell Model 204, the **UH-1F** was developed for missile site support duties. USAF ordered 146, of which a few were modified to **UH-1Ps** for classified psychological missions in Vietnam. **TH-1F** is a version of the UH-1F for instrument training. In November 1970, USAF ordered 30 larger 12/15-seat **HH-1Hs,** based on the Model 205, for local base rescue duties. All four models continue in service. (Data for UH-1F.)

Contractor: Bell Helicopter Textron.

Power Plant: one General Electric T58-GE-3 turboshaft engine; 1,272 shp (derated to 1,100 shp).

Accommodation: one pilot and 10 passengers; or two crew and 2,000 lb of cargo.

Dimensions: rotor diameter 48 ft 0 in, length of fuselage 39 ft 7½ in, height 14 ft 8 in.

Weight: gross 9,000 lb (9,500 lb for HH-1H).

Performance: max speed 138 mph, service ceiling at mission gross weight 13,450 ft, max range, no allowances, at mission gross weight 347 miles.

UH-1N Iroquois

The UH-1N is a twin-engine version of the UH-1 utility helicopter. Seventy-nine were ordered for USAF, most of which remain in the inventory for combat rescue and Special Operations Force duties with MAC's 23d Air Force.

Contractor: Bell Helicopter Textron.

Power Plant: Pratt & Whitney Canada T400-CP-400 Turbo "Twin-Pac," consisting of two PT6 turboshaft engines coupled to a combining gearbox with a single output shaft; flat-rated to 1,290 shp.

Accommodation: pilot and 14 passengers or cargo; or external load of 4,000 lb.

Dimensions: rotor diameter (with tracking tips) 48 ft 2¼ in, length of fuselage 42 ft 4¾ in, height 14 ft 10¼ in.

Weight: gross and mission weight 11,200 lb.

Performance: max cruising speed at S/L 115 mph, service ceiling 13,000 ft, max range, no reserves, 261 miles.

Armament (optional): two General Electric 7.62-mm Miniguns or two 40-mm grenade launchers; two seven-tube 2.75-in rocket launchers.

CH-3E

This twin-engine amphibious transport helicopter, based on the US Navy's SH-3A Sea King, incorporates important design changes that permit speedier cargo handling and ease of maintenance, with built-in equipment for the removal and replacement of all major components in remote areas. The initial version was the CH-3C. Introduction of uprated engines led to the designation CH-3E in February 1966, applicable to 42 new production aircraft and 41 reengined CH-3Cs, of which 50 were adapted subsequently as HH-3Es *(see below)*. CH-3 missions include Special Operations duties, natural disaster relief, and evacuation.

Contractor: Sikorsky Aircraft, Division of United Technologies Corporation.

Power Plant: two General Electric T58-GE-5 turboshaft engines; each 1,500 shp.

Accommodation: crew of two or three; 25 fully equipped troops, 15 litters, or 5,000 lb of cargo.

Dimensions: rotor diameter 62 ft 0 in, length of fuselage 57 ft 3 in, height 18 ft 1 in.

Weights: empty 13,255 lb, gross 22,050 lb.

Performance: max speed at S/L 162 mph, service ceiling 11,100 ft, max range, with 10% reserve, 465 miles.

Armament: General Electric 7.62-mm machine gun.

HH-3E Jolly Green Giant

Modified version of the CH-3E for USAF's Aerospace Rescue and Recovery Service, originally to facilitate penetration deep into North Vietnam on rescue missions. Additional equipment includes self-sealing fuel tanks, armor, defensive armament, a rescue hoist, and a retractable in-flight refueling probe. HH-3s are now assigned also to rescue units of the Reserve and ANG. (Data basically similar to CH-3E above.)

HH-53B Super Jolly

This twin-turbine heavy-lift helicopter was ordered in September 1966 for USAF's Aerospace Rescue and Recovery Service to supplement the HH-3E. The HH-53B carries the same general equipment as the HH-3E, including the in-flight refueling probe and all-weather avionics and armament, but is faster and larger. The first flew in March 1967; delivery began in June the same year. After extensive use for rescue operations in Southeast Asia, HH-53Bs continue in first-line service.

Contractor: Sikorsky Aircraft, Division of United Technologies Corporation.

Bell UH-1N Iroquois

Sikorsky HH-3E Jolly Green Giants

Sikorsky HH-53C

Sikorsky UH-60A Black Hawk

Power Plant: two General Electric T64-GE-7 turboshaft engines; each 3,925 shp.

Accommodation: crew of five; basic accommodation for 38 combat-equipped troops or 24 litters and four attendants.

Dimensions: rotor diameter 72 ft 3 in, length of fuselage (without refueling probe) 67 ft 2 in, height 24 ft 11 in.

Weights: empty 23,125 lb, gross 42,000 lb.

Performance: max speed at S/L 186 mph, service ceiling 18,400 ft, max range, with 10% reserve, 540 miles.

HH-53C and CH-53C

The **HH-53C,** an improved version of the HH-53B, was first delivered to USAF in August 1968. With a maximum speed of 196 mph, it can transport 38 passengers or 18,500 lb of freight and has an external cargo hook of 20,000 lb capacity. Other data basically as for HH-53B above. A total of 72 HH-53B/Cs was built. Eight generally similar **CH-53Cs** are used to provide battlefield mobility for the Air Force mobile Tactical Air Control System.

MH-53H/J Pave Low

Under USAF's Pave Low III program, nine HH-53Cs were modified for night and adverse weather operations and redesignated **MH-53H;** two lost in accidents in 1984 were replaced last year. Equipment includes a stabilized FLIR installation mounted below the refueling boom, an inertial navigation system, a new Doppler navigation system, and the computer-projected map display and radar from the A-7D, with the radar installed in an offset "thimble" fairing on the nose.

The first of the MH-53Hs was delivered to Pensacola, Fla., in March 1979, and the last in 1980. They form part of USAF's Special Operations Forces and are being joined by 31 **MH-53Js** that the Air Force is modifying to Pave Low Enhanced configuration under a program initiated in 1986.

UH-60A Black Hawk

USAF received ten **UH-60A** Black Hawks in standard US Army configuration, including a rescue hoist, deicing system, and winterization and air transportability kits. These were delivered to the 55th Aerospace Rescue and Recovery Squadron at Eglin AFB, Fla. An eleventh helicopter was used for prototype development of the HH-60A Night Hawk, now canceled. Under the Credible Hawk contract, Sikorsky is modifying the UH-60As to incorporate an aerial refueling probe, auxiliary fuel tank, and fuel management panel.

Contractor: Sikorsky Aircraft, Division of United Technologies Corporation.

Power Plant: two General Electric T700-GE-700 turboshaft engines; each 1,560 shp.

Accommodation: crew of two or three; 11–14 troops, up to six litters, or internal or external cargo.

Dimensions: rotor diameter 53 ft 8 in, length of fuselage 50 ft 0¾ in, height 16 ft 10 in.

Weights: empty 10,624 lb, gross 16,260–20,250 lb.

Performance: max speed 184 mph, service ceiling 19,000 ft, max range, with reserves, 373 miles (internal fuel), 1,380 miles (external tanks).

CV-22A Osprey

Under a contract awarded in May 1986, Boeing Vertol Company and Bell Helicopter Textron are prime contractors in a seven-year full-scale development (FSD) program for the V-22 Osprey, which resulted from the US government's Joint Services Advanced Vertical Lift Aircraft (formerly JVX) proposal. The USN and USAF are currently participating in the program, with the former as executive service. This tilt-rotor, multimission aircraft, based on Bell's XV-15, is designed to have the maneuverability and lift capability of a helicopter and speed of a fixed-wing aircraft. Boeing Vertol has overall responsibility for the aircraft's tail unit, overwing fairings, and fuselage, while Bell will build the wing, nacelles, transmissions, and rotor hub assemblies. Under subcontracts, Grumman is designing and building the V-22's tail unit, General Electric the digital fly-by-wire flight-control system, Lockheed-Georgia the wing control surfaces and fixed trailing-edge, and Menasco of Canada and Dowty of Canada, respectively, the nose and main landing gear. Allison will supply the aircraft's two 6,000 shp T406-AD-400 turboshaft engines.

USAF requires 80 long-range versions of the aircraft (designated **CV-22A**) for special operations to carry 12 troops or up to 2,880 lb of internal cargo over an 806-mile mission radius at 288 mph, with capability to hover OGE at 5,000 ft.

First flight of the V-22 Osprey is planned for June 1988, with production deliveries to the Marine Corps beginning in December 1991 (MV-22). Deliveries to the USN (HV-22) and the USAF (CV-22) will begin in late 1992; the US Army will receive its multimission version (MV-22) in mid-1993.

The following data are provisional:

Dimensions: rotor diameter (each) 38 ft 0 in, length 57 ft 4 in, height over tail fins 17 ft 4 in.

Weights: gross, STOL 59,000 lb, VTOL 47,500 lb.

Performance: max cruising speed 391 mph.

Strategic and Tactical Nuclear Missiles

LGM-25C Titan II

Phaseout of the Titan II two-stage liquid-fueled ICBM is scheduled for completion this year. After more than two decades of service, it became expensive to maintain and of decreasing value to the overall US strategic posture. As of January 1 this year, only five Titan IIs were still deployed, in a single squadron.

Contractor: Martin Marietta Aerospace.

Power Plant: first stage: Aerojet-General LR87 storable liquid-propellant engine, 430,000 lb thrust; second stage: Aerojet-General LR91 storable liquid-propellant engine, 100,000 lb thrust.

Guidance: inertial.

Warhead: thermonuclear, with the largest yield of any carried by a US missile.

Dimensions: length 103 ft 0 in, max body diameter 10 ft 0 in.

Weight: launch weight 330,000 lb.

Performance: max speed 17,000 mph (approx) max range 6,300 miles.

LGM-30F/G Minuteman

Minuteman remains a key element of the US strategic deterrent posture despite its 24 years of operational service. It is a three-stage, solid-propellant ICBM, smaller and lighter than the liquid-propellant Titan and with a smaller payload. The operational missiles are housed in underground silos, for which an upgrade program was completed in 1980 to provide increased launch facility protection. Minuteman silos and launch control centers are currently undergoing a depot level maintenance refurbishment, known as Rivet Mile, to correct existing, and retard future, age-related deterioration of facilities. This ongoing program will ensure viability of the weapon system beyond the year 2000. The current versions are:

LGM-30F Minuteman II: similar in configuration to the original Minuteman I, Minuteman II has increased range and targeting coverage; also increased accuracy and payload capacity. Operational since 1965, it is based at Malmstrom AFB, Mont.; Ellsworth AFB, S. D.; and Whiteman AFB, Mo.

In late summer of 1985, Minuteman IIs at Malmstrom and Whiteman AFBs were equipped with a command data buffer capability to permit rapid remote targeting, as in Minuteman III.

LGM-30G Minuteman III: third-stage motor with fluid-injection thrust vector control gives longer range and, allied to MIRV capability, enables this version to place warheads on three targets with a high degree of accuracy. First test launch was made in 1968, and Minuteman III is operational at Minot AFB, N. D.; F. E. Warren AFB, Wyo.; Grand Forks AFB, N. D.; and Malmstrom AFB, Mont. A command data buffer system permits rapid missile retargeting.

The Minuteman force was made up of 450 Minuteman IIs and 550 Minuteman IIIs, of which 50 are being displaced by Peacekeeper. Recent modifications have been aimed at providing improved command control and communications and at refinements to improve Minuteman III effectiveness by almost 30 percent through greater accuracy. Deployment of the larger-yield Mk 12A RV was completed in early 1983.

Assembly and Checkout: Boeing Aerospace Company.
Power Plant: first stage: Thiokol M-55E solid-propellant motor, 210,000 lb thrust; second stage: Aerojet-General SR19-AJ-1 solid-propellant motor, 60,300 lb thrust; third stage: LGM-30F: Hercules, Inc., solid-propellant motor; LGM-30G: Thiokol SR73-AJ-1 solid-propellant motor: 17,000 lb thrust (LGM-30F), 34,400 lb thrust (LGM-30G).
Guidance: Autonetics Division of Rockwell International inertial guidance system.
Dimensions: length LGM-30F 55 ft 10 in; LGM-30G 59 ft 10 in, diameter of first stage 5 ft 6 in.
Weights: launch weight (approx) LGM-30F 73,000 lb, LGM-30G 78,000 lb.
Performance: speed at burnout more than 15,000 mph, highest point of trajectory approx 700 miles, range with max operational load LGM-30F more than 6,000 miles; LGM-30G more than 7,000 miles.

LGM-118A Peacekeeper

Initiated in response to the improved hardness of Soviet strategic forces, this program continues on schedule and within budgeted cost. The US is deploying 50 Peacekeeper missiles in existing Minuteman III silos near F. E. Warren AFB, Wyo., and is currently developing and proposing the garrison/rail-mobile basing mode as alternative for the deployment of another 50 missiles. Sixty-six missiles were funded in FY '84–87, with 21 more requested in FY '88. Initial operational capability for the first ten Peacekeepers was achieved in December 1986; full IOC with 50 missiles is scheduled for 1988.

The Peacekeeper is a four-stage ICBM that carries up to ten independently targetable reentry vehicles. It has many advantages over missile weapon systems currently in the US inventory. Peacekeeper is more accurate, carries more warheads, and has greater range and target flexibility than the Minuteman ICBMs. In addition, its greater resistance to nuclear effects and its more capable guidance system provide Peacekeeper with a much improved ability to destroy very hard targets. The prompt retaliation made possible by these factors is expected to provide a decisive deterrent to any Soviet first strike. The initial test schedule is 90 percent completed, with excellent results.

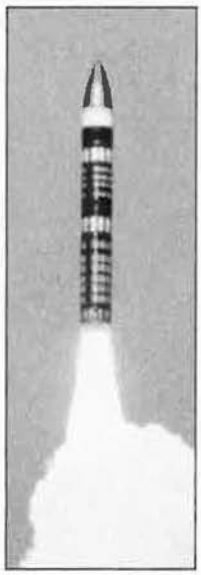
Basing: Boeing Aerospace Company.
Assembly and Test: Martin Marietta, Denver Aerospace.
Power Plant: first three stages solid-propellant, fourth stage storable liquid; by Thiokol, Aerojet, Hercules, and Rocketdyne, respectively.
Guidance: inertial; integration by Rockwell, IMU by Northrop
Warheads: 10 Avco Mk 21 reentry vehicles.
Dimensions: length 71 ft, diameter 7 ft 8 in.
Weight: approx 195,000 lb.

Small ICBM (SICBM)

Currently in the R&D phase, this weapon will carry a single Mk 21 reentry vehicle and weigh approximately 37,000 lb, making it compatible with a hard mobile launcher (HML). New lightweight high-strength casing materials will avoid sacrifice of range or payload. Accuracy will be ensured by use of a lightweight version of the advanced inertial reference sphere (AIRS) guidance system, with advanced technology alternatives such as ring-laser gyroscopes and stellar inertial updates. Mobility test versions of the HML were designed, built, and tested competitively, as a result of which Boeing was awarded the HML FSD contract in December 1986. A further $2.36 billion for development and basing is requested in the FY '88 budget proposals to continue full-scale development. Deployment is scheduled to start in December 1992. Initial decisions on where the mobile missile is to be based were made at the end of 1986. Nominal range of the SICBM will be 6,000 miles.

Contractor: Martin Marietta Aerospace Corporation.
Dimensions: length approx 53 ft, diameter approx 3 ft 10 in.

Minuteman III



Peacekeeper

AGM-86B ALCM

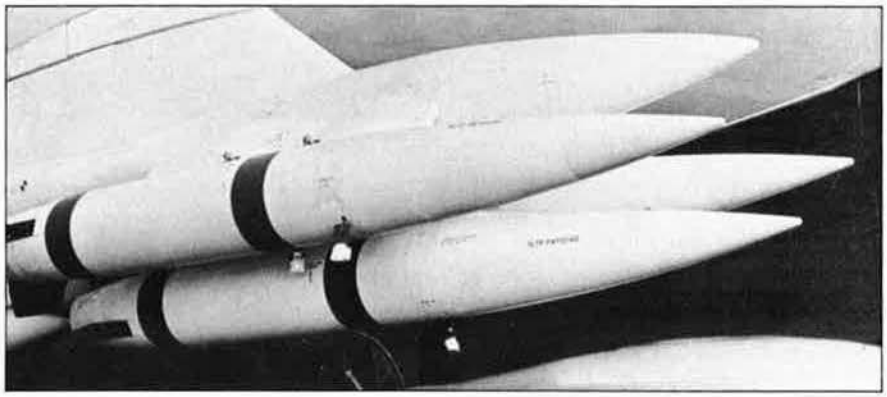
SRAM II

This program calls for the development of an improved air-to-surface missile with nuclear capability to augment and eventually replace the aging SRAM (AGM-69A). SRAM II will arm B-1Bs and ATBs and will be capable of penetrating advanced defense systems from standoff ranges to strike hardened and heavily defended targets. It will use existing propulsion, guidance, and airframe technology to make possible significant performance improvements without unacceptable program risk. Major program activities include development of a new rocket motor to provide higher missile velocities and increased range; development of a guidance system that will ensure greater accuracy, even with extended range; and incorporation of a new warhead with modern safety features. Like the AGM-69A, SRAM II will be supersonic.

Following the system definition phase, which involved Boeing Aerospace, Martin Marietta, and McDonnell Douglas Astronautics, a request for full-scale development proposals was issued to industry. Source selection was completed in December 1986, and Boeing was announced the winner. A contract to cover full-scale development and production of the first 400 missiles was deferred for several months and was to be dependent on the outcome of a DoD study undertaken to compare the cost and effectiveness of reengining the AGM-69s against building new missiles. Production of 1,633 SRAM IIs is expected to begin in 1989 to give an IOC in March 1992.

AGM-86B ALCM

The AGM-86B air-launched cruise missile is a small, unmanned winged air vehicle capable of sustained subsonic flight following launch from a carrier aircraft. It has a turbofan engine and a nuclear warhead and is programmed for precision attack on surface targets. When launched in large numbers, each of the missiles would have to be countered, making defense against them both costly and complicated. Additionally, by diluting defenses, the ability of manned aircraft to penetrate to major targets is improved. Small radar signature and low-level flight capability enhance the missile's effectiveness. Delivery of the last of 1,715 production models was completed in October 1986. SAC's 416th Bombardment Wing at Griffiss AFB, N. Y., became the first Air Force unit to attain operational capability with ALCM in December 1982, with 12 missiles fitted externally to each of its B-52Gs. Other ALCM-equipped units include the 379th Bomb Wing at Wurtsmith AFB, Mich., the 319th Bomb



AGM-69A SRAM on a B-52

AGM-69A SRAM

This defense suppression and primary attack missile was deployed initially with the B-52Gs of SAC's 42d Heavy Bombardment Wing at Loring AFB, Me., in 1972. USAF contracts covering the production of 1,500 AGM-69As were authorized, and deliveries to equip 17 B-52 wings and two FB-111 wings at 18 SAC bases were completed in July 1975.

Armed with a nuclear warhead, the supersonic air-to-surface SRAM was designed to attack and neutralize enemy terminal defenses, such as surface-to-air missile sites. An inertial guidance system makes the missile impossible to jam. Each SAC B-52G/H can carry eight AGM-69A SRAMs on a rotary dispenser in the aft bomb bay, together with up to four nuclear bombs. An FB-111A can carry four AGM-69As on swiveling underwing pylons and two internally. When carried externally, a tailcone, 22.2 in long, is added to reduce drag.

Contractor: Boeing Aerospace Company.
Power Plant: Lockheed Propulsion Company LPC-415 restartable solid-propellant two-pulse rocket engine.
Guidance: General Precision/Kearfott inertial system, permitting attack at high or low altitude and dogleg courses.
Warhead: nuclear, of similar yield to that of single Minuteman III warhead.
Dimensions: length 14 ft 0 in, body diameter 1 ft 5½ in.
Weight: launch weight approx 2,230 lb.
Performance: speed up to Mach 2.5, range 100 miles at high altitude, 35 miles at low altitude.

BGM-109G Tomahawk GLCM

Wing at Grand Forks AFB, N. D., and bomb wings at Fairchild AFB, Wash., Blytheville AFB, Ark., Carswell AFB, Tex., and Barksdale AFB, La. B-52Hs are undergoing similar conversion; ultimately, each B-52H is intended to be modified further to have a bomb-bay common strategic rotary launcher for eight more ALCMs, eight SRAMs, or a mix of both.

Contractor: Boeing Aerospace Company.
Power Plant: Williams International Corporation/Teledyne CAE F107-WR-100 turbofan engine; 600 lb thrust.
Guidance: inertial plus Tercom, by Litton.
Warhead: W80-1 nuclear.
Dimensions: length 20 ft 9 in, body diameter 2 ft 3.3 in, wing span 12 ft.
Weight: 3,200 lb.
Performance (approx): speed 500 mph, range 1,500 miles.

AGM-129A (ACM)

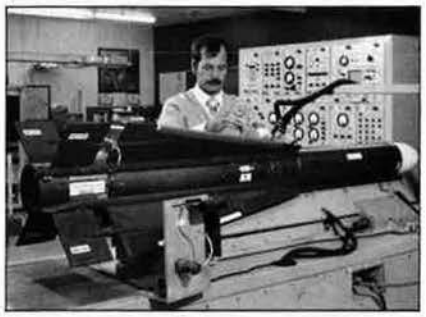
Convair Division of General Dynamics was selected in April 1983 to develop and manufacture an air-launched advanced cruise missile (ACM) to arm the B-52H and B-1B. It is expected to enter production in time to permit initial deployment to K. I. Sawyer AFB, Mich., in 1989 or 1990. The ACM will have improved range, accuracy, survivability, and targeting flexibility, notably through embodiment of low-observability technology. It will be powered by a Williams International F112 turbofan engine.

BGM-109G Tomahawk GLCM

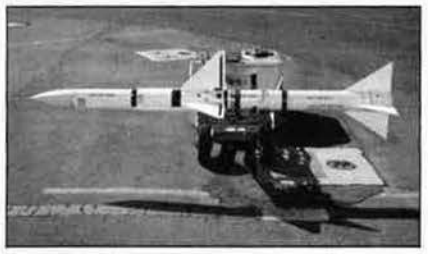
The GLCM is a small, mobile, ground-to-ground cruise missile developed to modernize NATO's intermediate-range nuclear forces (INF). Its characteristics include a small radar cross section, very low altitude flight profile, and all-weather capabilities; it is designed to complicate the enemy's targeting and defenses, thereby helping the survivability of other allied systems.

Deployment of the GLCM is well under way, with the first base operational at RAF Greenham Common, UK, since December 1983; the second operational at Comiso, Sicily, since March 1984; a third at Florennes, Belgium, since August 1984; and a fourth at Wueschheim AS, West Germany, since March 1986. Further deployment is planned in the Netherlands and the UK to give a total of 29 flights, stationed at six main European operating bases. A GLCM mobile flight comprises four transporter-erector launchers, each carrying four missiles, and two launch control centers. A total of 464 missiles is expected to be deployed by 1988.

Contractor: General Dynamics (Convair)/McDonnell Douglas Astronautics.
Power Plant: Williams International Corporation/Teledyne CAE F107-WR-400 turbofan engine; 600 lb thrust. Atlantic Research Corporation solid-propellant booster.
Guidance: inertial plus Tercom, by Litton.
Warhead: W84 nuclear.
Dimensions: length 20 ft 6 in, diameter 1 ft 8½ in, wing span 8 ft 7 in.
Weight: with booster, 3,250 lb.
Performance: max speed high subsonic, range 1,500 miles.



AIM-4F Super Falcon



AIM-7F Sparrow

Airborne Tactical and Defense Missiles

AIM-4F/G Super Falcon

These developed versions of the original AIM-4A/C Falcon were introduced simultaneously in 1960 to provide reduced susceptibility to enemy countermeasures and higher performance. The Super Falcon arms the F-106 Delta Dart, on which a mixed armament of four AIM-4F/Gs is carried internally.

Contractor: Hughes Aircraft Company.
Power Plant: Thiokol M46 two-stage solid-propellant motor; first-stage rating of 6,000 lb thrust.
Guidance: AIM-4F; Hughes semiactive radar homing guidance; AIM-4G: infrared homing system.
Warhead: high-explosive, weighing 9 lb.
Dimensions: length AIM-4F 7 ft 2 in, AIM-4G 6 ft 9 in, body diameter 6.6 in, wing span 2 ft 0 in.
Weights: launch weight AIM-4F 150 lb; AIM-4G 145 lb.
Performance: max speed Mach 2.5, max range 7 miles.

AIM-7 Sparrow

Sparrow is a radar-guided air-to-air missile with all-weather, all-altitude, and all-aspect capability. Approximately 34,000 AIM-7C, D, and E versions were produced. The **AIM-7E** is standard armament of the F-4 Phantom and is also used as a Sea Sparrow version against shipping targets. The **AIM-7E-2** is an improved version, providing better maneuverability and "dogfight" capability. A later version is the advanced solid-state **AIM-7F,** with larger motor, Doppler guidance, improved ECM, and better capability over both medium and "dogfight" ranges; this version equips USAF and USN F-4, F-14, F-15, and F/A-18 aircraft. Approximately 5,400 AIM-7Fs were produced. A monopulse version of Sparrow designated **AIM-7M,** aimed at reducing cost and improving performance in the ECM and look-down clutter regions, entered production in FY '80 and began operational service during FY '83. Procurement has been proposed through FY '88, with $99.5 million for 558 missiles for USAF requested in the FY '88 budget proposals. (Data for AIM-7F.)

Contractors: Raytheon Company/General Dynamics Pomona Division.
Power Plant: Hercules Mk 58 Mod 0 boost-sustain rocket motor.
Guidance: Raytheon semiactive Doppler radar homing system.
Warhead: high-explosive, blast fragmentation, weighing 86 lb.
Dimensions: length 11 ft 10 in, body diameter 8 in, wing span 3 ft 4 in.
Weight: launch weight 504 lb.
Performance (estimated): max speed more than Mach 3.5; range AIM-7E 14 miles, AIM-7F more than 25 miles.

AIM-9 Sidewinder

The AIM-9 Sidewinder is a close-range air-to-air missile using infrared guidance. Versions currently in production for USAF or in service are:

AIM-9L Sidewinder

AIM-9E: modification by Philco of original production AIM-9B, with improved guidance and control. Production completed, with more than 3,000 in service.

AIM-9H: version with improved close-range capability, produced for USN; one-time procurement of 800 by USAF in FY '76. Solid-state guidance, off-boresight acquisition/launch capability. Lead bias function moves missile impact point forward to more vulnerable area on target aircraft.

AIM-9J: conversion of AIM-9B/E, with increased range and new "front end" to improve maneuvering capability for dogfighting. About 14,000 were delivered to USAF by Ford Aerospace in 1977–78 to equip the F-15 and other Sidewinder-compatible aircraft.

AIM-9P: improved version of AIM-9J, produced by Ford Aerospace by conversion of existing AIM-9Es and -9Js. Increased target-acquisition envelope, solid-state electronics, and increased lethality due to seeker improvements.

AIM-9P-3: improved version of AIM-9P, with increased lethality due to fuze improvements and a new rocket motor, providing reduced smoke and increased range.

AIM-9P-4: improved version of AIM-9P-3 developed by Ford Aerospace. A new guidance control unit provides an increased target acquisition envelope. The AIM-9P-4 is being qualified by USAF for Foreign Military Sales.

AIM-9L: third-generation Sidewinder for USAF and USN, with all-aspect intercept capability. New motor. Double-delta nose fins for improved inner boundary performance and maneuverability. AM-FM conical scan for increased seeker sensitivity and improved tracking stability. Annular blast fragmentation warhead and active optical fuze for increased lethality and low susceptibility to countermeasures. This version arms USAF F-15 and F-16 aircraft and features in USAF plans to provide self-defense capability for its A-7s, A-10s, F-4s, and F-111s.

AIM-9M: improved version of AIM-9L, with increased IRCCM capability, improved background discrimination, and reduced-smoke rocket motor. Full production began in FY '81 with an order for approximately 1,850 missiles. Procurement proposed for FY '88 is $53.1 million for 956 missiles. Final USAF procurement is planned for FY '90. (Data for AIM-9M.)

Contractor: Raytheon Company/Ford Aerospace and Communications Corporation.
Power Plant: Thiokol Hercules Mk 36 Mod 11 solid-propellant motor.
Guidance: solid-state infrared homing guidance.
Warhead: high-explosive, weighing 20.8 lb.
Dimensions: length 9 ft 5 in, body diameter 5 in, fin span 2 ft 1 in.
Weight: launch weight 191 lb.
Performance: max speed above Mach 2.

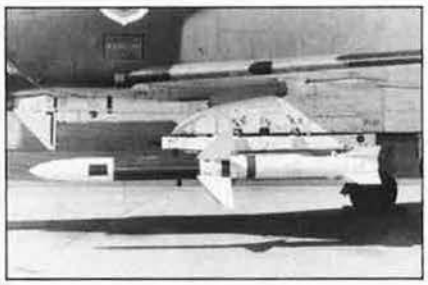
AGM-45A Shrike

Twelve versions of this supersonic air-to-surface missile were produced for USAF and USN, differing primarily in the frequency coverage of the front end detachable seeker sections. Designed to home automatically on enemy radar installations, the AGM-45 entered operational service in Vietnam during 1965. Thereafter, it played an important part in the US air offensive, becoming a standard penetration aid on US tactical aircraft. More than 13,000 were delivered to USAF between 1965 and 1978, and Shrikes continue to equip "Wild Weasel" F-4Gs and F-4Es. Modification under the Shrike gravity bias modification program will result in improved capabilities at low altitude.

Contractor: Naval Weapons Center.
Power Plant: Rocketdyne Mk 39 Mod 7 or Aerojet Mk 53 solid-propellant rocket motor.
Guidance: passive homing head by Texas Instruments.
Warhead: high-explosive fragmentation, weighing 145 lb.
Dimensions: length 10 ft 0 in, body diameter 8 in, span 3 ft 0 in.
Weight: launch weight 400 lb.
Performance (estimated): range more than 3 miles.

AGM-65 Maverick

The basic **AGM-65A** Maverick is a launch-and-leave TV-guided air-to-surface missile that enables the pilot of the launch aircraft to seek other targets or leave the target area once it has been launched. Production was initiated in 1971, following successful test launches over distances ranging from a few thousand feet to many miles and from high altitudes down to treetop level. Maverick missiles were first employed by USAF in Vietnam and are now carried by the A-7D, A-10, F-4D/E/G, F-5E/F, F-111F, and F-16, singly or in three-round underwing clusters, for use against pinpoint targets, such as tanks and columns of vehicles. Orders totaled 19,000. **AGM-65B** has a "scene magnification" TV seeker that enables the pilot to identify and lock on to smaller or more distant targets.



AIM-45A Shrike

AGM-65D Maverick

AGM-88A HARM

To overcome limitations of the TV Maverick, which can be used only in daylight clear-weather conditions, a new version was developed:

AGM-65D: with imaging infrared seeker (IIR). AFOTEC and TAC conducted operational flight testing with 25 live launches from A-7, A-10, F-4E, F-4G, and F-16 aircraft at Nellis AFB, Nev., in September 1986, resulting in 24 direct hits on a variety of vehicles. In FY '88 2,100 missiles are requested. A four-year multiyear contract will be completed in FY '89, winner-take-all, for at least 13,800 missiles. IIR Maverick became operational on A-10s at RAF Bentwaters, UK, in February 1986. Raytheon is second source supplier.

AGM-65G: uses the IIR seeker with an alternate 298 lb blast fragmentation warhead for use against hardened targets. USAF plans to buy 1,800 AGM-65Gs. (Data for AGM-65A.)

Contractor: GM-Hughes, Missile Systems Group.
Power Plant: Thiokol TX-481 solid-propellant rocket motor.
Guidance: self-homing electro-optical guidance system.
Warhead: high-explosive, shaped charge.
Dimensions: length 8 ft 2 in, body diameter 1 ft 0 in, wing span 2 ft 4½ in.
Weight: launch weight 462 lb.
Performance: range of 0.6 to 14 miles.

AGM-88A HARM

The lethality of USAF's F-4G "Wild Weasel" is greatly enhanced by the availability of HARM (High-speed Anti-Radiation Missile), which achieved IOC in September 1984. The emphasis on high speed reflects experience gained in Vietnam, where Soviet-built surface-to-air-missile radar systems sometimes detected the approach of first-generation Shrikes and ceased operation before the missiles could lock on them. HARM can cover a wide range of frequency spectra through the use of programmable digital processors in both the aircraft's avionics equipment and the missile. An integration program is ongoing to equip F-16s in the defense suppression role with HARM. The missile is also suitable for adaptation to the F-4E, EF-111A, B-52, F-15, and F-16. By the end of 1986, a total of 658 HARMs had been delivered, out of 2,813 ordered for USAF. A total of 1,384 missiles will be procured in FY '87. The FY '88 budget proposals request 1,748 more for USAF.

Contractor: Texas Instruments, Inc.
Power Plant: Thiokol smokeless dual-thrust solid-propellant rocket motor. Hercules second source.
Guidance: passive homing guidance system, using seeker head that homes on enemy radar emissions.
Warhead: high-explosive.
Dimensions: length 13 ft 8½ in, body diameter 10 in, wing span 3 ft 8½ in.
Weight: 807 lb.
Performance: cruising speed supersonic, altitude limits S/L to 40,000 ft, range more than 10 miles.

GBU-15 and AGM-130A

The **GBU-15** is an air-launched cruciform-wing glide bomb fitted with a guidance system designed to give it pinpoint accuracy from low or medium altitudes over short standoff ranges. Development began in 1974, based on experience gained in Vietnam with the earlier Pave Strike GBU-8 HOBO modular weapon program. The GBU-15 is intended for tactical use to suppress enemy defenses and to destroy heavily defended targets. The target-detecting device is carried on the front of the warhead; the control module, with autopilot and data link module, attaches to the rear.

The weapon offers two modes of attack. In direct attack, the weapon is locked on to the target before launch and flies a near line-of-sight profile to impact. In the indirect mode, the seeker can be locked on to the target after launch, or the operator can fly the weapon manually to impact, using guidance updates provided through the data link. This profile uses a midcourse glide phase and extends standoff range. Successful launches have been achieved from F-4s and F-111s. The **GBU-15(V)1/B** TV-guided variant qualified for opera-

tional service in 1983; the **GBU-15(V)2/B** imaging infrared (IIR) version is scheduled for deployment this year.

In addition, there is a rocket-powered version of the GBU-15 in development, designated **AGM-130A,** which has roughly three times the range of the unpowered weapon when released at low altitude. USAF already plans to acquire more than 2,000 AGM-130As, which use the Mk 84 bomb as standard unitary warhead; 51 were requested in FY '87, with a further 121 requested in the FY '88 budget proposals. (Data for GBU-15).

Contractor: Rockwell International Corporation.
Guidance: TV or imaging infrared seeker.
Warhead: Mk 84 bomb (2,000 lb unitary).
Dimensions: length 12 ft 10½ in, body diameter 1 ft 6 in, wing span 4 ft 11 in.
Weight: 2,617 lb.
Performance: cruising speed subsonic.

ASAT

Under USAF contract, Vought Missiles and Advanced Programs Division of LTV and the Boeing Company are developing and flight-testing a small high-technology air-launched antisatellite (ASAT) weapon capable of destroying enemy satellites at low orbital altitudes. This consists of a modified SRAM first stage, a Thiokol Altair III solid-propellant second stage rated at 6,000 lb thrust, and a Vought miniature vehicle (MV) with Hughes infrared terminal seeker mounted forward of the second stage. The guidance system is by Singer-Kearfott. ASAT is about 17 ft long, with a launch weight of 2,700 lb.

ASAT was intended to be carried by designated air defense F-15s, based at Langley AFB, Va. In operational form, it would be released from the F-15 in a zoom climb. Immediately before separation from the Altair, the miniature homing vehicle would be spun up to 20 rps for stabilization. Small solid-propellant rocket motors would then provide course corrections as a laser gyro and the infrared seeker guided it to target impact.

Firing trials from an F-15 began in 1983, and the first live launch against a target in space occurred successfully on September 13, 1985. A total of $440 million is sought for continuation of the ASAT program in FY '88, but further testing is barred, under a restriction contained in the FY '87 Appropriations Bill.

AIM-120A (AMRAAM)

TAC Commander Gen. Robert D. Russ referred to this advanced medium-range air-to-air missile (AMRAAM) as "the most important tactical weapon currently under development." It is intended as a replacement for the AIM-7 Sparrow and will provide an all-weather, all-environment capability for USAF's F-15 and F-16 and the Navy's F-14 and F/A-18 fighters. Full-scale development has been under way since December 1981.

Designated AIM-120A, AMRAAM has inertial midcourse guidance and active radar terminal homing that provides launch-and-maneuver capability. There are significant improvements in operational effectiveness over the AIM-7 Sparrow, including increased average velocity, reduced miss distance, improved fuzing, increased warhead lethality, multiple target engagement capability, improved clutter rejection in low-altitude environments, improved ECCM capability, increased maximum launch range, reduced-smoke motor, and improved maintenance and handling.

Twenty-one completely successful launches have taken place in the FSD program, seven of which scored direct hits on the target drones. A leader/follower program has been under way (Hughes/Raytheon), with the preproduction effort (producibility and qualification) in FY '86 and low-rate initial production in FY '87 (180 missiles). First deliveries are scheduled for FY '88 and IOC for 1989. Total planned USAF buy is 17,000 missiles.

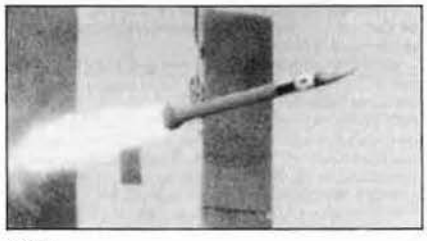
Contractors: Hughes Aircraft Company/Raytheon Company.
Guidance: inertial midcourse, with active radar terminal homing.
Dimensions: length 11 ft 9 in, body diameter 7 in, span of tail control fins 2 ft 1 in.
Weight: 335 lb.
Performance: cruising speed approx Mach 4.

Euromissile Roland

Rockwell GBU-15

AIM-120A (AMRAAM)

AGM-84 Harpoon



HVM

AGM-84 Harpoon

USAF has procured sufficient Harpoon all-weather antiship missiles to equip two 15-aircraft B-52G squadrons for maritime duties in support of Navy antisurface warfare operations. Compatibility testing began in spring 1983, and full operational capability was achieved that October. Modified aircraft are located at Loring AFB, Me., for Atlantic operations and at Andersen AFB, Guam, for Pacific operations. Each B-52G carries eight to 12 missiles.

Contractor: McDonnell Douglas Astronautics Company.
Power Plant: Teledyne CAE J402-CA-400 turbojet engine, 660 lb thrust.
Guidance: sea-skimming cruise monitored by radar altimeter, active radar terminal homing.
Warhead: penetration high-explosive blast type, weighing 488 lb.
Dimensions: length 12 ft 7½ in, body diameter 1 ft 1½ in, wing span 3 ft.
Weight: 1,145 lb.
Performance: speed high subsonic, range over 57 miles.

HVM

Under a USAF contract awarded in March 1985, Vought Missiles and Advanced Programs Division of LTV is demonstrating a guided air-to-surface hypervelocity missile (HVM) system capable of defeating all types of vehicles in an armored assault force. The system will consist of a FLIR/laser fire control system and podded launchers for up to 16 HVMs per pod. Each HVM will carry an inert, high-density warhead. Simultaneous multiple target engagement is an important requirement, and the small low-cost missiles will rely on kinetic energy derived from their speed for penetration. Initial ground-launched flight tests demonstrated the missile's ability to receive laser guidance signals through the rocket motor plume and its ability to respond to signals from a ground-based laser and then maneuver to its target. HVM will reach a speed of more than 5,000 fps and is expected to weigh less than 70 lb. Estimated range is greater than 10,000 ft. This is a joint USAF/Marine/Army program. Six HVMs, built under USAF contract, will be tested at Eglin AFB, Fla., in the fall.

Rapier

Rapier is unusual in that US land-based antiaircraft missiles are normally operated by the Army. Under a decision confirmed by an initial contract for 32 fire units in February 1981, British-built Rapier missile systems are deployed at seven USAF bases in the UK to protect Air Force installations. The last unit became operational in July last year. Manned by RAF Regiment personnel, the USAF version of Rapier is intended primarily for defense against fast (Mach 1 +) maneuvering, low-flying targets by day and night. The four-round fire unit, Blindfire radar, and a trailer of reload missiles are towed by Land Rovers loaded with support equipment.

Under a similar agreement, the government of Turkey will locate Rapiers procured by DoD to defend two US air bases in that country.

Contractor: British Aerospace PLC, Army Weapons Division.
Power Plant: IMI two-stage solid-propellant motor.
Guidance: Racal-Decca surveillance radar and command to line-of-sight guidance. Optional Marconi DN181 Blindfire radar or optical target tracking, according to conditions.
Warhead: semi armor-piercing, with impact fuze.
Dimensions: length 7 ft 4 in, body diameter 5 in, wing span 1 ft 3 in.
Weight: approx 94 lb.
Performance: max speed more than Mach 2, range 4 miles.

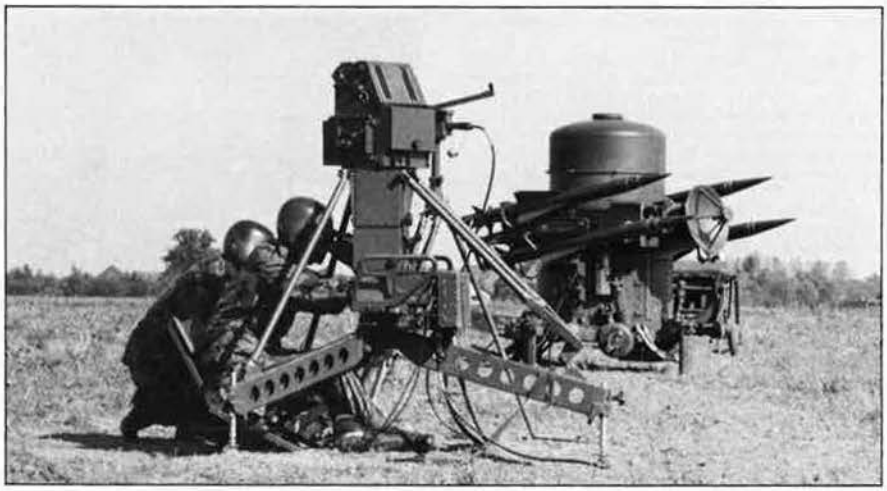
Roland

Roland is a highly mobile, short-range, all-weather missile system for defense against medium-, low-, and very-low-altitude aircraft and helicopter attack. All operational weapon system equipment and functions can be packaged into a single vehicle, including surveillance radar, tracking radar, optical sight, command computer, and command transmitter link. Two launch tubes each contain a single missile, with eight reload missiles stored in a magazine. After firing one or both missiles, reloading can be accomplished in about ten seconds.

Under a bilateral agreement, the West German government has agreed to provide and operate 27 Roland fire units to protect three US air bases in Germany.

Contractor: Euromissile GIE.

Power Plant: two-stage solid-propellant motor.
Guidance: pulse-Doppler surveillance radar on launch vehicle and command to line-of-sight guidance. Radar or optical target tracking, according to conditions.
Warhead: high-explosive with proximity and impact fuzes, weighing 14.3 lb.
Dimensions: length 7 ft 10½ in, body diameter 6.3 in, wing span 1 ft 7¾ in.
Weight: 147 lb.
Performance: speed Mach 1.5, range 3.7 miles.



Rapier

Launch Vehicles

Atlas Launchers

With nearly 500 launches since 1957, the Atlas and Atlas/Centaur vehicles have built up a success rate of nearly 95 percent in launching commercial and military satellites as well as manned space vehicles. There are currently three versions of the Atlas (Atlas E, Atlas H, and Atlas G/Centaur) available, and all retain the "stage-and-a-half" configuration of the long-retired Atlas ICBM. All versions have a central sustainer section and two side boosters.

Atlas E: As of early 1987, 11 examples of the Atlas E remained in the USAF inventory. The Atlas E is a modified ICBM and is used to launch various USAF, Navy, and NOAA satellites.

Atlas H: USAF had one Atlas H remaining in the inventory as of early 1987. Originally designed to fill an Air Force requirement for a dependable, low-cost, expendable launch vehicle, the Atlas H features a solid-propellant upper stage capable of boosting a 4,400 lb payload into low-earth polar orbit. There are no provisions in the Atlas H to launch payloads into geosynchronous transfer orbit. Employs a 7 ft diameter payload fairing system.

Atlas G/Centaur: With the capability to boost 5,200 lb of payload into geosynchronous transfer orbit, the Atlas G/Centaur combination is the largest Atlas booster currently available. In early 1987, two Atlas G/Centaurs remained in the NASA inventory, but one was destroyed on March 26 in an aborted launch attempt. Atlas G/Centaurs can place 13,500 lb of payload into low-earth polar orbit. Currently has a 10 ft-diameter payload fairing system, but larger fairings are planned.

Prime Contractor: General Dynamics Corporation, Convair Division.
Power Plant: uprated Rocketdyne MA-5 propulsion system, comprising central sustainer motor and two boosters. Total thrust (Atlas E) 392,000 lb; (Atlas H and Atlas G/Centaur) 439,000 lb.
Dimensions: length (Atlas E without upper stage or payload) 67 ft 0 in; (Atlas H without upper stage or payload) 66 ft 0 in; (Atlas G/Centaur) 137 ft 0 in (Atlas G by itself is 72 ft); max body diameter 10 ft 0 in.
Launch Weight: (Atlas G/Centaur) 360,000 lb.
Performance: (Atlas H) capable of putting payload of 4,400 lb into low-earth polar orbit, but has no provisions for geosynchronous transfer orbit; (Atlas G/Centaur) capable of putting 13,500 lb into low-earth polar orbit and a payload of 5,200 lb into geosynchronous transfer orbit.

Centaur

Centaur was the first US high-energy upper stage and first to utilize liquid hydrogen as a propellant. Its multiburn and extended coast capability were first used operationally during the 1977 Mariner Jupiter/Saturn missions. The **D-1A** version used with the Atlas has demonstrated widely ranging applications and capabilities. The nose section of Atlas is modified to a constant 10 ft diameter to accommodate the Centaur, which, in turn, generates most of the electronic command and control systems for the launch vehicle. A 10 ft diameter fairing protects payloads for Centaur D-1A.

The new **Centaur G-prime** upper stage will be used with the Titan IV, creating the greatest weight-to-altitude capability of any US launch vehicle.

Prime Contractor: General Dynamics Corporation, Convair Division.
Power Plant: two Pratt & Whitney RL10A-3 liquid oxygen/liquid hydrogen engines; each 16,500 lb thrust.
Guidance: inertial guidance system.
Dimensions (Centaur D-1A only): length 30 ft 0 in, diameter 10 ft 0 in.
Launch Weight (D-1A, approx): 35,000 lb.

Scout

Scout was designed to enable NASA and DoD to conduct space, orbital, and reentry research at comparatively low cost, using off-the-shelf major components where available. The basic current version, with an improved fourth stage, was launched successfully for the first time in August 1965. In addition to increasing the payload, this version can be maneuvered in yaw and can send a 100 lb payload more than 16,000 miles into space. Using the Algol IIIA first-stage motor, Scouts can put 377 lb payloads into a 310-mile polar orbit and have been used to launch many unmanned spacecraft, including satellites, for DoD, NASA, and international groups.

Prime Contractor: LTV Aerospace and Defense Company (subsidiary of LTV Corporation).
Power Plant: first stage: CSD Algol IIIA, 109,000 lb thrust; second stage: Thiokol Castor IIA solid-propellant motor, 64,000 lb thrust; third stage: Thiokol Antares IIIA solid-propellant motor, 18,700 lb thrust; fourth stage: Thiokol Altair IIIA solid-propellant motor, 5,800 lb thrust.
Guidance: simplified Honeywell gyro guidance system.
Dimensions: height overall 75 ft 5 in, max body diameter 3 ft 9 in.
Launch Weight: 47,619 lb.

Atlas-Centaur

Scout

Titan 34D

Titan II (MELV)

USAF plans to refurbish and reactivate at least 13 Titan II ICBMs for use as Medium Expendable Launch Vehicles (MELVs) at Vandenberg AFB, Calif. Able to place payloads of more than 4,000 lb into polar orbit, the Titan IIs are suitable for launch-on-demand missions. The first is likely to enter the inventory in 1989.

Titan 34D and Titan IV (CELV)

The basic **Titan 34D** has an uprated version of the two-stage Titan II ICBM as its core section, plus two five-and-a-half segment solid strap-on boosters and either the Boeing Inertial Upper Stage developed for the Shuttle or Transtage, an upper stage capable of functioning both in the boost phase of flight and as a restartable space propulsion vehicle. It can place a 4,000 lb payload into geosynchronous orbit or 27,000 lb into low earth polar orbit. Sixteen Titan 34Ds have been ordered to date by USAF. The first of them was launched from Cape Canaveral in October 1982. However, the launch program was seriously interrupted by the successive failure of two Titan 34Ds in August 1985 and April 1986. AFSC Space Division's subsequent reassessment of the 34D was expected to be completed in early 1987, and the rocket could be back in service by the end of the year.

In March 1985, the upgraded Titan 34D-7, now called **Titan IV** Complementary Expendable Launch Vehicle (CELV), was selected to augment the Space Shuttle and to allow greater flexibility in launching critical military payloads. It has stretched first and second stages, seven-segment solid boosters, and either the Centaur G-prime upper stage, enabling it to place a 10,200 lb payload into geosynchronous orbit or 31,000 lb into low polar orbit, or the Inertial Upper Stage (IUS), which can place 5,300 lb into geosynchronous orbit. USAF has been authorized to buy 23 Titan IVs, with delivery of the first two scheduled for late this year. The first will launch a satellite into equatorial orbit from Cape Canaveral, Fla., in April 1988. Launches of satellites into transpolar orbits from Vandenberg AFB are scheduled to begin in early to mid-1989, and the first Titan IV/Centaur launch of an ultraheavy military payload into geosynchronous orbit from Cape Canaveral is scheduled for early 1990. (Data for Titan 34D.)

Prime Contractor: Martin Marietta Denver Aerospace.
Power Plant: first and second stages: Aerojet liquid-propellant engines: first stage 526,000 lb thrust; second stage 102,000 lb thrust; Transtage: Aerojet twin-chamber liquid-propellant engine; 16,000 lb thrust; two CSD five and one-half segment solid-propellant booster rocket motors; each more than 1,150,000 lb thrust. (Titan IV: first stage 546,000 lb thrust; second stage 104,000 lb thrust; two SRBs total 2,725,000 lb thrust.)
Dimensions: first and second stages of core: height 101 ft, diameter 10 ft; Transtage: height 14 ft 8 in, diameter 10 ft.
Launch Weight (approx): 1,400,000 lb.
Performance (Titan 34D/Transtage): 4,000 lb to geosynchronous orbit.

Space Transportation System

Further flights of the Space Shuttle have been suspended, pending design changes to comply with recommendations of the Presidential inquiry following the ex-

plosion that led to the loss of the Orbiter *Challenger* and its crew on January 28, 1986.

Developed for use by both DoD and NASA, the Space Shuttle is the first reusable space vehicle. It consists of an Orbiter, similar in configuration to a delta-wing airplane but powered by liquid-propellant rocket motors; a large jettisonable tank carrying the fuel for these motors, which is attached to the Orbiter at liftoff; and two solid-propellant rocket boosters, mounted on each side of the fuel tank for liftoff.

The Shuttle is launched vertically, with all engines firing in both the Orbiter and the boosters. At an altitude of approximately 28 miles, the booster stages separate and descend by parachute into the ocean for recovery and eventual reuse. The Orbiter then continues under its own power, jettisoning the external fuel tank just before attaining orbit. The Orbiter is provided with a series of smaller rocket engines for maneuvering and attitude control, and these ensure insertion of the vehicle into the final desired orbit. Its main tasks are to place satellites into orbit, retrieve satellites from orbit, and repair and service satellites in orbit. It can be used to place a propulsive stage and satellite into precise low earth orbit for subsequent transfer into synchronous orbit or to an "escape" mission into space. It also carries a pressurized and manned space laboratory in its payload bay on some missions, with a basic seven-day duration. On completion of a mission, the Orbiter flies back into the atmosphere and, once through the reentry phase, lands like an airplane, but without power.

Accommodation is provided in a two-level cabin for up to eight crew members. The upper flight deck level has side-by-side seating for two flight crew, with dual controls. Behind them are seats for one or two mission specialists. Four more mission specialists can be located on the mid-deck. Bunks on this deck can be removed to provide three additional seats in a rescue mission.

Four operational Orbiters, named *Columbia, Challenger, Discovery,* and *Atlantis,* were built, with funding for a new Orbiter to replace *Challenger* now authorized. The first of four test flights (STS-1) was made by *Columbia* from Kennedy Space Center, Fla., in April 1981. The first operational mission ejected two satellites into space in November 1982. During subsequent missions, further satellites were deployed and recovered for repair; Spacelab was carried for the first time on STS-9; during the tenth mission, two astronauts made the first untethered orbital EVAs, using Martin Marietta's manned maneuvering units (MMUs). First payload deployment for DoD, using an IUS booster, took place in January 1985. However, following the loss of *Challenger,* military payloads will be carried on fewer than half of the Shuttle flights now scheduled over the next few years. To ensure adequate security and West Coast launch capability, new Shuttle facilities were completed at the Vandenberg AFB launch and landing site in October 1985, although this has been placed in an operational caretaker status following the *Challenger* loss.

Prime Contractors: Rockwell International (Orbiter), Martin Marietta (propellant tank), Thiokol (boosters), Lockheed Space Operations (Shuttle processing).

Power Plant: three Rocketdyne main engines, each 375,000 lb thrust at liftoff. Two Thiokol solid-propellant rocket boosters, each 3,300,000 lb thrust at liftoff.

Guidance: automatic and manual control.

Dimensions: Orbiter: length 122 ft, wing span 78 ft 0.7 in, height 56 ft 7 in.

Launch Weights: Shuttle complete approx 4,500,000 lb, Orbiter (empty) 150,000 lb, external tank (full) 1,655,600 lb, boosters (2) each 1,292,000 lb.

Space Shuttle

Inertial Upper Stage (IUS)

Used for the first time in October 1982, the IUS is intended to serve as an upper stage for both the Titan 34D/IV and the Space Shuttle. Consisting of an aft skirt, an aft-stage solid rocket motor, an interstage, a forward-stage solid rocket motor, and an equipment support structure, it has the capability of boosting 4,000 lb into geosynchronous orbit when used with Titan 34 or 5,300 lb on Titan IV.

Prime Contractor: Boeing Aerospace Company.

Power Plant: aft-stage solid rocket motor 21,400 lb thrust, forward-stage solid rocket motor 18,500 lb thrust.

Guidance: inertial, plus star tracker.

Dimensions: length 17 ft, diameter 9 ft 2¼ in.

Launch Weight: 32,500 lb.

PAM-D II

The original PAM (Payload Assist Module) was developed as a commercial venture in 1976 to improve the load-carrying capability of the Delta and Atlas launch vehicles and for use on the Space Shuttle. An improved motor in PAM-D II enables it to boost a 4,200 lb satellite into geosynchronous orbit. It was selected by USAF to put all 28 Navstar GPS satellites into 10,900 nautical mile, twelve-hour orbits from the Shuttle, under a multi-year purchase agreement to procure 28 of the upper stages in 1985–90. It is still hoped to launch 22 of the satellites by October 1991, but 12 of them will now be put into orbit by Delta II MLVs and only ten by Shuttle. A spring-loaded mechanism will eject each spinning PAM-D II and satellite from the Shuttle cargo bay. The spinning motion will stabilize the package from initial deployment to positioning in orbit.

Contractor: McDonnell Douglas Astronautics Company.

Delta II (MLV)

On January 21 this year, McDonnell Douglas was selected by USAF to build 20 modified versions of its Delta rocket to launch the Navstar Global Positioning System (GPS) satellites, the first of which had been scheduled for launch this February on board the Shuttle. **Delta II** is a three-stage liquid-propellant Medium Launch Vehicle (MLV), designed to be slightly larger than the earlier Delta in order to satisfy USAF's medium-payload requirement. All 20 rockets are to be launched by 1991, the contract containing harsh financial penalties should any fail.

BQM-34 Firebee aboard USAF missile-recovery ship

Remotely Piloted Vehicles (RPVs)

MQM-107B Streaker

A longer, reengined version of the earlier MQM-107A, originally ordered for the US Army in 1975, the **MQM-107B** is a recoverable, variable-speed target drone. Improvements tested and proven on the A version are incorporated on the B version. MQM-107Bs assigned to Tyndall AFB, Fla., and Wallace AS in the Philippines are used to test and evaluate air-to-air missiles. An initial order for ten each for USAF and the US Army was supplemented in April 1983, with major production orders for both services. Deliveries were made between August 1984 and May 1985, but it is planned to continue procurement of the MQM-107B as USAF's standard subscale target drone.

Contractor: Beech Aircraft Corporation.

Power Plant: one Microturbo TRI 60-2 Model 074 turbojet engine; 827 lb thrust.

Guidance and Control: analog or digital, for both ground control and preprogrammed flight. High-*g* autopilot provisions.

Dimensions: length 18 ft 1 in, body diameter 1 ft 3 in, span 9 ft 10 in.

Weight: launch weight (incl booster) 1,090 lb.

Performance: operating speed 317–615 mph, operating height 50–40,000 ft, endurance more than 3 hours.

BQM-34 Firebee

Since initial development of the **BQM-34A** in the late 1950s, more than 6,000 of these jet target vehicles have been delivered to support weapon system and target research, development, test, evaluation, quality assurance, training, and annual service practices by all three of the US services and foreign governments. The BQM-34s deployed at Wallace AS in the Philippines and Tyndall AFB, Fla., are used in the testing and evaluation of air-to-air missiles. In addition, the BQM-34A and supersonic **BQM-34F** Firebee II are used as targets in the William Tell exercise held every two years at Tyndall AFB. Final procurement of the BQM-34A was in 1985. This target is to be replaced by the MQM-107B. (Data for BQM-34A.)

Contractor: Teledyne Ryan Aeronautical.

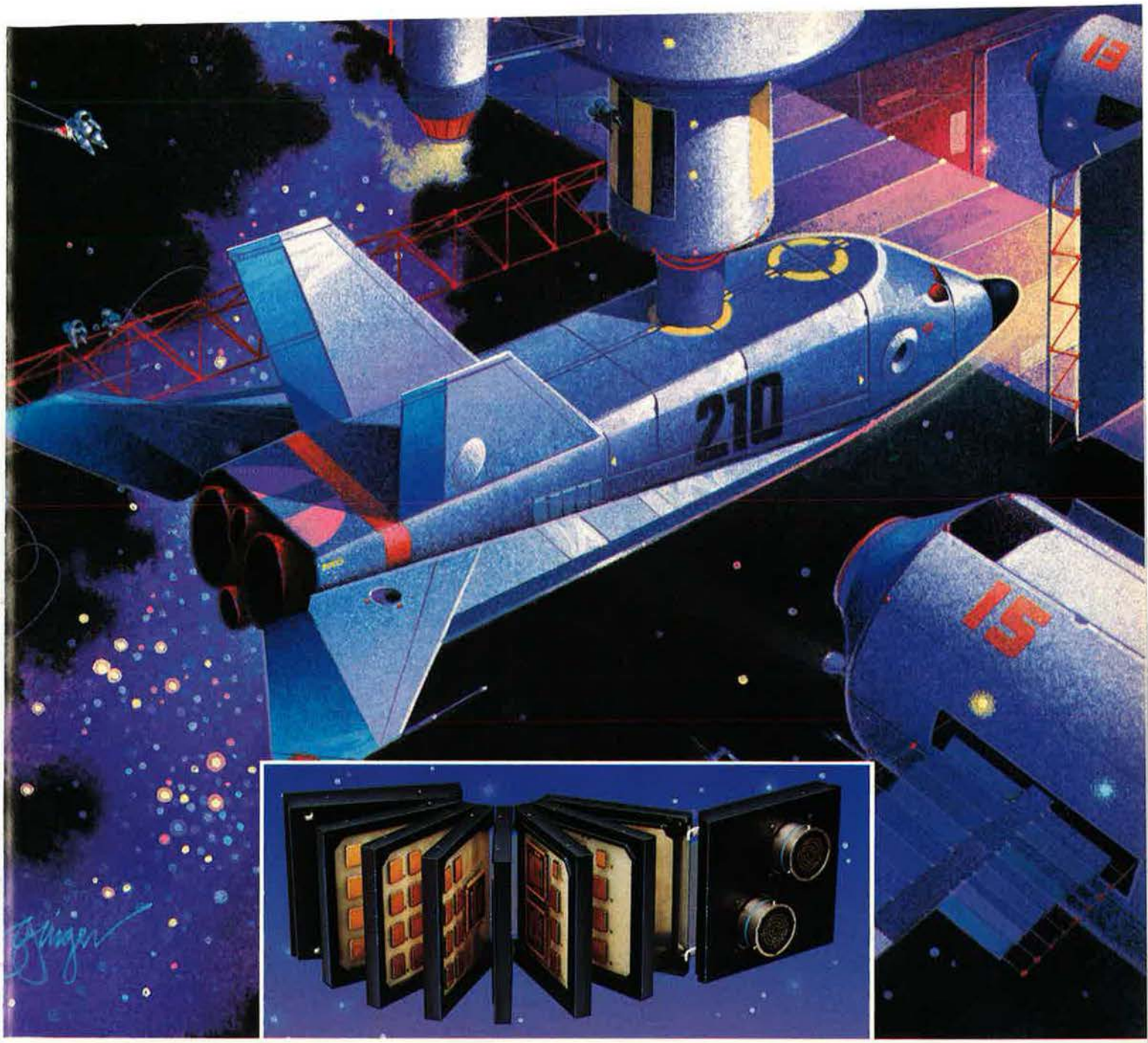
Power Plant: one Teledyne CAE J69-T-29 turbojet engine, 1,700 lb thrust; latest models have one General Electric J85-GE-7 turbojet engine, 2,450 lb thrust.

Guidance and Control: remote control methods include choice of radar, radio, active seeker, and automatic navigator developed by Teledyne Ryan; Vega DTCS (drone tracking and control system); microwave command and guidance system also available.

Dimensions: length 22 ft 10.8 in, body diameter 3 ft 1.2 in, span 12 ft 10.8 in.

Weight: launch weight 2,500 lb.

Performance: max level speed at 6,500 ft 690 mph, operating height range 20 ft to more than 60,000 ft, max range 796 miles. ■



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AIR FORCE MAGAZINE'S

Guide to USAF Bases at Home and Abroad

(Includes civilian airports and airfields of other military services that provide basing for USAF units and activities.)

Altus AFB, Okla. 73523-5000; within Altus city limits. Phone (405) 482-8100; AUTOVON 866-1110. MAC base. 443d Military Airlift Wing (Training); 340th Air Refueling Wing (SAC); 2002d Communications Sqdn. (AFCC); Field Training Det. 403; 57th Flying Training Wing, OL C (ATC), T-37 aircraft operations; Det. 4, 17th Weather Sqdn.; Det. 3, 1600th Management Engineering Sqdn.; Det. 4, 1365th Audiovisual Sqdn. Base activated Jan. 1943; inactivated May 1945; reactivated Jan. 1953. Area 3,582 acres, plus 818 leased. Altitude 1,376 ft. Military 3,634; civilians 947; approximately 500 TDY students (officer and enlisted) in training per month. Payroll $145 million. Housing: 133 officer; 667 NCO; 365 VAQ, 158 VOQ, 4 transient family units. 25-bed hospital.

Andrews AFB, Md. 20331-5000; 11 mi. SE of Washington, D. C. Phone (301) 981-9111; AUTOVON 858-1110. MAC base. Hq. Air Force Systems Command. 1776th Air Base Wing; 89th Military Airlift Wing; 113th Tactical Fighter Wing (ANG); 459th Military Airlift Wing (AFRES); 2045th Communications Gp. (AFCC); Det. 11, 1361st Audiovisual Sqdn.; Naval Air Facility; Marine Aircraft Gp. 41, Det. A. Base activated May 1943; named for Lt. Gen. Frank M. Andrews, military air pioneer and WW II commander of the European theater, killed in aircraft accident May 3, 1943, in Iceland. Area 4,982 acres (including easements). Altitude 281 ft. Military 7,287; civilians 2,736. Payroll $283.5 million. Housing: 389 officer; 1,695 NCO; 210 mobile home spaces; 354 transient (incl. 68 temp. living quarters for incoming personnel, 54 DV suites, 176 VOQ, 56 TAQ). 320-bed hospital.

Arnold AFS, Tenn. 37389; approx. 7 mi. SE of Manchester. Phone (615) 454-3000; AUTOVON 340-5011. AFSC station. Site of Arnold Engineering Development Center, free world's largest complex of wind tunnels, jet and rocket engine test cells, space simulation chambers, and hyperballistic ranges. AEDC supports the acquisition of new aerospace systems by conducting research, development, and evaluation testing for USAF, other services, and government agencies. Base activated Jan. 1, 1950; named for Gen. H. H. "Hap" Arnold, wartime Chief of the AAF. Area 40,118 acres. Altitude 950–1,150 ft. Military 186; civilians 220; contractor employees 3,600. Payroll $142.2 million. Housing: 24 officer; 16 NCO; 45 transient. Medical aid station.

Barksdale AFB, La. 71110-5000; in Bossier City. Phone (318) 456-2252; AUTOVON 781-1110. SAC base. Hq. 8th Air Force; 2d Bomb Wing (B-52G, KC-135, and KC-10 aircraft operations); 1st Combat Evaluation Gp.; 46th Communications Gp. (AFCC); Det. 1, 307th Civil Engineering Sqdn. "Red Horse" (AFRES); Det. 1, 14th Flying Training Wing (ATC), T-37 aircraft operations; Det. 5, 3904th Management Engineering Sqdn.; 26th Weather Sqdn. (MAC); Det. 3, 1401st Military Airlift Sqdn. (MAC), CT-39 aircraft operations; 49th Test Sqdn.; 3097th Aviation Depot Sqdn. (AFLC); Det. 2, 4200th Test Sqdn.; 3903d School Sqdn. (SAC NCO Academy); 745th Air Force Band Sqdn.; 78th Air Refueling Sqdn. (AFRES), KC-10 aircraft operations; 917th Tactical Fighter Gp. (AFRES), A-10 operations. Also home of the 8th Air Force Museum. The 917th TFG trains all ANG and AFRES pilots in the 46th Tactical Fighter Training Sqdn. Base named for Lt. Eugene H. Barksdale, WW I airman killed in Aug. 1926 in crash near Wright Field, Ohio. Base activated Feb. 2, 1933. Area 22,000 acres (20,000 acres reserved for recreation). Altitude 166 ft. Military 7,000; civilians 1,207. Payroll $145.3 million. Housing: 205 officer; 828 NCO; 29 transient. 70-bed hospital.

Beale AFB, Calif. 95903-5000; 13 mi. E of Marysville. Phone (916) 634-3000; AUTOVON 368-1110. SAC base. 14th Air Div.; 9th Strategic Recon Wing; 7th Missile Warning Sqdn. (AFSPACECOM); 1883d Communications Sqdn. (AFCC). Aircraft include the SR-71, U-2, and TR-1 reconnaissance aircraft, KC-135 aerial tankers, and T-38 trainers. Originally US Army's Camp Beale. Became Air Force installation in Apr. 1948; became AFB in Nov. 1951. Named for Brig. Gen. E. F. Beale, Indian agent in California prior to Civil War. Area 22,944 acres. Altitude 113 ft. Military 4,422; civilians 528. Payroll $147.7 million. Housing: 211 officer; 1,501 NCO; 103 transient. 30-bed hospital.

Bergstrom AFB, Tex. 78743-5002; 7 mi. SE of downtown Austin. Phone (512) 479-4100; AUTOVON 685-4100. TAC base. 67th Tactical Reconnaissance Wing, RF-4C reconnaissance operations; Hq. 12th Air Force; Hq. 10th Air Force (AFRES); 924th Tactical Fighter Gp. (AFRES), F-4D fighter operations; TAC NCO Academy West; Det. 8, 602d Tactical Air Control Wing; Det. 1, 4400th Management Engineering Sqdn.; Det. 12, Tactical Communications Div. Base activated Sept. 22, 1942; named for Capt. John A. E. Bergstrom, first Austin serviceman killed in WW II; died Dec. 8, 1941, at Clark Field, Philippines. Area 3,998 acres. Altitude 541 ft. Military 5,199; civilians 960. Payroll $129.73 million. Housing: 78 officer; 642 enlisted; 235 transient. 35-bed hospital.

Blytheville AFB, Ark. 72315-5000; 4 mi. NW of Blytheville. Phone (501) 762-7000; AUTOVON 721-1110. SAC base. 42d Air Div.; 97th Bomb Wing. Aircraft include B-52s and KC-135s. Base activated June 1942; inactivated Feb. 1947; reactivated Aug. 1955. Area 3,092 acres. Altitude 254 ft. Military 2,914; civilians 362. Payroll $69.4 million. Housing: 197 officer; 733 NCO; 69 transient. 25-bed hospital.

Bolling AFB, D. C. 20332-5000; 3 mi. S of US Capitol. Phone (202) 545-6700; AUTOVON 227-0101. Air Force District of Washington. 1100th Air Base Gp.; US Air Force Honor Guard; US Air Force Band; Air Force Office of Scientific Research (AFSC); Air Force Chief of Chaplains; Air Force Surgeon General; Air Force Office of History; Hq. Air Force Office of Special Investigations. Activated Oct. 1917; named for Col. Raynal C. Bolling, first high-ranking Air Service officer killed in WW I. Area 604 acres. Military 2,800; civilians 1,000. Payroll $112 million. Housing: 405 officer; 990 NCO; 257 transient. Clinic.

Brooks AFB, Tex. 78235; in SE San Antonio. Phone (512) 536-1110; AUTOVON 240-1110. AFSC base. Aerospace Medical Div.; USAF School of Aerospace Medicine; USAF Occupational and Environmental Lab; USAF Drug Testing Lab; USAF Human Resources Lab. Tenant units include Det. 20 of AFSC (Directorate of Professional Development), the AFSC Systems Acquisition School, USAF Office of Medical Support, a security squadron, and a communications group. Base activated Dec. 8, 1917; named for Cadet Sidney J. Brooks, Jr., killed Nov. 13, 1917, on his final solo flight before commissioning. Area 1,310 acres. Altitude 600 ft. Military 1,500; civilians 1,200. Payroll $54.9 million. Housing: 70 officer; 100 NCO; 8 transient. Clinic.

Cannon AFB, N. M. 88103-5000; 7 mi. W of Clovis. Phone (505) 784-3311; AUTOVON 681-1110. TAC base. 27th Tactical Fighter Wing, F-111D fighter operations. Base activated Aug. 1942; named for Gen. John K. Cannon, WW II commander of all Allied air forces in the Mediterranean theater. Area 25,636 acres. Altitude 4,295 ft. Military 3,650; civilians 782. Payroll $75 million. Housing: 149 officer; 862 enlisted. 25-bed hospital.

Carswell AFB, Tex. 76127-5000; 7 mi. WNW of downtown Fort Worth. Phone (817) 735-5000; AUTOVON 739-1110. SAC base. 19th Air Div.; 7th Bomb Wing (SAC); 301st Tactical Fighter Wing (AFRES); aircraft include B-52s, KC-135s, and AFRES F-4s. Base activated Aug. 1942; named Jan. 30, 1948, for Maj. Horace S. Carswell, Jr., native of Fort Worth, WW II B-24 pilot, and posthumous Medal of Honor recipient. Area 3,274 acres. Altitude 650 ft. Military 5,050; civilians 1,060. Payroll $246 million. Housing: 98 officer; 709 NCO; 44 VOQ, 22 TLF, 80 VAQ under renovation. 120-bed regional hospital.

Castle AFB, Calif. 95342-5000; 8 mi. NW of Merced. Phone (209) 726-2011; AUTOVON 347-1110. SAC base. 93d Bomb Wing. Conducts training of all SAC B-52G and H and KC-135 aircrews. Also houses 84th Fighter Interceptor Training Sqdn. (TAC) and Det. 1, 318th Fighter Interceptor Sqdn. Site of Castle Air Museum. Base activated Sept. 1941; named for Brig. Gen. Frederick W. Castle, WW II B-17 pilot and Medal of Honor recipient. Area 2,700 acres. Altitude 188 ft. Military 5,570; civilians 404. Payroll $172.7 million. Housing: 92 officer; 842 NCO; 432 transient (incl. 108 VAQ, 156 VOQ, 4 family quarters, and 24 DV quarters). 25-bed hospital.

Chanute AFB, Ill. 61868-5000; 14 mi. N of Champaign at Rantoul, Ill. Phone (217) 495-1110; AUTOVON 862-1110. ATC base. Chanute Technical Training Center provides training in missile and aircraft mechanics, aerospace ground equipment, life support, metallurgy and nondestructive inspection, weather forecasting, weather equipment, and fire protection and rescue. Display Center and Historical Aircraft Park comprise a base museum. Base activated May 1, 1917; named for Octave Chanute, aeronautical engineer and glider pioneer who died in 1910. Area 2,125 acres. Altitude 735 ft. Military 7,118; civilians 1,106. Payroll $172.66 million. Housing: 153 officer; 1,169 enlisted; 188 VOQ, 948 VAQ, 32 TLF. 35-bed hospital.

Charleston AFB, S. C. 29404-5000; located in North Charleston 16 mi. from downtown Charleston. Phone (803) 554-0230; AUTOVON 583-0111. MAC base. Joint-use airfield. 437th Military Airlift Wing; 315th MAW (AFRES Assoc.); 1968th Communications Sqdn.; Det. 1, 107th Fighter Interceptor Sqdn. (TAC); Det. 7, 1361st Audiovisual Sqdn. Base activated Dec. 1941; inactivated Feb. 1946; reactivated 1952. Area 6,314 acres (incl. an auxiliary airfield). Altitude 45 ft. Military 7,777 (incl. AFRES); civilians 1,745. Payroll $139.4 million. Housing: 142 officer; 813 NCO; 75 trailer spaces; 472 transient (150 VOQ, 322 VAQ). Dispensary.

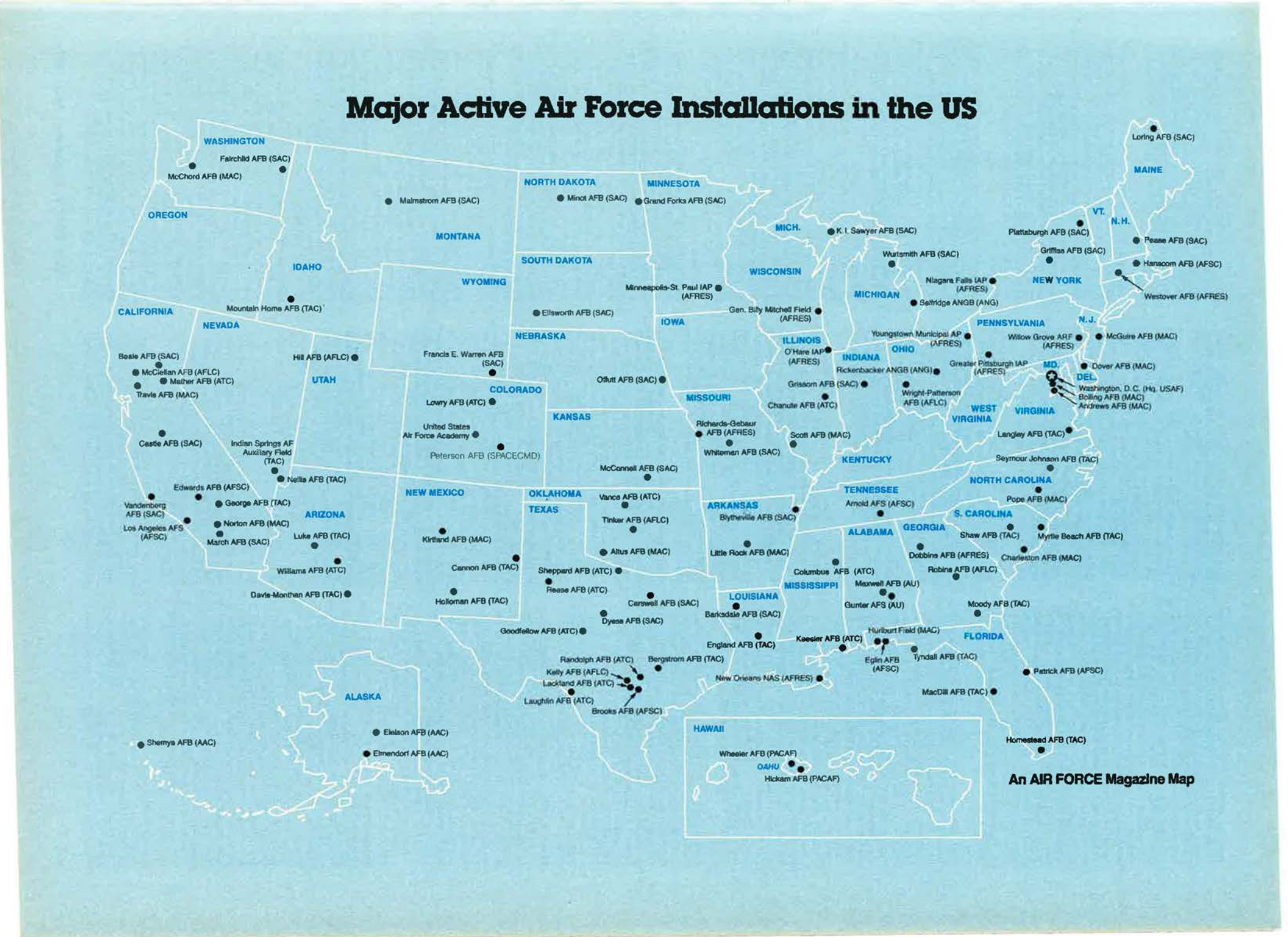
Columbus AFB, Miss. 39701-5000; 10 mi. NNW of Columbus. Phone (601) 434-7322; AUTOVON 742-1110. ATC base. 14th Flying Training Wing, undergraduate pilot training. Base activated 1941 for pilot training. Area 6,013 acres. Altitude 214 ft. Military 2,985; civilians 499. Payroll $99.5 million. Housing: 234 officer; 586 NCO; 60 transient. 20-bed hospital.

Davis-Monthan AFB, Ariz. 85707-5000; within city limits of Tucson. Phone (602) 748-3900; AUTOVON 361-1110. TAC base. 836th Air Div.; 355th Tactical Training Wing, A-10 combat crew training; 602d Tactical Air Control Wing, headquarters for OA-37, OV-10, and ground FAC tactical air control operations; 868th Tactical Missile Training Gp., ground-launched cruise missile training operations; 41st Electronic Combat Sqdn. (EC-130H); Det. 1, 318th Fighter Interceptor Gp. (TAC). Also site of AFLC's Military Aerospace Maintenance and Regeneration Center. Base activated 1927; named for two local early aviators—1st Lt. Samuel H. Davis, killed Dec. 28, 1921, and 2d Lt. Oscar Monthan, killed Mar. 27, 1924. Area 11,000 acres. Altitude 2,620 ft. Military 5,124; civilians 1,359. Payroll $134.4 million. Housing: 133 officer; 1,102 enlisted; 8 guest; 680 transient. 65-bed hospital.

Dover AFB, Del. 19902-5000; 3 mi. SE of Dover. Phone (302) 678-7011; AUTOVON 455-1110. MAC base. 436th Military Airlift Wing; 512th MAW (AFRES Assoc.). Dover operates the largest aerial port facility on the East Coast. Base activated Dec. 1941; inactivated 1946; reactivated Feb. 1951. Area 3,734 acres. Altitude 28 ft. Military 4,574; civilians 1,358. Payroll $205.5 million. Housing: 107 officer; 1,449 NCO; 670 transient (512 VAQ, 158 VOQ), 14 TLF. 30-bed hospital.

Dyess AFB, Tex. 79607-5000; WSW border of Abilene. Phone (915) 696-0212; AUTOVON 461-1110. SAC base. 12th Air Div.; 96th Bomb Wing; Det. 1, 4201st Test Sqdn. (SAC); 463d Tactical Airlift Wing; Det. 4, 1722d Combat Control Sqdn. (MAC); 1993d Communications Sqdn. (AFCC); 417th Field Training Det.; Det. 1, 47th Flying Training Wing (ATC); B-1B Site Activation Task Force (AFSC); B-1B FOT&E Test Team (AFOTEC). B-1B, KC-135, C-130, T-38 operations. First base to activate an operational B-1B wing and conduct B-1 combat crew training for the Air Force. First B-1B arrived June 1985; wing met initial operational capability Oct. 1986. Base activated Apr. 1942; deactivated Dec. 1945; reactivated as Abilene AB Sept. 1955. In Mar. 1956, renamed for Lt. Col. William E. Dyess, WW II fighter pilot known best for his escape from a Japanese prison camp; killed in P-38 crash at Burbank, Calif., Dec. 1943. Area 6,058 acres. Altitude 1,789 ft. Military 5,270; civilians 448. Payroll $179 million. Housing: 150 officer; 848 NCO; 265 BAQ/VOQ, 200 TLF. 35-bed hospital.

Major Active Air Force Installations in the US



An AIR FORCE Magazine Map

Edwards AFB, Calif. 93523; 20 mi. E of Rosamond. Phone (805) 277-1110; AUTOVON 527-1110. AFSC base. Site of Air Force Flight Test Center (AFFTC), which conducts developmental and follow-on testing and evaluation of manned and unmanned aircraft and related avionics and weapon systems. AFFTC also operates the USAF Test Pilot School, which trains test pilots, flight-test engineers, and flight-test navigators. Also site of USAF Rocket Propulsion Laboratory, US Army Aviation Engineering Flight Activity, the NASA Dryden Flight Research Facility, and the Jet Propulsion Laboratory's test facility. Edwards is the primary landing site for all Space Shuttle test and evaluation flights and a primary backup landing site for operational Shuttle missions. Base activated Sept. 1933 as Muroc Army Air Field; renamed for Capt. Glen W. Edwards, killed June 5, 1948, in crash of a YB-49 "Flying Wing." Area 301,000 acres. Altitude 2,302 ft. Military 4,859; government and contractor civilians 8,281. Payroll $304 million. Housing: 534 officer (incl. BOQ); 3,241 enlisted (incl. 1,466 dormitory spaces and 196 bachelor NCO quarters); 218 transient (70 VAQ, 97 VOQ, 51 TLF); 164 mobile home park units. 25-bed hospital.

Eglin AFB, Fla. 32542; 2 mi. SW of the twin cities of Niceville and Valparaiso; 7 mi. NE of Fort Walton Beach. Phone (904) 881-6668; AUTOVON 872-1110. AFSC base. Eglin is the free world's largest air force base in terms of land area, covering an area roughly two-thirds the size of Rhode Island. Air Force Armament Division (host); Air Force Armament Test Lab; 33d Tactical Fighter Wing; 39th Aerospace Rescue & Recovery Wing; Tactical Air Warfare Center; 1972d Communications Sqdn.; 919th Special Operations Gp. (AFRES); 20th Missile Warning Sqdn.; 55th Aerospace Rescue & Recovery Sqdn.; 728th Tactical Control Sqdn.; US Army Florida Ranger Camp; a US Navy Explosive Ordnance Disposal School; Air Force Armament Museum. Base activated 1935; named for Lt. Col. Frederick I. Eglin, WW I flyer killed in aircraft accident Jan. 1, 1937. Area 464,980 acres. Altitude 85 ft. Work force (excl. Hurlburt Field): military 10,972; civilians 3,982; contractor 1,378. Payroll $382 million (incl. Hurlburt Field). Housing: 263 officer; 2,072 enlisted; 227 trailer spaces (officer and enlisted); 88 transient. 155-bed USAF regional hospital. AFSC clinic at Hurlburt Field.

Eielson AFB, Alaska 99702-5000; 26 mi. SE of Fairbanks. Phone (907) 377-1178; AUTOVON (317) 377-1110. AAC base. 343d Tactical Fighter Wing; 343d Combat Support Gp.; 18th Tactical Fighter Sqdn.; 25th Tactical Air Support Sqdn. 343d Tactical Fighter Wing is host unit. Close air support for ground forces and search and rescue for AAC; 6th Strategic Wing (SAC) tanker operations; communications for AFCC; Arctic Survival School (ATC); 168th AREFS (ANG). Base activated Oct. 1944; named for Carl B. Eielson, Arctic aviation pioneer, died Nov. 1929. Area 23,500 acres (approx.). Altitude 534 ft. Military 3,338; civilians 416. Payroll $68.4 million. Housing: 164 officer; 1,296 NCO; 90 transient. Clinic.

Ellsworth AFB, S. D. 57706; 11 mi. ENE of Rapid City. Phone (605) 342-2400; AUTOVON 747-1110. SAC base. Largest operational base in SAC. 44th Strategic Missile Wing (Minuteman II); 28th Bomb Wing (the 28th BMW is receiving the B-1B bomber and will have two B-1B squadrons [35 B-1B aircraft] by Oct. 1987); Det. 2, 37th Aerospace Rescue & Recovery Sqdn.; OL A, 64th Flying Training Wing (ATC); Det. 17, 9th Weather Sqdn.; 2148th Communications Sqdn. (AFCC). Home of the South Dakota Air and Space Museum. Base activated July 1942 as Rapid City Army Air Base; named for Brig. Gen. Richard E. Ellsworth, killed Mar. 18, 1953, in crash of RB-36 in Newfoundland. Area 4,906 acres. Altitude 3,200 ft. Military 6,450; civilians 535. Payroll $135 million. Housing: 331 officer; 1,526 NCO; 173 transient. 30-bed hospital.

Elmendorf AFB, Alaska 99506-5000; bordering Anchorage. Phone (907) 552-1110; AUTOVON (317) 552-1110. AAC base. Hq. Alaskan Air Command. 21st Tactical Fighter Wing; NORAD Region Operations Control Center; Rescue Coordination Center; 11th Tactical Control Gp.; 43d Tactical Fighter Sqdn.; 5021st Tactical Operations Sqdn.; 962d AWACS (TAC); 1931st Communications Wing (AFCC); 6981st Electronic Security Sqdn. (ESC); 616th Military Airlift Gp. (MAC); 17th Tactical Airlift Sqdn. (MAC); 71st Aerospace Rescue & Recovery Sqdn. (MAC); 11th Weather Sqdn. (MAC); plus varied US Army, Navy, and Marine activities. 21st Tactical Fighter Wing is host unit. Base activated July 1940; named for Capt. Hugh Elmendorf, killed Jan. 13, 1933, at Wright Field, Ohio, while flight-testing a new type of pursuit plane. Area 13,130 acres. Altitude 118 ft. Military 6,219; civilians 1,721. Payroll $221 million. Housing: 232 officer; 1,638 NCO; transient incl. 52 family units (no pets), 140 VOQ, 230 VAQ. 95-bed hospital.

England AFB, La. 71311-5004; 5 mi. W of Alexandria. Phone (318) 448-2100; AUTOVON 683-1110. TAC base. 23d Tactical Fighter Wing, A-10 fighter operations. Base activated Oct. 1942; named for Lt. Col. John B. England, WW II P-51 pilot and ace credited with 17.5 victories, killed Nov. 17, 1954, in F-86 crash in France. Area 2,282 acres. Altitude 89 ft. Military 3,057; civilians 667. Payroll $44 million. Housing: 109 officer; 491 NCO; transient incl. 23 VAQ 40-bed double rooms, 26 VOQ single rooms, 10 family rooms. 25-bed hospital.

Fairchild AFB, Wash. 99011-5000; 12 mi. WSW of Spokane. Phone (509) 247-1212; AUTOVON 352-1110. SAC base. 47th Air Div.; 92d Bomb Wing (SAC); 3636th Combat Crew Training Wing (ATC); 141st Air Refueling Wing (ANG); Det. 24, 40th Aerospace Rescue & Recovery Sqdn. (MAC); Det. 1, 1000th Satellite Operations Gp. (AFSPACECOM); 2039th Communications Sqdn. (AFCC). Base activated Jan. 1942; named for Gen. Muir S. Fairchild, USAF Vice Chief of Staff at his death in 1950. Area 6,127 acres. Altitude 2,462 ft. Military 4,859; civilians 610. Payroll $94 million for civilian and active-duty military; $12 million for ANG. Housing: 502 officer; 1,079 NCO; transient incl. 60 VOQ and 62 VAQ, no family transient quarters. 45-bed hospital.

Francis E. Warren AFB, Wyo. 82005; adjacent to Cheyenne. Phone (307) 775-1110; AUTOVON 481-1110. SAC base. 4th Air Div.; 90th Strategic Missile Wing; 90th Combat Support Gp.; 37th Aerospace Rescue & Recovery Sqdn. (MAC). Base activated as Fort D. A. Russell July 4, 1867; under Army jurisdiction until 1947, when reassigned to USAF. Base renamed in 1930 for Francis Emory Warren, Wyoming senator and early governor. Base has 5,866 acres, plus 200 Minuteman III missile sites distributed over 12,600 sq. mi. in Wyoming, Colorado, and Nebraska. The base is the new home of the Peacekeeper missile system; 50 will be deployed by 1988. Altitude 6,142 ft. Military 3,816; civilians 751. Payroll $102.4 million. Housing: 203 officer; 628 NCO; 36 transient. 25-bed hospital.

George AFB, Calif. 92394-5000; 6 mi. NW of Victorville. Phone (619) 269-1110; AUTOVON 353-1110. TAC base. 831st Air Div.; 37th Tactical Fighter Wing, home of TAC's Wild Weasel F-4G squadrons; 35th Tactical Training Wing, F-4 transitional and upgrade training; German Air Force training in F-4; OL AD, 144th Fighter Interceptor Wing (TAC); 27th Tactical Air Support Sqdn. (OV-10); 2067th Communications Sqdn. (AFCC). Base activated 1941; named for Brig. Gen. Harold H. George, WW I fighter ace killed Apr. 29, 1942, in aircraft accident in Australia. Area 5,347 acres. Altitude 2,875 ft. Military 5,450; civilians 512. Payroll $193.35 million. Housing: 229 officer; 198 senior NCO; 1,214 NCO; 63 transient. 30-bed hospital.

Gila Bend Air Force Auxiliary Field, Ariz. 85337-5000; 65 mi. SW of Luke AFB, 4 mi. S of Gila Bend. Phone (602) 683-6220; AUTOVON 853-5220. TAC base. 832d Combat Support Sqdn. Provides bombing and gunnery range support for tactical operations from Luke AFB; manages construction and maintenance of realistic target complexes. Base activated 1941. Area 2,700,000 acres. Altitude 858 ft. Military 177; civilians 80. Payroll included in Luke AFB entry. Housing: 6 officer; 93 NCO; 49 BAQ; 6 VOQ; 3 temporary family lodging facilities; 19 trailer spaces (plus 18-lot FAMCAMP). Medical aid station.

Goodfellow AFB, Tex. 76908-5000; 2 mi. SE of San Angelo. Phone (915) 657-3231; AUTOVON 657-3231. ATC base. Goodfellow Technical Training Center provides cryptologic training for all services. Designated the newest technical training center Mar. 1, 1985. Will house all Air Force intelligence training by 1989 under the Intelligence Training Consolidation program. Other major units include 3480th Technical Training Wing; 3480th Technical Training Gp.; 3480th Air Base Gp. (ATC); 3480th Student Gp.; 3490th Technical Training Gp.; 8th Missile Warning Sqdn. (at nearby Eldorado Air Force Station, the location of the Southwest PAVE PAWS radar site) (AFSPACECOM); Det. 6, USAF Occupational Measurement Center (USAFOMC); 2081st Communications Sqdn. (AFCC); Det. 12, 3314th Management Engineering Sqdn. (ATC); NCO Professional Military Education Center (ESC); US Army Intelligence Training Battalion; Naval Technical Training Center Detachment; Marine Corps Administrative Detachment. Base activated Jan. 1941; named for Lt. John J. Goodfellow, Jr., WW I fighter pilot killed in combat Sept. 14, 1918. Area 1,127 acres. Altitude 1,877 ft. Military 2,765; civilians 592. Payroll $70.47 million. Housing: 3 officer; 96 NCO; 617 transient (581 VAQ, 36 VOQ). 12-unit TLF. Clinic.

Grand Forks AFB, N. D. 58205-5000; 16 mi. W of Grand Forks. Phone (701) 594-6011; AUTOVON 362-1110. SAC base. 319th Bomb Wing (KC-135); 321st Strategic Missile Wing (Minuteman III). Base activated 1956; named after the city of Grand Forks, whose citizens bought the property for the Air Force. Area 6,912 acres. Missile complex covers an additional 7,500 sq. mi. Altitude 911 ft. Military 5,537; civilians 561. Payroll $147.6 million. Housing: 442 officer; 1,835 NCO; 136 transient. 35-bed hospital.

Griffiss AFB, N. Y. 13441-5000; 1 mi. NE of Rome. Phone (315) 330-1110; AUTOVON 587-1110. SAC base. 416th Bomb Wing. Other major units are Rome Air Development Center (AFSC); 485th Engineering Installation Gp. (AFCC); 49th Fighter Interceptor Sqdn. (TAC); Hq. 24th Air Div. and the Northeast Sector Operations Control Center (NORAD/ADTAC); 933d Civil Engineering Sqdn. (AFRES). Base activated Feb. 1, 1942; named for Lt. Col. Townsend E. Griffiss, killed in aircraft accident Feb. 15, 1942 (the first US airman to lose his life in Europe during WW II while in the line of duty). Area 3,896 acres. Altitude 504 ft. Military 4,523; civilians 3,204. Payroll $267 million. Housing: 169 officer; 566 NCO; 50 trailers; 109 transient. 70-bed hospital.

Grissom AFB, Ind. 46971; 7 mi. S of Peru. Phone (317) 689-5211; AUTOVON 928-1110. SAC base. 305th Air Refueling Wing; 434th Tactical Fighter Wing (AFRES); 931st Air Refueling Gp. (AFRES). Activated Jan. 1943 for Navy flight training; reactivated June 1954 as Bunker Hill AFB; renamed May 1968 for Lt. Col. Virgil I. "Gus" Grissom, killed Jan. 27, 1967, at Cape Kennedy, Fla., with other Astronauts Edward White and Roger Chaffee in Apollo capsule fire. Area 3,000 acres. Altitude 800 ft. Military 2,350; civilians 1,056. Payroll $53.1 million (SAC only). Housing: 276 officer; 1,852 NCO; 138 transient. 10-bed hospital.

Gunter AFS, Ala. 36114; 4 mi. NE of Montgomery. Phone (205) 279-1110; AUTOVON 446-1110. AU station. Hq. Standard Systems Center (AFCC); Air Force Logistics Management Center; USAF Extension Course Institute; USAF Senior NCO Academy. Base activated Aug. 27, 1940; named for William A. Gunter, longtime mayor of Montgomery and airpower exponent, died 1940. Area 368 acres. Altitude 220 ft. Military 1,600; civilians 931. Payroll included in Maxwell entry. Housing: 118 officer; 206 NCO; 265 transient (108 VOQ, 157 VAQ, 3 TLF).

Hanscom AFB, Mass. 01731; 17 mi. NW of Boston. Phone (617) 861-4441; AUTOVON 478-5980. AFSC base. Hq. Electronic Systems Div. (AFSC) manages development and acquisition of command control communications and intelligence (C^3I) systems. Also site of Air Force Geophysics Lab, center for research and exploratory development in the terrestrial, atmospheric, and space environments. Base has no flying mission; transient USAF aircraft use runways of Laurence G. Hanscom Field, state-operated airfield adjoining the base. Named for a pre-WW II advocate of private aviation, killed in a lightplane accident in 1941. Area 846 acres. Altitude 133 ft. Military 2,100; civilians 3,100. Payroll $160 million. Housing: 387 officer; 472 NCO; 30-unit TLF, 754 BOQ/VOQ. Clinic.

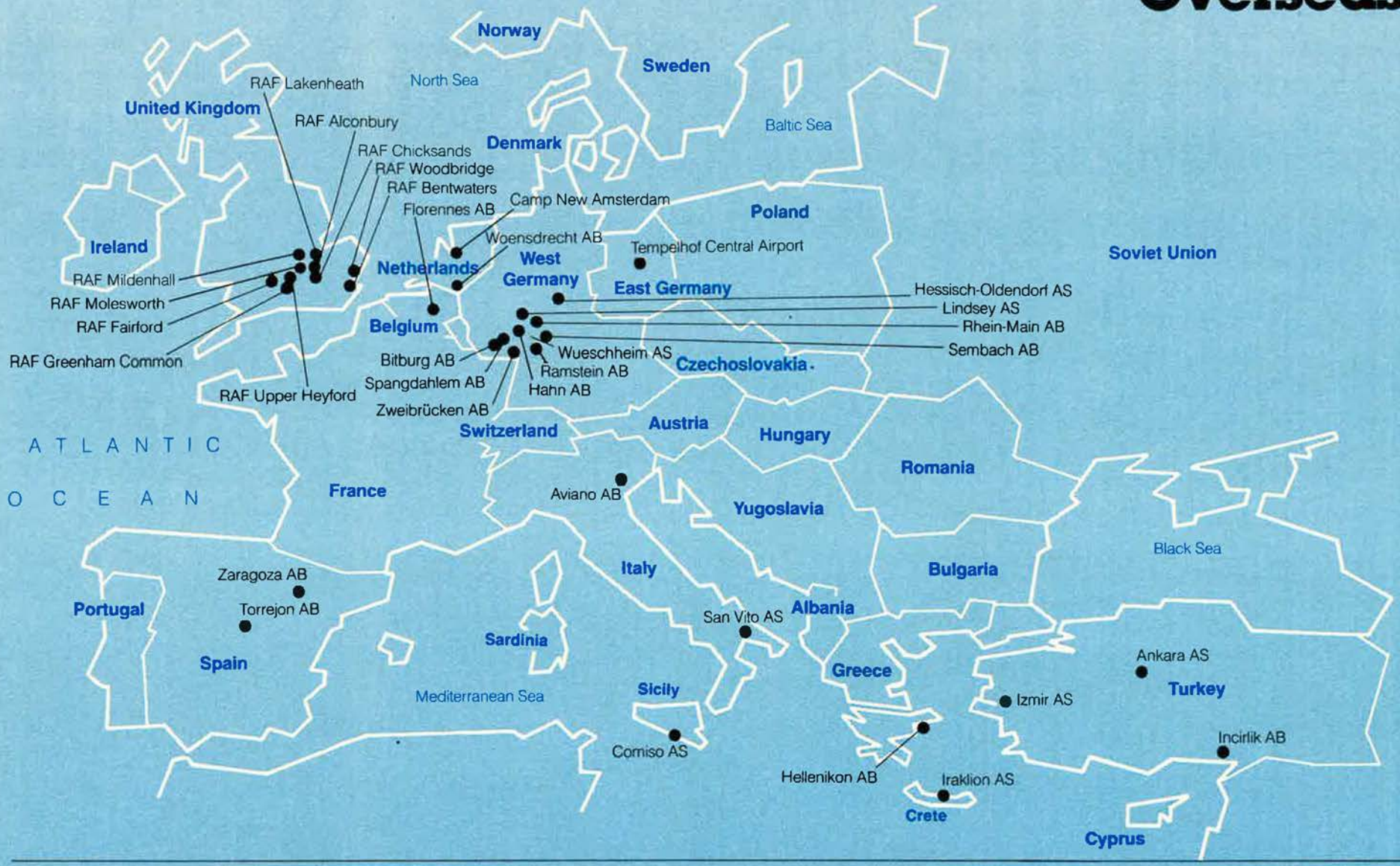
Hickam AFB, Hawaii 96853-5000; 10 mi. W of Honolulu. Phone (808) 422-0531 (Oahu military operator); AUTOVON 430-0111. PACAF base. Hq. Pacific Air Forces. Host unit 15th Air Base Wing, supporting Air Force units and installations in Hawaii and throughout the Pacific; subordinate unit 9th Airborne Command and Control Sqdn. Major associate units include 834th Airlift Div. (MAC); Hq. Pacific Communications Div. (AFCC); 1st Weather Wing (MAC); 154th Composite Gp. (ANG); 619th Military Airlift Support Sqdn. (MAC); Det. 1, 89th Military Airlift Wing (MAC). Base activated Sept. 1938; named for Lt. Col. Horace M. Hickam, air pioneer killed in crash Nov. 5, 1934, at Fort Crockett, Tex. Area 2,694 acres. Altitude sea level. Military 4,834; civilians 1,886. Payroll $332 million (includes Hickam and Wheeler AFBs and Bellows AFS). Housing: 535 officer; 1,920 enlisted. Clinic.

Hill AFB, Utah 84056-5990; 5 mi. S of Ogden. Phone (801) 777-7221; AUTOVON 458-1110. AFLC base. Hq. Ogden Air Logistics Center. Furnishes logistics support for Peacekeeper, Minuteman, and Titan II missiles; Maverick air-to-ground missiles; laser and electro-optical guided bombs; F-4 and F-16 systems manager; air munitions; aircraft landing gears; wheels, brakes and struts, tires, and tubes; photographic and aerospace training equipment. Other units include 388th Tactical Fighter Wing; 419th Tactical Fighter Wing (AFRES); 40th Aerospace Rescue & Recovery Sqdn.; 729th Tactical Control Sqdn.; 6545th Test Gp. (AFSC), which oversees management of Utah Test and Training Range and RPV test programs. Base activated Nov. 1940; named for Maj. Ployer P. Hill, killed Oct. 30, 1935, test-flying the first B-17. Area 6,666 acres; manages 961,012 acres. Altitude 4,788 ft. Military 5,200; civilians 16,200. Payroll $593 million. Housing: 263 officer; 882 NCO; 45 transient. 35-bed hospital.

Holloman AFB, N. M. 88330-5000; 8 mi. SW of Alamogordo. Phone (505) 479-6511; AUTOVON 867-1110. TAC base. 833d Air Div.; 49th Tactical Fighter Wing, F-15 operations; 479th Tactical Training Wing, AT-38B fighter lead-in training; 4449th Mobility Support Sqdn., Harvest Bare; 82d and 83d Tactical Control Flights; 6585th Test Gp. (AFSC) conducts test and evaluation of aircraft and missile systems. Twenty-one other tenant units located at Holloman, including 1877th Information Systems Sqdn., 4th Satellite Communications Sqdn. (AFSPACECOM), 1984th Communications Sqdn., 40th Aerospace Rescue & Recovery Sqdn., Air Force Geophysical Laboratory detachment, and a US Army unit. Base activated 1942; named for Col. George Holloman, guided-missile pioneer, killed in B-17 crash on Formosa Mar. 19, 1946. Area 50,697 acres. Altitude 4,093 ft. Military 6,624; civilians 1,412. Payroll $238 million. Housing: 191 officer; 1,360 NCO; 255 transient. 35-bed hospital.

Europe

USAF's Principal Bases Overseas



Homestead AFB, Fla. 33039-5000; 5 mi. NNE of Homestead. Phone (305) 257-8011; AUTOVON 791-0111. TAC base. 31st Tactical Fighter Wing, F-4D and F-16 fighter operations and training; site of ATC sea-survival school; 726th Tactical Control Sqdn. (TAC); Naval Security Group Activity; 482d Tactical Fighter Wing (AFRES); 301st Aerospace Rescue & Recovery Sqdn. (AFRES); OL AA, 125th Fighter Interceptor Gp. (TAC). Base activated Apr. 1955. Area 3,491 acres. Altitude 7 ft. Military 5,411; civilians 10,462. Payroll $313.8 million. Housing: 321 officer; 1,294 NCO; 359 transient. 80-bed hospital.

Hurlburt Field, Fla. 32544-5000; 5 mi. W of Fort Walton Beach. Phone (904) 881-6668; AUTOVON 872-1110. MAC base, though located on the Eglin AFB (AFSC) reservation. Hurlburt is the home of Air Force special operations forces. Assigned to the 1st Special Operations Wing are special-equipped MC-130E (Combat Talon), AC-130H (Spectre gunship), and MH-53 (Pave Low) aircraft. Under the 1st SOW's responsibility are the helicopters of Det. 1, 1st SOW, at Howard AFB, Panama. The USAF Special Operations School, 1723d Combat Control Sqdn., and the Special Operations Weather Team are all located at Hurlburt. Tenant units assigned to Hurlburt Field include the Special Missions Operational Test and Evaluation Center; the 4442d Tactical Control Gp., which includes the US Air Force Air-Ground Operations School and the 727th Tactical Control Sqdn.; and the 823d Civil Engineering Sqdn. "Red Horse." Base activated 1943; named for Lt. Donald W. Hurlburt, WW II pilot killed Oct. 2, 1943, in a crash on Eglin reservation. Altitude 35 ft. Military 3,800; civilians 320. Payroll $83 million. Housing: 74 officer; 306 NCO; 341 transient. Medical clinic only at Hurlburt, but 155-bed hospital at Eglin Regional Hospital located 12 mi. away.

Indian Springs Air Force Auxiliary Field, Nev. 89018-5000; 45 mi. NW of Las Vegas. Phone (702) 897-6201; AUTOVON 682-6201. TAC base. 554th Combat Support Sqdn.; 4460th Helicopter Sqdn. Provides bombing and gunnery range support for tactical operations from Nellis AFB; manages construction of realistic target complexes; supports US Department of Energy research activities. Base activated 1942. Area 1,652 acres. Altitude 3,124 ft. Military 289; civilians 19. (Payroll included in Nellis AFB entry.) Housing: 78 officer and NCO quarters; 30 trailer spaces. Dispensary.

Keesler AFB, Miss. 39534-5000; located in Biloxi. Phone (601) 377-1110; AUTOVON 868-1110. ATC base. Hq. Keesler Technical Training Center (communications, electronics, avionics, radar systems, computer and command and control systems, personnel, and administrative courses); Keesler USAF Medical Center. Hosts MAC and AFRES weather reconnaissance units, TAC airborne command and control sqdn., AFCC engineering installation gp., AFCC NCO Academy/Leadership School; USAF First Sergeant's Academy. Base activated June 12, 1941; named for 2d Lt. Samuel R. Keesler, Jr., WW I aerial observer, killed in action Oct. 9, 1918, near Verdun, France. Area 3,600 acres. Altitude 26 ft. Military 13,019; civilians 3,167. Payroll $287 million. Housing: 310 officer; 1,647 NCO; 51 trailer spaces; 76 transient (376 VOQ and 1,348 VAQ units on space availability, technical training students occupy many units). 325-bed medical center.

Kelly AFB, Tex. 78245-5000; 5 mi. SW of San Antonio. Phone (512) 925-1110; AUTOVON 945-1110. AFLC base. Hq. San Antonio Air Logistics Center provides logistics management, procurement, and distribution support for such USAF aircraft as the C-5A and C-5B, C-17, C-9, F-5, O-2, OV-10, T-38, and T-46A. As a specialized repair activity, SA-ALC modernizes and performs heavy depot maintainance on the entire USAF fleet of C-5s, a significant portion of Strategic Air Command B-52s, Military Airlift Command C-130s, and various engines, including the TF39, TF56, and F100. SA-ALC also manages more than half of the Air Force's engine inventory, all fuel lubricants used by the Air Force and NASA, the Air Force's fleet of boats and ships, and the Department of Defense Working Dog Program. Other major units include Hq. Electronic Security Command; Air Force Electronic Warfare Center; Air Force Cryptologic Support Center; Joint Electronic Warfare Center; USAF Service Information and News Center; Hq. Air Force Commissary Service; 433d Military Airlift Wing (AFRES); 149th Tactical Fighter Gp. (ANG); 1923d Communications Gp.; 1827th Electronics Installation Sqdn.; Defense Reutilization and Marketing Office; Air Force Audit Agency Office. Dating back to Nov. 21, 1916, Kelly AFB is the oldest continuously active air base in the US. Named for Lt. George E. M. Kelly, first Army pilot to lose his life in a military aircraft, killed May 10, 1911. Area 4,660 acres. Altitude 689 ft. Military 4,932; civilians 20,600. Payroll $628 million. Housing: 46 officer; 368 NCO. Clinic.

Kirtland AFB, N. M. 87117-5000; S of Albuquerque. Phone (505) 844-0011; AUTOVON 244-0011. MAC base. 1606th Air Base Wing. Major agencies and units include Air Force Contract Management Div. (AFSC); Air Force Operational Test and Evaluation Center; Air Force Space Technology Center; Air Force Weapons Laboratory (AFSC); Air Force Office of the Chief of Security Police; New Mexico ANG; 1550th Combat Crew Training Wing (MAC); Defense Nuclear Agency Field Command; Naval Weapons Evaluation Facility, Sandia National Laboratories; Lovelace Biomedical and Environmental Research Institute; Department of Energy's Albuquerque Operations Office; AFSC NCO Academy; Air Force Directorate of Nuclear Surety; 150th Tactical Fighter Gp. (ANG); 1960th Communications Sqdn. (AFCC); 3098th Aviation Depot Sqdn.; Det. 1, 1369th Audiovisual Sqdn. These agencies furnish contract management; nuclear and laser research, development, and testing; operational test and evaluation services; advanced helicopter training; HC-130 search and rescue training; and pararescue training. Other major units include AFLC Nuclear Support Office; Albuquerque Seismological Laboratory; Command Control Communications Countermeasures Joint Test Force; University of New Mexico Civil Engineering Research Facility; Interservice Nuclear Weapons School. Base activated Jan. 1941; named for Col. Roy S. Kirtland, air pioneer and commandant of Langley Field in the 1930s, died May 2, 1941. Area 52,450 acres. Altitude 5,352 ft. Military 4,984; civilians 14,223. Payroll $750 million. Housing: 350 officer; 1,784 NCO; 399 transient (274 VOQ, 125 VAQ). 40-bed hospital.

K. I. Sawyer AFB, Mich. 49843-5000; 20 mi. S of Marquette. Phone (906) 346-6511; AUTOVON 472-1110. SAC base. 410th Bomb Wing; ELF Transmitter Facility (Navy); 2001st Communications Sqdn. (AFCC). Base activated 1959; named for Kenneth I. Sawyer, who proposed site for county airport, died 1944. Area 5,278 acres. Altitude 1,220 ft. Military 3,637; civilians 529. Payroll $116.8 million. Housing: 279 officer; 1,414 NCO; 199 trailer spaces; 26 BNCOQ; 22 BOQ; 59 transient (incl. 20 fully furnished TLFs, 22 VAQ, and 17 VOQ). 15-bed hospital.

Lackland AFB, Tex. 78236-5000; 8 mi. WSW of San Antonio. Phone (512) 671-1110; AUTOVON 473-1110. ATC base. Provides basic military training for active-duty, Air Guard, and Air Reserve airmen; technical training of basic and advanced security police/law enforcement personnel; patrol dog-handler courses; training of instructors, recruiters, and social actions/drug abuse counselors; USAF marksmanship training; Officer Training School; Defense Language Institute English Language Center; Wilford Hall USAF Medical Center (USAF's largest medical center, also conducts medical education and clinical research); ATC NCO Academy; military training instructor reserve squadron; 539th Air Force Band; 3504th Recruiting Gp.; Det. 40, Air Logistics Center. Base activated 1941; named for Brig. Gen. Frank D. Lackland, early commandant of Kelly Field flying school, died 1943. Area 6,783 acres, incl. 3,972 acres at Lackland Training Annex. Altitude 745 ft. Military 20,357; civilians 6,636. Payroll $436.6 million. Housing: 106 officer; 619 NCO. Transient facilities available for 831. 1,000-bed medical center.

Langley AFB, Va. 23665-5000; 3 mi. N of Hampton. Phone (804) 764-9990; AUTOVON 574-1110. TAC base. Hq. Tactical Air Command. 1st Tactical Fighter Wing, host unit, F-15 fighter operations; Hq. 1st Air Force (TAC); Hq. CONUS NORAD region; 2d Aircraft Delivery Gp. (TAC); 1913th Communications Gp. (AFCC); 1912th Computer Systems Gp. (AFCC); 564th Air Force Band (TAC); Det. 7, 3d Weather Sqdn. (MAC); 48th Fighter Interceptor Sqdn. (TAC); 6th Airborne Command and Control Sqdn. (TAC); Low Intensity Conflict Center; 20 other tenant units. Base activated Dec. 30, 1916. Langley is the second oldest continuously active air base in the US; named for aviation pioneer and scientist Samuel Pierpont Langley, who died in 1906. NASA Langley Research Center is located across base. Area 3,439 acres. Altitude 10 ft. Military 9,417; civilians 2,792. Military payroll $289.5 million; civilian payroll $46.1 million. Housing: 384 officer; 1,259 NCO; 312 transient. USAF regional 70-bed hospital.

Laughlin AFB, Tex. 78843-5000; 6 mi. E of Del Rio. Phone (512) 298-3511; AUTOVON 732-1110. ATC base. 47th Flying Training Wing, undergraduate pilot training. Base activated Oct. 1942; named for 1st Lt. Jack T. Laughlin, B-17 pilot killed over Java on Jan. 29, 1942. Area 4,008 acres. Altitude 1,080 ft. Military 2,946; civilians 601 (141 contract civilians). Payroll $103.3 million. Housing: 202 officer; 401 NCO; 37 transient, 24 temporary family lodging facilities, 54 mobile home spaces. 20-bed hospital.

Laurence G. Hanscom AFB *(see Hanscom AFB).*

Little Rock AFB, Ark. 72099-5000; 12 mi. NE of Little Rock. Phone (501) 988-3131; AUTOVON 731-1110. MAC base. 314th Tactical Airlift Wing, only C-130 training base in DoD, training crew members from all branches of service and some foreign countries. Tenants include 308th Strategic Missile Wing, the only Titan II missile wing in USAF; 2151st Communications Sqdn.; 22d Air Force NCO Leadership School. Base activated 1955. Area 6,898 acres. Altitude 310 ft. Military 7,300; civilians 1,000. Payroll $159 million. Housing: 313 officer; 1,222 NCO; 387 transient (162 VAQ, 225 VOQ). 30-bed hospital.

Loring AFB, Me. 04751-5000; 4 mi. W of Limestone. Phone (207) 999-1110; AUTOVON 920-1110. SAC base. 42d Bomb Wing. Base activated Feb. 25, 1953, as Limestone AFB; renamed for Maj. Charles Loring, Jr., F-80 pilot killed Nov. 22, 1952, in North Korea and posthumously awarded Medal of Honor. Area more than 9,000 acres. Altitude 756 ft. Military 3,782; civilians 840. Payroll $129.4 million. Housing: 303 officer; 1,481 NCO; 122 transient; 4 VIP. 23-bed hospital, with a new 20-bed hospital under construction.

Los Angeles AFS, Calif. 90009-2960; in metropolitan Los Angeles area, city of El Segundo, 3 mi. S of Los Angeles IAP. Phone (213) 643-1000; AUTOVON 833-1110. AFSC station. Headquarters of AFSC's Space Division, which manages the design, development, acquisition, and launch of DoD's space program. Support unit is 6592d Air Base Gp. 24 tenant units on station; also provides support to 41 off-station units/activities. Station activated Dec. 14, 1960. Area 96 acres at Los Angeles AFS and 96 acres at Fort MacArthur Annex. Altitude 95 ft. Military 2,109; civilians 2,278. Payroll $116.6 million. Housing at Fort MacArthur Annex in San Pedro: 370 officer and enlisted townhomes; general officer houses; 27 enlisted dormitory rooms; 60 visiting and unaccompanied officer quarters. 23 TLF units. Clinic, commissary, child-care center, and Family Support Center.

Lowry AFB, Colo. 80230-5000; on border between Denver and Aurora. Phone (303) 370-1110; AUTOVON 926-1110. ATC base. Technical Training Center; Air Force Accounting and Finance Center; Air Reserve Personnel Center; 3320th Correction and Rehabilitation Sqdn. Lowry Technical Training Center conducts training in avionics, space operations, munitions, logistics, and audiovisual fields. Base activated Oct. 1, 1937; named for 1st Lt. Francis B. Lowry, killed in action Sept. 26, 1918, near Crepion, France, while on a photo mission. Area 1,863 acres (3,511-acre training annex 25 mi. E of Lowry). Altitude 5,400 ft. Military 10,655; civilians 6,322. Payroll $301.2 million. Housing: 95 officer; 772 enlisted; 240 VOQ, 585 VAQ, 40 TLF. USAF clinic on base, with Fitzsimons Army Medical Center 5 minutes away.

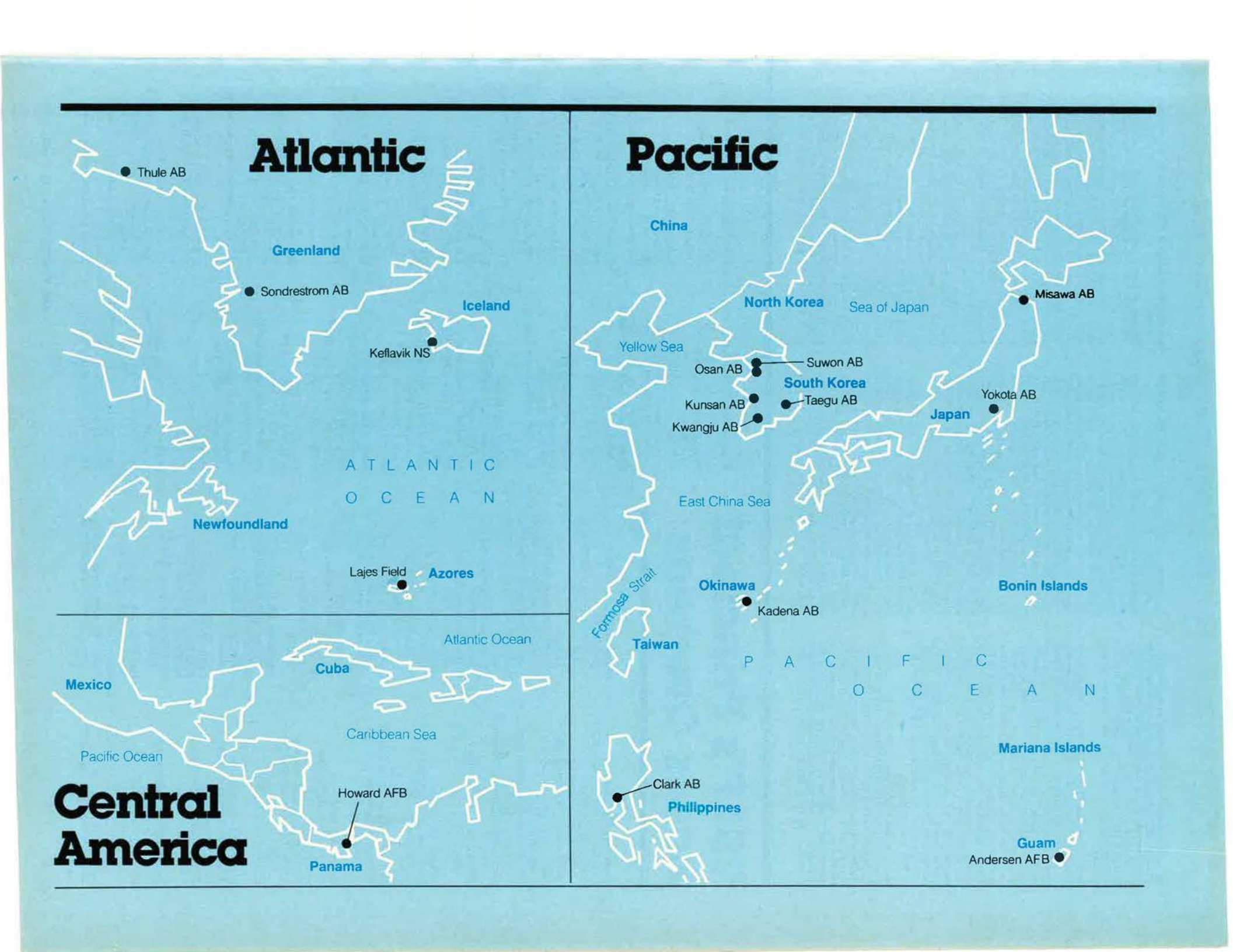
Luke AFB, Ariz. 85309-5000; 20 mi. WNW of Phoenix. Phone (602) 856-7411; AUTOVON 853-1110. TAC base. 832d Air Div.; 405th Tactical Training Wing, F-15 operations; 58th Tactical Training Wing, F-16 operations; 302d Special Operations Sqdn. (AFRES). Luke, the largest fighter training base in the free world, conducts training of USAF and foreign pilots in the F-15, F-16, and F-5 through the 425th Tactical Fighter Training Sqdn. at nearby Williams AFB. Base activated 1941; named for 2d Lt. Frank Luke, Jr., observation balloon-busting ace of WW I and first flyer to receive the Medal of Honor, killed in action Sept. 29, 1918, near Murvaux, France. Area 4,197 acres, plus 2,700,000-acre range at Gila Bend. Altitude 1,090 ft. Military 5,543; civilians 1,450. Payroll $253 million. Housing: 95 officer; 779 NCO; 265 transient (180 VOQ, 85 VAQ); 40 temporary family lodging facilities. 105-bed hospital.

MacDill AFB, Fla. 33608-5000; adjacent to Tampa city limits. Phone (813) 830-1110; AUTOVON 968-1110. TAC base. 56th Tactical Training Wing, F-16 operations; Hq. US Readiness Command; Hq. US Central Command; Joint Communication Support Element. 56th Tactical Training Wing conducts replacement training in the F-16. Base activated Apr. 15, 1941; named for Col. Leslie MacDill, killed in an aircraft accident Nov. 8, 1938, near Washington, D. C. Area 5,631 acres. Altitude 6 ft. Military 6,824; civilians 1,832. Payroll $183 million. Housing: 58 officer; 746 enlisted; 360 transient. 75-bed USAF regional hospital.

Malmstrom AFB, Mont. 59402-5000; 1.5 mi. E of Great Falls. Phone (406) 731-9990; AUTOVON 632-1110. SAC base. 341st Strategic Missile Wing. Base activated Dec. 15, 1942; named for Col. Einar A. Malmstrom, WW II fighter commander killed in air accident Aug. 24, 1954. Site of SAC's first Minuteman wing. Area 3,573 acres, plus about 23,000 sq. mi. of missile complex. Altitude 3,525 ft. Military 3,537; civilians 530. Payroll $122 million. Housing: 294 officer; 1,112 NCO; 107 transient. 29-bed hospital.

March AFB, Calif. 92518-5000; 9 mi. SE of Riverside. Phone (714) 655-1110; AUTOVON 947-1110. SAC base. Hq. 15th Air Force; 22d Air Refueling Wing; 26th Air Div., Southwest Sector (TAC); 452d Air Refueling Wing (AFRES); 943d Tactical Airlift Gp.; 163d Tactical Fighter Gp. (ANG). Base activated Mar. 1, 1918; named for 2d Lt. Peyton C. March, Jr., who died in Texas of crash injuries Feb. 18, 1918. Area 7,703 acres. Altitude 1,530 ft. Military 3,565; civilians 949. Payroll $171 million. Housing: 103 officer; 608 NCO; 146 transient. 110-bed hospital.

Mather AFB, Calif. 95655-5000; 12 mi. ESE of Sacramento. Phone (916) 364-1110; AUTOVON 828-1110. ATC base. DoD executive manager for navigator training (USAF, Navy, and Marine Corps basic navigation training). Provides navigator training for 2d German AF and 90 other countries. Only navigator training base; also trains USAF electronic warfare officers. 323d Flying Training Wing


Atlantic
Thule AB
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Sondrestrom AB
Iceland
Keflavik NS
ATLANTIC
OCEAN
Newfoundland
Lajes Field
Azores
Pacific
China
North Korea
Sea of Japan
Misawa AB
Yellow Sea
Osan AB
Suwon AB
South Korea
Kunsan AB
Taegu AB
Yokota AB
Kwangju AB
Japan
East China Sea
Okinawa
Kadena AB
Bonin Islands
Formosa Strait
Taiwan
PACIFIC
OCEAN
Mariana Islands
Clark AB
Philippines
Guam
Andersen AFB
Central America
Atlantic Ocean
Cuba
Mexico
Caribbean Sea
Pacific Ocean
Howard AFB
Panama

(ATC); 320th Bomb Wing (SAC); 940th Air Refueling Gp. (AFRES); 3506th Recruiting Gp. Base activated 1918; named for 2d Lt. Carl S. Mather, killed in midair collision Jan. 30, 1918, in Texas. Area 5,800 acres. Altitude 96 ft. Military 5,328; civilians 2,126. Payroll $219.2 million. Housing: 452 officer; 820 NCO; 208 transient. 80-bed hospital.

Maxwell AFB, Ala. 36112; 1 mi. WNW of Montgomery. Phone (205) 293-1110; AUTOVON 875-1110. AU base. Hq. Air University, professional education center for USAF. 3800th Air Base Wing; Air War College; Air Command and Staff College; Center for Aerospace Doctrine, Research, and Education; Center for Professional Development; Squadron Officer School; Air Force Historical Research Center; Hq. Air Force ROTC (ATC); Hq. Civil Air Patrol-USAF; Community College of the Air Force (ATC); 908th Tactical Airlift Gp. (AFRES). (The Senior NCO Academy and Extension Course Institute are at Gunter AFS.) Base activated 1918; named for 2d Lt. William C. Maxwell, killed in air accident Aug. 12, 1920, in the Philippines. Area 2,535 acres. Altitude 168 ft. Military 4,271; civilians 1,620. Payroll $275.9 million. Housing: 263 officer; 436 NCO; 1,106 transient (1,078 VOQ, 28 VAQ, and 30 TLF). 90-bed hospital.

McChord AFB, Wash. 98438-5000; 8 mi. S of Tacoma. Phone (206) 984-1910; AUTOVON 976-1110. MAC base. 62d Military Airlift Wing; Hq. 25th Air Div. (TAC); 318th Fighter Interceptor Sqdn. (TAC); Region Operations Control Center (NORAD); 446th Military Airlift Wing (AFRES Assoc.). Base activated May 5, 1938; named for Col. William C. McChord, killed Aug. 18, 1937, while attempting a forced landing at Maidens, Va. Area 4,609 acres. Altitude 322 ft. Military 5,662; civilians 1,982. Payroll $152 million. Housing: 111 officer; 882 NCO; 284 transient. Dispensary.

McClellan AFB, Calif. 95652; 9 mi. NE of Sacramento. Phone (916) 643-2111; AUTOVON 633-1110. AFLC base. Hq. Sacramento Air Logistics Center provides logistics management, procurement, maintenance, and distribution support for such USAF weapon systems as F-111, FB-111, A-10, EF-111; surveillance and warning systems, the Space Transportation System, communication-electronics equipment, radar sites, and generators; maintenance support for F-4 aircraft. Other major units include 41st Rescue and Weather Reconnaissance Wing (MAC); 2049th Communications Gp. and 1849th Electronics Installation Sqdn. (AFCC); Technical Operations Division, Air Force Technical Applications Center (AFSC); Test and Evaluation Center (TAC); Hq. 4th Air Force (AFRES); Defense Logistics Agency; US Coast Guard Air Station, Sacramento (DOT). Named for Maj. Hezekiah McClellan, pioneer in Arctic aeronautical experiments who was killed in crash May 25, 1936. Area 2,917 acres. Military 3,900; civilians 15,000. Payroll $500 million. Housing: 132 officer; 343 NCO; 21 transient. Clinic.

McConnell AFB, Kan. 67221-5000; 5 mi. SE of Wichita. Phone (316) 652-6100; AUTOVON 743-1110. SAC base. 384th Air Refueling Wing (will become 384th Bomb Wing in July '87); 184th Tactical Fighter Gp. (ANG). First B-1B arrives Jan. 1988. Base activated June 5, 1951; named for Capt. Fred J. McConnell, WW II B-24 pilot who died in crash of a private plane Oct. 25, 1945, and for his brother, 2d Lt. Thomas L. McConnell, also a WW II B-24 pilot, killed July 10, 1943, during attack on Bougainville in the Pacific. Area 3,066 acres. Altitude 1,371 ft. Military 2,788; civilians 627. Payroll $80 million. Housing: 119 officer; 506 NCO; 98 transient (26 VOQ, 60 VAQ, 12 TLF). 15-bed hospital.

McGuire AFB, N. J. 08641-5000; 18 mi. SE of Trenton. Phone (609) 724-1110; AUTOVON 440-0111. MAC base. 438th Military Airlift Wing; Hq. 21st Air Force; New Jersey ANG; New Jersey Civil Air Patrol; 170th Air Refueling Gp. (ANG); 108th Tactical Fighter Wing (ANG); 514th Military Airlift Wing (AFRES Assoc.); MAC NCO Academy East; Air Force Band of the East. Base adjoins Army's Fort Dix; formerly Fort Dix Army Air Base. Activated as AFB 1949; named for Maj. Thomas B. McGuire, Jr., P-38 pilot, second leading US ace of WW II, and recipient of Medal of Honor, killed in action Jan. 7, 1945, in the Philippines. Area 3,552 acres. Altitude 133 ft. Military 5,258; civilians 1,901. Payroll $170 million. Housing: 194 officer; 1,560 NCO; 620 transient (186 VOQ, 244 VAQ, 160 transient family units, 30 other transient). Dispensary and 150-bed hospital at Fort Dix.

Minot AFB, N. D. 58705-5000; 13 mi. N of Minot. Phone (701) 727-6000; AUTOVON 344-1110. SAC base. 57th Air Div.; 91st Strategic Missile Wing, Minuteman III operations; 5th Bombardment Wing, B-52H and KC-135 operations; 5th Fighter Interceptor Sqdn. (TAC), F-15A/B, T-33 operations; 2150th Communications Sqdn. (AFCC); Det. 7, 37th Aerospace Rescue & Recovery Sqdn. (MAC), UH-1 operations; 64th Flying Training Wing, OL B (ATC), T-38 operations; Det. 21, 9th Weather Sqdn. (AWS); Det. 7, Air Force Institute of Technology; AFOSI Det. 1312; Det. 35, 3904th Management Engineering Sqdn.; Det. 520, Air Force Audit Agency; 15th Air Force NCO Leadership School. Base activated Jan. 1957; named after the city of Minot, whose citizens donated $50,000 toward purchase of the land for the Air Force. Area 5,085 acres, plus

USAF's Principal Bases Overseas

Andersen AFB, Guam
APO San Francisco 96334-5000
AUTOVON 322-1110
Hq. 3d Air Division, SAC
43d Bombardment Wing, SAC
605th Military Airlift Support Squadron, MAC
54th Weather Reconnaissance Squadron, MAC
27th Communications Squadron, AFCC
Det. 11, 2d Aircraft Delivery Group, TAC

Ankara AS, Turkey
APO New York 09254-5000
AUTOVON 672-1110
Hq. TUSLOG
7217th Air Base Group, USAFE
Command, logistical management

Aviano AB, Italy
APO New York 09293-5000
AUTOVON 632-1110
40th Tactical Group, USAFE
2187th Communications Group, AFCC
Support base, USAFE

Bitburg AB, W. Germany
APO New York 09132-5000
AUTOVON 453-1110
36th Tactical Fighter Wing, USAFE

Camp New Amsterdam, The Netherlands
APO New York 09292-5226
(Call Sembach, AUTOVON 496-1110; ask for Camp New Amsterdam.)
32d Tactical Fighter Squadron, USAFE

Clark AB, Republic of the Philippines
APO San Francisco 96274-5000
AUTOVON 869-1110 (Direct 89X-XXXX)
Hq. 13th Air Force, PACAF
3d Tactical Fighter Wing, PACAF
374th Tactical Airlift Wing, MAC
1961st Communications Group, AFCC
6200th Tactical Fighter Training Group, PACAF
6922d Electronic Security Squadron, ESC
1st Special Operations Squadron, MAC
9th Aeromedical Evacuation Squadron, MAC
31st Aerospace Rescue and Recovery Squadron, MAC
600th Air Force Band, PACAF

Comiso AS, Italy
APO New York 09694-5154
AUTOVON 628-8110
487th Tactical Missile Wing, USAFE

Florennes AB, Belgium
APO New York 09188-5000
AUTOVON 791-3255
485th Tactical Missile Wing, USAFE

Hahn AB, W. Germany
APO New York 09109-5000
AUTOVON 450-1110
50th Tactical Fighter Wing, USAFE

Hellenikon AB, Greece
APO New York 09223-5000
AUTOVON 662-1110
7206th Air Base Group, USAFE
2140th Communications Group, AFCC
Support, communications, USAFE

Hessisch-Oldendorf AS, W. Germany
APO New York 09669-5000
(Call Sembach, AUTOVON 496-1110; ask for Hessisch-Oldendorf.)
600th Combat Support Squadron, USAFE
Support, communications, USAFE

Howard AFB, Panama
APO Miami 34001-5000
AUTOVON 284-1110
Hq. USAF Southern Air Division, TAC

Incirlik AB, Turkey
APO New York 09289-5000
AUTOVON 676-1110
39th Tactical Group, USAFE
2006th Communications Group, AFCC
628th Military Airlift Support Squadron, MAC
USAF Hospital Incirlik
Support base, USAFE

Iraklion AS, Crete
APO New York 09291-5225
AUTOVON 668-1110
7276th Air Base Group, USAFE
Support base, USAFE

Izmir AS, Turkey
APO New York 09224-5000
AUTOVON 675-1110
7241st Air Base Group, USAFE
Support base, USAFE

Kapaun AS, W. Germany
APO New York 09012-6343
AUTOVON 489-1110
Hq. European Communications Division, AFCC

Kadena AB, Okinawa, Japan
APO San Francisco 96239-5000
AUTOVON 630-1110
313th Air Division, PACAF
18th Tactical Fighter Wing, PACAF
376th Strategic Wing, SAC
1962d Communications Group, AFCC
6990th Electronic Security Group, ESC
961st Airborne Warning and Control Squadron, TAC

Keflavik NS, Iceland
FPO New York 09571
AUTOVON 231-1290
Fighter-interceptor unit, TAC

Kunsan AB, Republic of Korea
APO San Francisco 96264-5000
AUTOVON 272-2345
8th Tactical Fighter Wing, PACAF

Kwangju AB, Republic of Korea
APO San Francisco 96264-5000
(Call Korea, AUTOVON 272-2345; ask for Kwangju AB.)
6171st Air Base Squadron, PACAF

Lajes Field, Azores
APO New York 09406
AUTOVON 723-1410
Airlift support base, MAC

Lindsey AS, W. Germany
APO New York 09633-5000
AUTOVON 339-1110
7100th Combat Support Wing, USAFE
USAF Regional Medical Center (Wiesbaden)
1st Combat Communications Group, AFCC
Support base, USAFE

Misawa AB, Japan
APO San Francisco 96519-5000
AUTOVON 248-1101
432d Tactical Fighter Wing, PACAF
6920th Electronic Security Group, ESC

Osan AB, Republic of Korea
APO San Francisco 96570-5000
AUTOVON 284-4110
Hq. 7th Air Force, PACAF
51st Tactical Fighter Wing, PACAF
5th Tactical Air Control Group, PACAF
6th Tactical Intelligence Group, PACAF
2146th Communications Group, AFCC

additional 19,324 acres for missile sites. Altitude 1,668 ft. Military 6,147; civilians 866. Payroll $141.3 million. Housing: 469 officer; 2,001 NCO; 153 private trailer spaces; 138 transient (incl. 52 VOQ, 46 VAQ, 40 TLF). Dispensary; 40-bed military hospital in city of Minot. On-base hospital under construction; scheduled completion 1988.

Moody AFB, Ga. 31699-5000; 10 mi. NNE of Valdosta. Phone (912) 333-4211; AUTOVON 460-1110. TAC base. 347th Tactical Fighter Wing, F-4E fighter operations. Base activated June 1941; named for Maj. George P. Moody, killed May 5, 1941, while test-flying Beech AT-10. Area 6,050 acres. Altitude 233 ft. Military 3,493; civilians 664. Payroll $82 million. Housing: 36 officer; 268 NCO; 76 transient. 30-bed hospital.

Mountain Home AFB, Idaho 83648-5000; 10 mi. SW of Mountain Home. Phone (208) 828-2111; AUTOVON 857-1110. TAC base. 366th Tactical Fighter Wing, F-111A fighter and EF-111A electronic countermeasures operations. 2036th Communications Sqdn. (AFCC); 513th Field Training Det. (ATC); Det. 22, 40th Aerospace Rescue & Recovery Sqdn. (MAC); OL AF. 4444th Operations Sqdn.; Det. 2, USAF Fighter Weapons School; Det. 3, Tactical Air Warfare Center; AFOSI Det. 2007; Det. 454, Air Force Audit Agency; Det. 11, 4400th Management Engineering Sqdn.; Det. 18, 25th Weather Sqdn. Base activated Apr. 1942. Area 9,147 acres. Altitude 3,000 ft. Military 3,929; civilians 473. Payroll $82 million. Housing: 152 officer; 1,369 NCO; 121 transient; 16 TLF. 30-bed hospital.

Myrtle Beach AFB, S. C. 29579-5000; in south Myrtle Beach. Phone (803) 238-7211; AUTOVON 748-1110. TAC base. Shares runway with Myrtle Beach Jetport. 354th Tactical Fighter Wing, A-10 fighter operations; 2066th Communications Sqdn. (AFCC); Det. 11, 39th Aerospace Rescue & Recovery Wing (MAC); 301st Field Training Det. (ATC); 1816th Reserve Advisor Sqdn.; Det. 3, 3d Weather Sqdn.; Det. 12, 440th Management Engineering Sqdn. (ATC); Det. 2105, Air Force Office of Special Investigations; 73d Tactical Control Flight (TAC). Served as Army air base, 1941–47; USAF base since 1956. Area 3,793 acres. Altitude 25 ft. Military 3,500; civilians 760. Payroll $92 million. Housing: 95 officer; 682 NCO; 65 trailer lots; 117 transient. 25-bed hospital.

Nellis AFB, Nev. 89191-5000; 8 mi. NE of Las Vegas. Phone (702) 643-1800; AUTOVON 682-1800. TAC base. Tactical Fighter Weapons Center, F-5E, F-15, F-16, F-111, A-10, T-38, and UH-1N operations; 57th Fighter Weapons Wing, F-5E Aggressor operations; Thunderbirds Air Demonstration Sqdn.; 4440th Tactical Fighter Training Gp. (Red Flag); 554th Operations Support Wing; 554th Range Gp.; 474th Tactical Fighter Wing, F-16 operations; 4450th Tactical Training Gp.; 820th Civil Engineering Sqdn. "Red Horse"; 3096th Aviation Depot Sqdn.; 2069th Communications Sqdn. Base activated July 1941; named for 1st Lt. William H. Nellis, WW II P-47 fighter pilot, killed Dec. 27, 1944, in Europe. Area 11,274 acres, with ranges totaling 3,012,770 acres. Altitude 1,869 ft. Military 13,500; civilians 1,500. Payroll $426 million. Housing: 107 officer; 1,367 enlisted; 100 trailer spaces; 364 transient (153 officer, 211 enlisted); 60 TLF. 45-bed hospital.

Newark AFS, Ohio 43057; 1 mi. SW of Newark. Phone (614) 522-2171; AUTOVON 580-2171. AFLC station. Aerospace Guidance and Metrology Center repairs inertial guidance and navigation systems for most of the Air Force's missiles and aircraft as well as a variety of inertial systems for other branches of the armed forces. Also manages the Air Force's worldwide measurement and calibration program, providing the link between the National Bureau of Standards and the Air Force's 130 precision measurement equipment laboratories at bases around the world. 5 tenant units. Station activated Nov. 7, 1962. Military 35; civilians 2,700. Payroll $77 million.

Norton AFB, Calif. 92409-5000; 59 mi. E of Los Angeles, within San Bernardino corporate limits. Phone (714) 382-1110; AUTOVON 876-1110. MAC base. 63d Military Airlift Wing; Hq. Air Force Inspection and Safety Center; Hq. Air Force Audit Agency; Hq. Aerospace Audiovisual Service (MAC). Also Ballistic Missile Office (AFSC); 445th Military Airlift Wing (AFRES Assoc.); MAC NCO Academy West and 22d Air Force NCO Leadership School. Base activated Mar. 2, 1942; named for Capt. Leland F. Norton, native of San Bernardino, WW II A-20 attack bomber pilot, killed in action May 27, 1944, near Amiens, France. Area 2,430 acres. Altitude 1,156 ft. Military 8,912 (including AFRES); civilians 2,626. Payroll $502 million. Housing: 55 officer; 208 NCO; 400 transient. Clinic.

Offutt AFB, Neb. 68113-5000; 8 mi. S of Omaha. Phone (402) 294-1110; AUTOVON 271-1110. SAC base. Hq. Strategic Air Command. 55th Strategic Reconnaissance Wing; 544th Strategic Intelligence Wing; Air Force Global Weather Central (MAC); 3d Weather Wing (MAC); 3902d Air Base Wing; Hq. Strategic Communications Division (AFCC); 1st Aerospace Communications Wing (AFCC); 1000th Satellite Operations Gp. (AFSPACECOM); 6949th Electronic Security Sqdn. (ESC); 702d Air Force Band. Base activated 1896 as Army's Fort Crook; landing field named in 1924 for 1st Lt. Jarvis J. Offutt, WW I pilot, died Aug. 13, 1918, from injuries received at

6903d Electronic Security Group, ESC

RAF Alconbury, United Kingdom
APO New York 09238-5000
AUTOVON 223-1110
10th Tactical Reconnaissance Wing, USAFE
17th Reconnaissance Wing, SAC

RAF Bentwaters, United Kingdom
APO New York 09755
AUTOVON 225-1110
81st Tactical Fighter Wing, USAFE

RAF Chicksands, United Kingdom
APO New York 09193-5000
AUTOVON 234-1110
7274th Air Base Group, USAFE
6950th Electronic Security Group, ESC
Support base, USAFE

RAF Fairford, United Kingdom
APO New York 09125-5000
AUTOVON 247-1110
7020th Air Base Group, USAFE
KC-135 refueling support base, USAFE

RAF Greenham Common, United Kingdom
APO New York 09150
AUTOVON 266-1110
501st Tactical Missile Wing, USAFE

RAF Lakenheath, United Kingdom
APO New York 09179-5000
AUTOVON 226-1110
48th Tactical Fighter Wing, USAFE

RAF Mildenhall, United Kingdom
APO New York 09127-5000
AUTOVON 238-1110
Hq. 3d Air Force, USAFE
513th Tactical Airlift Wing, USAFE
306th Strategic Wing, SAC (Rotational)
313th Tactical Airlift Group, MAC (Rotational)
2147th Communications Wing, AFCC

RAF Molesworth, United Kingdom
APO New York 09236-0006
AUTOVON 223-1110
302d Tactical Missile Wing, USAFE

RAF Upper Heyford, United Kingdom
APO New York 09194-5000
AUTOVON 263-1110
20th Tactical Fighter Wing, USAFE

RAF Woodbridge, United Kingdom
APO New York 09405-5000
AUTOVON 225-1110
81st Tactical Fighter Wing, USAFE
67th Aerospace Rescue and Recovery Squadron, MAC

Ramstein AB, W. Germany
APO New York 09012-5000
AUTOVON 480-1110
Hq. USAFE (APO New York 09012-5001)
316th Air Division, USAFE
86th Tactical Fighter Wing, USAFE
377th Combat Support Wing, USAFE
608th Military Airlift Group, MAC
1856th Communications Group, AFCC
1964th Communications Group, AFCC
7455th Tactical Intelligence Wing, USAFE
Hq. European Electronic Security Division, ESC
7th Air Division, SAC
322d Airlift Division, MAC
2d Weather Wing, MAC

Rhein-Main AB, W. Germany
APO New York 09057
AUTOVON 330-1110
435th Tactical Airlift Wing, MAC
435th Combat Support Group, MAC

San Vito dei Normanni AS, Italy
APO New York 09240
AUTOVON 622-1110
7275th Air Base Group, USAFE
Support base, USAFE

Sembach AB, W. Germany
APO New York 09130-5000
AUTOVON 496-1110
Hq. 17th Air Force, USAFE (APO New York 09130-5002)
65th Air Division, USAFE
66th Electronic Combat Wing, USAFE
601st Tactical Control Wing, USAFE
2005th Communications Wing, AFCC
Allied Tactical Operations Center
Command control communications, electronic combat

Sondrestrom AB, Greenland
APO New York 09121
(Call AUTOVON 834-1211; ask for Sondrestrom AB.)
Support base, AFSPACECOM

Spangdahlem AB, W. Germany
APO New York 09123-5000
AUTOVON 452-1110
52d Tactical Fighter Wing, USAFE

Suwon AB, Republic of Korea
APO San Francisco 96461-5000
(Call Korea, AUTOVON 284-4110; ask for Suwon AB.)
25th Tactical Fighter Squadron, PACAF
(51st Tactical Fighter Wing)

Taegu AB, Republic of Korea
APO San Francisco 96213-5000
(Call Korea, AUTOVON 284-4110; ask for Taegu AB.)
497th Tactical Fighter Squadron, PACAF
(51st Tactical Fighter Wing)

Tempelhof Central Airport, West Berlin
APO New York 09611-5155
AUTOVON 332-1110
7350th Air Base Group, USAFE
6912th Electronic Security Group, ESC
Support base, USAFE

Thule AB, Greenland
APO New York 09023-5000
(Call AUTOVON 834-1211; ask for Thule AB.)
Support base, AFSPACECOM

Torrejon AB, Spain
APO New York 09283
AUTOVON 723-1110
Hq. 16th Air Force, USAFE
401st Tactical Fighter Wing, USAFE

Woensdrecht AB, The Netherlands
APO New York 09027-5000
AUTOVON 364-7280
486th Combat Support Group, USAFE
(486th Tactical Missile Wing activates mid-1987)

Wueschheim AS, W. Germany
APO New York 09109-5000
AUTOVON 474-1110
38th Tactical Missile Wing, USAFE

Yokota AB, Japan
APO San Francisco 96328-5000
AUTOVON 248-1101
Hq. US Forces, Japan
Hq. 5th Air Force, PACAF
475th Air Base Wing, PACAF
316th Tactical Airlift Group, MAC
1956th Communications Group, AFCC
1837th Electronics Installation Squadron, AFCC

Zaragoza AB, Spain
APO New York 09286-5000
AUTOVON 724-1110
406th Tactical Fighter Training Wing, USAFE
Tactical fighter training base, USAFE

Zweibrücken AB, W. Germany
APO New York 09860-5000
AUTOVON 498-1110
26th Tactical Reconnaissance Wing, USAFE
10th Military Airlift Squadron, MAC

Valheureux, France. Area 1,914 acres (incl. housing area and off-base sites). Altitude 1,048 ft. Military 12,047; civilians 3,490 (incl. 518 contractor personnel). Payroll $336 million. Housing: 511 officer; 2,169 NCO; 60 transient. 93-bed hospital.

Patrick AFB, Fla. 32925; 2 mi. S of Cocoa Beach. Phone (305) 494-1110; AUTOVON 854-1110. AFSC base. Operated by the Eastern Space and Missile Center in support of DoD, NASA, and other agency missile and space programs. Major tenants are Defense Equal Opportunity Management Institute; Air Force Technical Applications Center; 549th Tactical Air Support Gp.; 2d Combat Communications Gp. (AFCC). Base activated 1940; serves as airhead for Cape Canaveral AFS. CCAFS has supported more than 2,300 launches since 1950. Named for Maj. Gen. Mason M. Patrick, chief of AEF's Air Service in WW I and chief of the Air Service/Air Corps, 1921–27. Area 2,341 acres. Altitude 9 ft. Military 4,494; civilians 1,640. Payroll $190.6 million (military, civil service). Housing: 168 officer; 1,408 NCO. 25-bed hospital.

Pease AFB, N. H. 03803-5000; 3 mi. W of Portsmouth. Phone (603) 430-0100; AUTOVON 852-1110. SAC base. 45th Air Div.; 509th Bomb Wing (FB-111 medium bomber and KC-135 tanker operations); 541st Air Force Band; 1916th Communications Sqdn. (AFCC); 3519th USAF Recruiting Sqdn. (ATC); 157th Air Refueling Gp. (ANG). Base activated 1956; named for Capt. Harl Pease, Jr., WW II B-17 pilot and Medal of Honor recipient, killed Aug. 7, 1942, during attack on Rabaul, New Britain Island. Area 4,254 acres. Altitude 101 ft. Military 3,743; civilians 465. Payroll $133.06 million. Housing: 196 officer; 1,015 NCO (plus 50 trailer spaces); 124 transient (incl. 41 VOQ, 55 VAQ, 28 TLF). 70-bed hospital.

Peterson AFB, Colo. 80914-5000; E of Colorado Springs. Phone (303) 554-7321; AUTOVON 692-7011. AFSPACECOM base. Hq. Air Force Space Command. Host unit is 3d Space Support Wing (AFSPACECOM). Hq. North American Aerospace Defense Command; Hq. US Space Command; Cheyenne Mountain Complex; 1st Space Wing; 302d Tactical Airlift Wing (AFRES). 2d Space Wing located 9 mi. E at Falcon AFS. Base activated 1942; named for 1st Lt. Edward J. Peterson, who was killed Aug. 8, 1942, in aircraft crash at the base. Area 1,176 acres. Altitude 6,200 ft. Military active-duty 4,500; reserves 1,000; civilians 1,700. Payroll $186.35 million. Housing: 106 officer; 384 NCO; 130 transient (40 BOQ, 90 VAQ). Clinic.

Plattsburgh AFB, N. Y. 12903-5000; adjacent to Plattsburgh. Phone (518) 565-5000; AUTOVON 689-5000. SAC base. 380th Bomb Wing, medium bomber and tanker operations with FB-111 and KC-135. 530th Strategic Bombing Training Sqdn. trains all FB-111 combat crews for SAC. Det. 18, 40th Aerospace Rescue & Recovery Sqdn. (MAC); FOL E, 71st Flying Training Wing (ATC); 2042d Communications Sqdn. (AFCC); 210th Field Training Det. Second oldest active military installation in the US, established 1814; AFB since 1955. Area 4,879 acres. Altitude 235 ft. Military 4,077; civilians 450. Payroll $112.7 million. Housing: 222 officer; 1,421 NCO. 20-bed hospital.

Pope AFB, N. C. 28308-5000; 12 mi. NNW of Fayetteville. Phone (919) 394-0001; AUTOVON 486-1110. MAC base. USAF Airlift Center; 317th Tactical Airlift Wing; 1st Aeromedical Evacuation Sqdn.; 1943d Communications Sqdn.; 53d Mobile Aerial Port Sqdn. (AFRES); 1721st Combat Control Sqdn. Base adjoins Army's Fort Bragg and provides intratheater airlift support for airborne forces and other personnel, equipment, and supplies. Base activated 1919; named for 1st Lt. Harley H. Pope, WW I flyer, killed Jan. 7, 1917, when his JN-4 "Jenny" ran out of fuel and crashed near Fayetteville. Area 1,750 acres. Altitude 218 ft. Military 4,357; civilians 610. Payroll $105 million. Housing: 89 officer; 370 NCO; 218 transient. Clinic.

Randolph AFB, Tex. 78150-5001; 20 mi. ENE of San Antonio. Phone (512) 652-1110; AUTOVON 487-1110. ATC base. Hq. Air Training Command. 12th Flying Training Wing, T-37 and T-38 pilot instructor training; Air Force Military Personnel Center; Occupational Measurement Center; Civilian Personnel Management Center; Hq. USAF Recruiting Service. Base activated June 1930; named for Capt. William M. Randolph, killed Feb. 17, 1928, when his AT-4 crashed on takeoff at Gorman, Tex. Area 2,901 acres. Altitude 761 ft. Military 5,445; civilians 3,002. Payroll $277 million. Housing: 254 officer; 765 NCO; 317 transient. Clinic.

Reese AFB, Tex. 79489-5000; adjacent to Lubbock. Phone (806) 885-4511; AUTOVON 838-1110. ATC base. 64th Flying Training Wing, undergraduate pilot training. Base activated 1942; named for 1st Lt. Augustus F. Reese, Jr., P-38 fighter pilot killed in Sardinia May 14, 1943. Area 2,467 acres. Altitude 3,338 ft. Military 2,433; civilians 736. Payroll $98 million. Housing: 112 officer; 295 NCO; 63 transient. 15-bed hospital.

Robins AFB, Ga. 31098; 18 mi. SSE of Macon at Warner Robins. Phone (912) 926-1110; AUTOVON 468-1110. AFLC base. Hq. Warner Robins Air Logistics Center provides worldwide logistics management for the F-15, B-52, C-141, C-140, C-130, and C-7A. Also manages utility helicopters, remotely piloted vehicles, and air-to-air, air-to-ground, and ground-to-air missiles. Responsible for the management and repair of electronic components, including airborne communications and navigation equipment, airborne bomb and gun directing systems, and all Air Force airborne electronic warfare equipment. Other major units include Hq. Air Force Reserve (AFRES); 2853d Air Base Gp.; 19th Air Refueling Wing (SAC); 5th Combat Communications Gp. (AFCC); 3503d Recruiting Gp.; 1926th Communications Sqdn. (AFCC). Base activated Mar. 1942; named for Brig. Gen. Augustine Warner Robins, an early Chief of the Materiel Division of the Air Corps, died June 16, 1940. Area 8,863 acres. Altitude 294 ft. Military 3,889; civilians 16,742. Payroll $583 million. Housing: 225 officer; 1,171 NCO; 40 TLF, 150 VOQ, 120 VAQ; 100 trailer spaces. 30-bed hospital.

Sawyer AFB *(see K. I. Sawyer AFB).*

Scott AFB, Ill. 62225-5000; 6 mi. ENE of Belleville. Phone (618) 256-1110; AUTOVON 576-1110. MAC base. Hq. Military Airlift Command. Hq. Air Force Communications Command. 375th Aeromedical Airlift Wing; Hq. 23d Air Force; Hq. Aerospace Rescue & Recovery Service; Hq. Air Weather Service; Defense Commercial Communications Office; Environmental Technical Applications Center; USAF Medical Center, Scott; 7th Weather Wing; 932d Aeromedical Airlift Gp. (AFRES Assoc.); Airlift Communications Div.; 375th Air Base Gp. Base activated June 14, 1917; named for Cpl. Frank S. Scott, first enlisted man to die in an air accident, killed Sept. 28, 1912, at College Park, Md. Area 3,000 acres. Altitude 453 ft. Military 7,034; civilians 3,113. Payroll $275.5 million. Housing: 393 officer; 1,386 NCO, plus 105 spaces for privately owned trailers; 300 transient. 185-bed hospital; 100-bed aeromedical staging facility.

Seymour Johnson AFB, N. C. 27531-5000; adjacent to Goldsboro. Phone (919) 736-0000; AUTOVON 488-1110. TAC base. 4th Tactical Fighter Wing, F-4E fighter operations; 68th Air Refueling Wing (SAC); 2012th Communications Sqdn. (AFCC); OL AD, 191st Fighter Interceptor Gp. (MichANG). Base activated June 12, 1942; named for Navy Lt. Seymour A. Johnson, Goldsboro native, killed Mar. 5, 1941, in an aircraft accident in Maryland. Area 4,122 acres. Altitude 109 ft. Military 4,703; civilians 693. Payroll $101 million. Housing: 217 officer; 1,482 enlisted; 95 VAQ, 46 VOQ, 8 BOQ, 27 transient family units. 35-bed hospital.

Shaw AFB, S. C. 29152-5000; 10 mi. WNW of Sumter. Phone (803) 668-8110; AUTOVON 965-1110. TAC base. 363d Tactical Fighter Wing, F-16 fighter and RF-4C reconnaissance operations; Hq. 9th Air Force (TAC); 507th Tactical Air Control Wing, manages 407L/485L tactical air control systems. Base activated Aug. 30, 1941; named for 2d Lt. Ervin D. Shaw, one of the first Americans to see air action in WW I, killed in action in France on July 9, 1918, when his Bristol fighter was shot down during a reconnaissance mission. Area 3,363 acres; supports another 8,078 acres. Altitude 244 ft. Military 6,125; civilians 1,666. Payroll $135 million. Housing: 389 officer; 1,315 NCO; 189 transient. 40-bed hospital.

Shemya AFB, Alaska (APO Seattle 98736-5000); located at western tip of the Aleutian Islands chain, midway between Anchorage, Alaska, and Tokyo, Japan. Phone (907) 392-3000; AUTOVON (317) 392-3000. AAC base. 5073d Air Base Gp. (AAC) host unit. Base activated 1943. Shemya was used as a bomber base in WW II. The International Date Line has been bent around Shemya so that the local date is the same as elsewhere in the US. Island area about 11.25 sq. mi. Altitude 270 ft. Military 556; civilian contract employees 399. Payroll $8.4 million. Housing: 70 transient. Dispensary.

Sheppard AFB, Tex. 76311-5000; 4 mi. N of Wichita Falls. Phone (817) 851-2511; AUTOVON 736-1001. ATC base. Sheppard Technical Training Center includes the 3700th Technical Training Wing, which provides resident courses in aircraft maintenance, civil engineering, communications, comptroller, transportation, and instructor training. The 3785th Field Training Wing provides specialized and advanced training on specific weapon systems at 77 field training detachments, 19 operating locations, and 1 field training unit worldwide. The School of Health Care Sciences provides training in medicine, dentistry, nursing, biomedical sciences, medical readiness, and health services administration. The 80th Flying Training Wing conducts undergraduate pilot training and instructor training for the Euro-NATO Joint Jet Pilot Training Program and the 2054th Communications Sqdn. (AFCC). The wing trains allied fighter pilots for 12 NATO countries. Base activated June 14, 1941; named for Morris E. Sheppard, US senator from Texas, died 1941. Area 5,000 acres. Altitude 1,015 ft. Military 8,151; civilians 1,331. Payroll $286 million. Housing: 200 officer; 1,287 NCO; 374 transient (6 VIP, 318 VOQ, 50 TLF). 150-bed regional hospital.

Tinker AFB, Okla. 73145-5990; 8 mi. SE of Oklahoma City. Phone (405) 732-7321; AUTOVON 884-4360. AFLC base. Hq. Oklahoma City Air Logistics Center; furnishes logistic support for bombers, jet engines, instruments, and electronics. Other major units include Engineering Installation Div. (AFCC); 3d Combat Communications Gp. (AFCC); 28th Air Div. (TAC); 507th Tactical Fighter Gp. (AFRES). Base activated Mar. 1941; named for Maj. Gen. Clarence L. Tinker, whose LB-30 (an early model B-24) apparently went down at sea after attacking a retreating enemy ship at the end of the Battle of Midway. Area 4,775 acres. Altitude 1,291 ft. Military 7,400; civilians 19,825. Payroll $672 million. Housing: 108 officer; 622 NCO. 40-bed hospital.

Travis AFB, Calif. 94535-5000; 50 mi. NE of San Francisco at Fairfield. Phone (707) 438-4011; AUTOVON 837-1110. MAC base. Hq. 22d Air Force; 60th Military Airlift Wing; 349th Military Airlift Wing (AFRES Assoc.); David Grant Medical Center. Base activated May 17, 1943; named for Brig. Gen. Robert F. Travis, killed Aug. 5, 1950, in a B-29 accident. Area 7,580 acres. Altitude 62 ft. Military 12,797; civilians 4,037. Payroll $294.3 million. Housing: 273 officer; 1,993 NCO; 655 transient (incl. 40 TLF, 204 VOQ, 248 VAQ, 26 DVQ, 68 aerial port quarters with cooking facilities, 69 aerial port quarters without). 283-bed hospital.

Tyndall AFB, Fla. 32403-5000; 13 mi. E of Panama City. Phone (904) 283-1113; AUTOVON 970-1110. TAC base. USAF Air Defense Weapons Center; primary units are the 325th Tactical Training Wing, 475th Weapons Evaluation Gp., and 325th Combat Support Gp. Provides DoD a centralized location for operational and technical advice on air defense concepts and tactics and combat readiness training for tactical and strategic air defense aircrews and weapons controllers. Single-point management for all continental USAF subscale and full-scale drone aerial target operations. TAC units include 23d Air Div., home of Southeast Sector Operations Control Center. Tenants include Air Force Engineering and Services Center; 3625th Technical Training Sqdn. (ATC); 2021st Communications Sqdn. (AFCC); 4702d Computer Services Sqdn. (TAC); Det. 1, 48th Fighter Interceptor Sqdn. (TAC); and TAC NCO Academy East. Base activated Dec. 7, 1941; named for 1st Lt. Frank B. Tyndall, WW I fighter pilot killed July 15, 1930, in crash of P-1 near Mooresville, N. C. Area 28,000 acres. Altitude 18 ft. Military 4,623; civilians 1,672. Payroll $156.9 million. Housing: 139 officer; 814 NCO. 50-bed hospital.

US Air Force Academy, Colo. 80840-5000; 10 mi. N of Colorado Springs. Phone (303) 472-3110; AUTOVON 259-3110. Direct reporting unit, activated Apr. 1, 1954, at Lowry AFB, Colo. Moved to permanent location Aug. 1958. Tenant units include 1876th Information Systems Support Gp.; Frank J. Seiler Research Lab (AFSC); DoD Medical Exam Review Board; Det. 470, Air Force Audit Agency; 557th Flying Training Sqdn.; 94th Air Training Sqdn. Area 18,000 acres. Altitude 7,280 ft. Military 2,382; cadets 4,327; civilians 1,750. Payroll $186 million. Housing: 452 officer; 779 NCO; 80 transient, plus 28 temporary family quarters. 85-bed hospital.

Vance AFB, Okla. 73705-5000; 3 mi. SSW of Enid. Phone (405) 237-2121; AUTOVON 962-7110. ATC base. 71st Flying Training Wing, undergraduate pilot training. Base activated Nov. 1941; named for Lt. Col. Leon R. Vance, Jr., native of Enid, 1939 West Point graduate, and Medal of Honor recipient; killed July 26, 1944, when the air-evac plane returning him to the US went down in the Atlantic near Iceland. Area 1,811 acres. Altitude 1,307 ft. Military 1,300; civilians 1,320 (1,200 contract employees). Payroll $74.7 million. Housing: 132 officer; 98 enlisted; 40 transient, plus 10 TLF. Clinic.

Vandenberg AFB, Calif. 93437-5000; 8 mi. NNW of Lompoc. Phone (805) 866-1611; AUTOVON 276-1110. SAC base. Site of 1st Strategic Aerospace Div. (SAC); Space and Missile Test Organization (AFSC); Western Space and Missile Center (AFSC); Shuttle Test Group (AFSC). Host command conducts missile crew training and provides facilities and support for operational ballistic missiles in the SAC deterrent force. The Space and Missile Test Organization (SAMTO) is responsible for management of field test and launch operations for all DoD-directed space programs as well as long-range ballistic missile research and development. SAMTO also develops, manages, and operates, through the Eastern and Western Space and Missile Centers, the National Test Ranges. The Western Test Range supports ballistic and space test operations as well as East Coast Space Shuttle flights and other aeronautical tests employing the same sensors and data-gathering equipment. The Western Space and Missile Center (WSMC) provides launch and launch support of research and development ballistic missile tests and polar-orbiting space launches for DoD, USAF, and NASA. WSMC plans and executes Peacekeeper research and development, supports antisatellite missile development, and will provide support for West Coast Space Shuttle operations scheduled to begin in 1992. Originally Army's Camp Cooke. Activated Oct. 1941. Base was taken over by USAF June 7, 1957; renamed for Gen. Hoyt S. Vandenberg, USAF's second

Chief of Staff. Area 98,400 acres. Altitude 400 ft. Military 3,971; civilians 1,487; civilian contractors 7,913. Payroll $157 million (military and civilian); $244 million (contractors). Housing: 511 officer; 1,567 NCO; 172 mobile trailer spaces; 400 transient. 45-bed hospital.

Warren AFB *(see Francis E. Warren AFB).*

Wheeler AFB, Hawaii 96854-5000; near center of the island of Oahu, adjacent to the Army's Schofield Barracks. Phone (808) 422-0531; AUTOVON 430-0111. PACAF base. Host unit 15th Air Base Sqdn. 326th Air Div. (Air Defense Control Center); 22d Tactical Air Support Sqdn.; 169th Aircraft Warning and Control Sqdn. (Hawaii Air National Guard—Air Defense Direction Center); US Army aviation units from Schofield Barracks; 6924th Electronic Security Sqdn.; several other associate units. Base activated Feb. 1922; named for Maj. Sheldon H. Wheeler, CO of Luke Field, Hawaii, in 1919; killed there July 13, 1921, when his biplane crashed during an aerial exhibition. Area 1,369 acres. Altitude 845 ft. Military 1,039; civilians 121. Payroll included in entry for Hickam AFB. Housing: 102 officer; 390 NCO. Dispensary.

Whiteman AFB, Mo. 65305; 1.5 mi. S of Knob Noster. Phone (816) 687-1110; AUTOVON 975-1110. SAC base. 351st Strategic Missile Wing. Base activated 1942; named for 2d Lt. George A. Whiteman, shot down while taking off in a fighter from Wheeler Field, Hawaii, on Dec. 7, 1941—the first Army Air Forces airman to be shot down in WW II. Area 3,384 acres, plus missile complex of about 10,000 sq. mi. Altitude 869 ft. Military 3,362; civilians 757. Payroll $120 million. Housing: 200 officer; 791 NCO; 46 transient (incl. 4 guest houses, 24 VAQ, and 18 VOQ). 30-bed hospital.

Williams AFB, Ariz. 85240-5000; 14 mi. SE of Mesa. Phone (602) 988-2611; AUTOVON 474-1001. ATC base. 82d Flying Training Wing; 1922d Communications Sqdn. Largest undergraduate pilot training base; also provides F-5 combat crew training for foreign students via the 425th Tactical Fighter Training Sqdn. Home of AFSC Human Resources Lab/Flying Training Div., doing extensive research on flight simulators. Base activated July 1941; named for 1st Lt. Charles D. Williams, killed in bomber crash near Fort De Russy, Hawaii, July 6, 1927. Area 4,761 acres. Altitude 1,385 ft. Military 3,029; civilians 1,700. Payroll $251 million. Housing: 248 officer; 453 NCO; 40 transient. 30-bed hospital.

Wright-Patterson AFB, Ohio 45433; 10 mi. ENE of Dayton. Phone (513) 257-1110; AUTOVON 787-1110. AFLC base. Hq. Air Force Logistics Command. Hq. Aeronautical Systems Div. (AFSC); Air Force Institute of Technology; USAF Medical Center, Wright-Patterson; US Air Force Museum; Air Force Acquisition Logistics Center; Logistics Operations Center; Logistics Management Systems Center; AFLC International Logistics Center; 2750th Air Base Wing (AFLC); 906th Tactical Fighter Gp. (AFRES); more than 90 other DoD activities and government agencies. Originally separate, Wright Field and Patterson Field were merged and redesignated Wright-Patterson AFB on Jan. 13, 1948. Named for aviation pioneers Orville and Wilbur Wright and for 1st Lt. Frank S. Patterson, killed June 19, 1918, in the crash of a DH-4. The Wright brothers did much of their early flying on Huffman Prairie, now in Area C of present base. Area 8,145 acres. Altitude 824 ft. Military 9,500; civilians 17,500; contracted service and contractor employees 6,000. Payroll $755 million. Housing: 736 officer; 1,627 NCO. 245-bed hospital.

Wurtsmith AFB, Mich. 48753-5000; 3 mi. NW of Oscoda. Phone (517) 739-2011; AUTOVON 623-1110. SAC base. 40th Air Div.; 379th Bomb Wing. Base activated 1924 as Camp Skeel, gunnery camp for Selfridge Field; became Oscoda Army Air Field during WW II; renamed 1953 for Maj. Gen. Paul B. Wurtsmith, killed Sept. 13, 1946, in a B-25 crash near Asheville, N. C. Base assigned to SAC Apr. 1, 1960. Area 5,223 acres. Altitude 634 ft. Military 3,033; civilians 615. Payroll $99.9 million. Housing: 200 officer; 1,142 NCO; 7 transient. 20-bed hospital. ■

Guide to Air Force Stations

In addition to the major facilities in this Guide to Bases, USAF has a number of Air Force stations (AFS) throughout the US and overseas. These stations perform varied missions, including air defense and missile warning. Here is a listing of stations with state, ZIP code, and major command. Where a station can be reached by a general-purpose AUTOVON number, such a number (AV) is listed. If it can be reached by NORAD Tactical AUTOVON System (NTAS), the number (NTAS) is listed. Commercial telephone numbers (AC) are given for stations not having access to AUTOVON.

Albrook AFS, APO Miami 34002 (TAC)	AV 222-4012
Bellows AFS, Hawaii 96795-5000 (PACAF)	AC (808) 259-5941
Calumet AFS, Mich. 49913 (TAC)	NTAS 640-1301
Cape Canaveral AFS, Fla. 32925-5000 (AFSC)	AV 467-1110
Cape Cod AFS, Mass. 02532-1419 (AFSPACECOM)	AV 557-2277
Clear AFS, APO Seattle 98704 (AFSPACECOM)	AV 317-585-6409
Concrete AFS, N. D. 58220-5000 (AFSPACECOM)	AV 330-3297
Cudjoe Key AFS, Fla. 33039 (TAC)	AV 483-8452
Falcon AFS, Colo. 80912 (AFSPACECOM)	AV 692-7011
Fort Fisher AFS, N. C. 28449 (TAC)	NTAS 652-2265
Galena Airport, APO Seattle 98723 (AAC)	AV 317-446-3311
Gentile AFS, Ohio 45401 (AFLC)	AV 986-5111
John Hay AS, APO San Francisco 96298-5000 (PACAF)	AV 822-1201
King Salmon Airport, APO Seattle 98713 (AAC)	AV 317-721-3301
Los Angeles AFS, Calif., 90009-2960 (AFSC)	AV 833-1110
Makah AFS, Wash. 98357 (TAC)	NTAS 490-6343
Newark AFS, Ohio 43057-5000 (AFLC)	AV 580-2171
Oklahoma City AFS, Okla. 73145-5000 (AFLC)	AV 735-9011
Onizuka AFS, Calif. 94088-3430 (AFSC)	AV 359-3611
Point Arena AFS, Calif. 95468 (TAC)	NTAS 644-4316
Port Austin AFS, Mich. 48467 (TAC)	NTAS 779-3345
Wallace AS, APO San Francisco 96277-5000 (PACAF)	AV 822-1201

Guide to ANG and AFRES Bases

NOTE: This section of the Guide consolidates major Air National Guard (ANG) and Air Force Reserve (AFRES) bases into a single listing. Most ANG locations are listed alphabetically, according to the city where they are located. AFRES units are listed by the names of their bases and are designated as AFRES facilities. There are, in addition, some ANG and AFRES units that are located on active-duty bases. These may be found in the main "Guide to Bases" section elsewhere in this issue. Information for the Air National Guard is current as of May 1986.

Anchorage, Alaska (Kulis ANG Base at Anchorage IAP) 99502. Phone (907) 243-1145; AUTOVON (317) 626-1444. 176th Tactical Airlift Gp. (ANG); 144th Tactical Airlift Sqdn. (ANG). Named for Lt. Albert Kulis, killed in training flight in 1954. Area 129 acres. Altitude 124 ft. Military 862, technicians 241. Payroll $12.6 million. 6-bed hospital.

Atlanta, Ga. (McCollum Airport, Kennesaw, Ga.) 30144; 27 mi. N of Atlanta, 10 mi. from Dobbins AFB. Phone (404) 422-2500; AUTOVON 925-2474. 129th Tactical Control Sqdn. Area 13 acres. Altitude 1,060 ft. Military 350, technicians 44. Payroll through Dobbins AFB.

Atlantic City Airport, N. J. (Federal Aviation Administration Technical Center) 08405-5199; 10 mi. W of Atlantic City. Phone (609) 645-6000; AUTOVON 445-6000. 177th Fighter Interceptor Gp. (ANG). Area 286 acres. Altitude 76 ft. Military 978, full-time support 315. Payroll $13.1 million.

Baltimore, Md. (Glenn L. Martin State Airport) 21220-2899; 8 mi. E of Baltimore. Phone (301) 687-6270; AUTOVON 235-9210. 175th Tactical Fighter Gp. (ANG); 135th Tactical Airlift Gp. (ANG). Area 78 acres. Altitude 89 ft. Military 1,798, technicians 425. Payroll $18.8 million. Clinic.

Bangor ANG Base, Me. 04401-4393; 4 mi. NW of Bangor. Phone (207) 947-0571; AUTOVON 476-6210. 101st Air Refueling Wg. (ANG). Area 384 acres. Altitude 192 ft. Military 980, technicians 272. Payroll $12.6 million. Small BX-Foodland.

Battle Creek, Mich. 49015-1291; adjacent to W. K. Kellogg Airport. Phone (616) 963-1596; AUTOVON 580-3210. 110th Tactical Air Support Gp. (ANG). Area 241 acres. Altitude 941 ft. Military 954, technicians 211. Payroll $10.3 million.

Birmingham Municipal Airport, Ala. 35217. Phone (205) 841-9200; AUTOVON 694-2260. 117th Tactical Recon Wg. (ANG). Area 86 acres. Altitude 650 ft. Military 1,316, technicians 328. Payroll $16.4 million.

Boise Air Terminal, Idaho (Gowen Field) 83707; 6 mi. S of Boise. Phone (208) 385-5011; AUTOVON 941-5011. 124th Tactical Recon Gp. (ANG). Also host to ARNG (Army field training site) and Marine Corps Reserve. Airport named for Lt. Paul R. Gowen, killed in B-10 crash in Panama July 11, 1938. Area 1,994 acres. Altitude 2,858 ft. Military 1,407, technicians 399. Payroll $15.0 million. Limited transient facilities available during Army Guard camps.

Buckley ANG Base, Colo. 80011; 8 mi. E of Denver. Phone (303) 366-5363; AUTOVON 877-9011. 140th Tactical Fighter Wg. (ANG); 154th Tactical Control Gp.; Hq. Colorado ANG. Also host to Navy Reserve, Marine Corps Reserve, ARNG, and Air Force units. Base activated Apr. 1, 1942, as a gunnery training facility. ANG assumed control from US Navy in 1959. Named for Lt. John H. Buckley, National Guardsman, killed in the Argonne, France, Sept. 27, 1918. Area 3,903 acres. Altitude 5,663 ft. Military 1,340, technicians 324. Payroll $21.4 million. Dispensary.

Burlington, Vt. (Burlington International Airport) 05401; 3 mi. E of Burlington. Phone (802) 658-0770; AUTOVON 689-4310. 158th Tactical Fighter Gp. (ANG). Area 241 acres. Altitude 371 ft. Military 990, technicians 269. Payroll $11.9 million.

Charleston, W. Va. (Yeager Airport) 25311-5000; 4 mi. NE of Charleston. Phone (304) 357-5100; AUTOVON 366-9210. 130th Tactical Airlift Gp. (ANG). Area 56 acres. Altitude 981 ft. Military 965, technicians 213. Payroll $10.8 million. Dispensary, clinic.

Charlotte, N. C. (Charlotte/Douglas Municipal Airport) 28208. Phone (704) 399-6363; AUTOVON 583-9210. 145th Tactical Airlift Gp. (ANG). Area 69 acres. Altitude 749 ft. Military 1,184, technicians 227. Payroll $12.3 million. Clinic.

Cheyenne, Wyo. (Cheyenne Municipal Airport) 82001. Phone (307) 772-6201; AUTOVON 943-6201. 153d Tactical Airlift Gp. (ANG). Area 67 acres. Altitude 6,156 ft. Military 973, technicians 217. Payroll $10.4 million.

Chicago, Ill. (O'Hare Air Reserve Forces Facility) 60666; 22 mi. NW of Chicago's Loop. Phone (312) 694-6000; AUTOVON 930-1110. AFRES base. 928th Tactical Airlift Gp. (AFRES); 126th Air Refueling Wg. (ANG). Defense Contract Administration Services Region. Base activated Apr. 1946; named for Lt. Cmdr. Edward H. "Butch" O'Hare, USN Medal of Honor recipient, killed Nov. 26, 1943, during battle for Gilbert Islands. Area 391 acres. Altitude 643 ft. Reservists 1,500, technicians and civilians (all units) 1,440, Illinois ANG 1,350. Payroll for total facility $43.3 million.

Dallas Naval Air Station, Tex. (Hensley Field) 75211. Phone (214) 266-6111; AUTOVON 874-6111. 136th Tactical Airlift Wg. (ANG). Area 49 acres. Altitude 495 ft. Military 1,039, technicians 228. Payroll $11.7 million.

Des Moines Municipal Airport, Iowa 50321; in city of Des Moines. Phone (515) 285-7182; AUTOVON 939-8210. 132d Tactical Fighter Wg. (ANG). Area 112 acres. Altitude 957 ft. Military 1,074, technicians 293. Payroll $12.9 million.

Dobbins AFB, Ga. 30069-5000; 2 mi. S of Marietta, 16 mi. NW of Atlanta. Phone (404) 429-5000; AUTOVON

925-1110. AFRES base. Hq. 14th Air Force (AFRES); 94th Tactical Airlift Wg. (AFRES); 116th Tactical Fighter Wg. (ANG). Base activated 1943; named for Capt. Charles Dobbins, WW II pilot killed in action near Sicily. Area 1,984 acres. Altitude 1,068 ft. AFRES: military 246, technicians 237, civilians 421, Reservists 4,135. Payroll $35.8 million. ANG: military 1,194, technicians 341. Payroll $16.9 million. Housing: 3 officer, 5 NCO. Dispensary.

Duluth International Airport, Minn. 55811-5000; 5 mi. NW of Duluth. Phone (218) 727-6886; AUTOVON 825-7210. 148th Fighter Interceptor Gp. (ANG). Area 152 acres. Altitude 1,429 ft. Military 1,028, technicians 335 (+ 25 civilians). Payroll $14.2 million.

Ellington ANG Base, Tex. 77034-5586; adjacent to Ellington Field, a City of Houston Airport 17 mi. SE of downtown Houston. Phone (713) 481-1400; AUTOVON 954-2110. 147th Fighter Interceptor Gp. (ANG). Other tenants include NASA Flight Operations, US Coast Guard, Army National Guard, FAA. Named for Lt. Eric L. Ellington, a pilot killed Nov. 1913. Area 213 acres. Altitude 40 ft. Military 1,022, technicians 333. Payroll $16.3 million.

Fargo, N. D. (Hector Field) 58105-5536. Phone (701) 237-6030; AUTOVON 362-8110. 119th Fighter Interceptor Gp. (ANG). Area 133 acres. Altitude 900 ft. Military 1,098, technicians 330. Payroll $14 million.

Forbes Field, Kan. 66619-5000; 2 mi. S of Topeka. Phone (913) 862-1234; AUTOVON 720-4210. 190th Air Refueling Gp. (ANG). Area 170 acres. Altitude 1,079 ft. Military 895, technicians 259 (+ 43 civilians). Payroll $11.8 million.

Fort Smith Municipal Airport, Ark. 72906. Phone (501) 646-1601; AUTOVON 962-8210. 188th Tactical Fighter Gp. (ANG). Area 95 acres. Altitude 468 ft. Military 986, technicians 275. Payroll $11.5 million.

Fort Wayne, Ind. (Fort Wayne Municipal Airport) 46809-5000; 5 mi. SSW of Fort Wayne. Phone (219) 478-3210; AUTOVON 786-1210. 122d Tactical Fighter Wg. (ANG). Area 87 acres. Altitude 800 ft. Military 1,131, technicians 325. Payroll $14 million.

Fresno Air Terminal, Calif. 93727-2199; 5 mi. NE of Fresno. Phone (209) 454-5100; AUTOVON 949-9210. 26th NORAD Region and 26th Air Div. (TAC); 194th Fighter Interceptor Sqdn. (ANG); 144th Fighter Interceptor Wg. (ANG). Area 139 acres. Altitude 332 ft. Military 1,010, technicians 340. Payroll $14.4 million.

Gen. Billy Mitchell Field, Wis. 53207; downtown Milwaukee. AFRES base. Altitude 722 ft. ANG and AFRES have separate phones and facilities. ANG phone (414) 747-4410; AUTOVON 580-8410. 128th Air Refueling Gp. (ANG). ANG area 111 acres. Military 1,015, technicians 293. Payroll $11.4 million. AFRES phone (414) 481-6400; AUTOVON 786-9110. 440th Tactical Airlift Wg. (AFRES). AFRES area 100 acres. Military 11, technicians 199, Reservists 942, civilians 150. Payroll $12 million.

Greater Peoria Airport, Ill. 61607; 7 mi. SW of Peoria. Phone (309) 697-6400; AUTOVON 724-9210. 182d Tactical Air Support Gp. (ANG). Area 381 acres. Altitude 624 ft. Military 962, technicians 215. Payroll $10.5 million. Dispensary.

Greater Pittsburgh International Airport, Pa. 15231; 15 mi. NW of Pittsburgh. Altitude 1,203 ft. AFRES base. ANG and AFRES have separate phones and facilities. ANG phone (412) 269-8350; AUTOVON 277-8350. 171st Air Refueling Wg. (ANG); 112th Tactical Fighter Gp. (ANG). ANG area 90 acres. Military 1,641, technicians 490. Payroll $18.2 million. AFRES phone (412) 269-8000; AUTOVON 277-8000. 911th Tactical Airlift Gp. (host unit). AFRES area 165 acres. Military 21, technicians 133, civilians 209, Reservists 1,050. Payroll $11.5 million. Other units include 1998th Communications Installation Gp. (AFCC). Base activated 1943. 50 VOQ; 230 enlisted qtrs.

Great Falls International Airport, Mont. 59401-5000; 5 mi. SW of Great Falls. Phone (406) 727-4650; AUTOVON 279-2301. 25th NORAD Region and 25th Air Div. (TAC); 120th Fighter Interceptor Gp. (ANG). Area 139 acres. Altitude 3,674 ft. Military 1,004, technicians 388. Payroll $15.3 million. Dispensary.

Gulfport-Biloxi Regional Airport, Miss. 39501; within city limits of Gulfport. Phone (601) 868-6200; AUTOVON 363-8200. Training site; also host to 255th Combat Communications Sqdn., the Army National Guard Transportation Repair Shop, and 173d Civil Engineering Flt. An air-to-ground gunnery range is located 70 mi. due north of site. Area 211 acres. Altitude 28 ft. ANG military 374, technicians 75. Payroll $2.1 million. 2-bed dispensary.

Harrisburg International Airport, Middletown, Pa. 17057; 10 mi. E of Harrisburg. Phone (717) 948-2201; AUTOVON 454-9201. 193d Special Operations Gp. (ANG). ANG area 70 acres. Altitude 310 ft. Military 1,117, technicians 269. Payroll $15.4 million.

Jackson, Miss. (Allen C. Thompson Field) 39208-0810; 7 mi. E of Jackson. Phone (601) 968-8321; AUTOVON 731-9310. 172d Tactical Airlift Gp. (ANG). ANG area 84 acres. Altitude 346 ft. Military 962, technicians 235. Payroll $11.9 million. 6-bed dispensary.

Jacksonville International Airport, Fla. 32229; 15 mi. NW of Jacksonville. Phone (904) 757-1360; AUTOVON 460-7210. 125th Fighter Interceptor Gp. (ANG). Area 332 acres. Altitude 26 ft. Military 1,010, technicians 338. Payroll $14.2 million. 5-bed dispensary.

Kingsley Field, Ore. 97603-0400; 5 mi. SE of Klamath Falls. Phone (503) 883-6350; AUTOVON 830-6350. 114th Tactical Fighter Training Sqdn. (ANG); 142d OLAD (ANG). Named for Lt. David Kingsley of Oregon, killed in the Pacific in WW II. Area 405 acres. Altitude 4,000 ft. Military 214, technicians 50. Payroll $6 million. Clinic.

Knoxville, Tenn. (McGhee Tyson Airport) 37901; 10 mi. SW of Knoxville. Phone (615) 970-3077; AUTOVON 588-8210. Host unit is 134th Air Refueling Gp. (ANG). Tenants include 228th Combat Communications Sqdn. and ANG's I. G. Brown Professional Military Education Center. Area 287 acres. Altitude 980 ft. Military 1,165, technicians 337 (+ 4 civilians). Payroll $13.8 million. Dispensary.

Lincoln Municipal Airport, Neb. 68524-1897; 1 mi. NW of Lincoln. Phone (402) 473-1326; AUTOVON 720-1210. 155th Tactical Recon Gp. (ANG). Also hosts Army National Guard unit. Area 163 acres. Altitude 1,207 ft. Military 1,148, technicians 292. Payroll $13.3 million. Tactical clinic.

Louisville, Ky. (Standiford Field) 40213. Phone (502) 566-9400; AUTOVON 989-4400. 123d Tactical Recon Wg. (ANG). Area 65 acres. Altitude 497 ft. Military 1,238, technicians 310. Payroll $14.5 million.

Mansfield Lahm Airport, Ohio 44901-5000; 3 mi. N of Mansfield. Phone (419) 522-9355; AUTOVON 696-6210. 179th Tactical Airlift Gp. (ANG). Named for nearby city and aviation pioneer Brig. Gen. Frank P. Lahm. Area 45 acres. Altitude 1,296 ft. Military 958, technicians 211. Payroll $10.5 million. Dispensary.

Martinsburg, W. Va. (Shepherd Field) 25401; 4 mi. S of Martinsburg. Phone (304) 267-5100; AUTOVON 242-9210. 167th Tactical Airlift Gp. (ANG). Area 346 acres. Altitude 556 ft. Military 1,019, technicians 215. Payroll $10.6 million. Dispensary.

McEntire ANG Base, S. C. 29044; 12 mi. E of Columbia. Phone (803) 776-5121; AUTOVON 583-8201. 169th Tactical Fighter Gp. (ANG). Also host to 240th Combat Communications Sqdn. (ANG) and Army Guard aviation unit. Base named for ANG Brig. Gen. B. B. McEntire, Jr., killed in an F-104 in 1961. Area 2,480 acres. Altitude 250 ft. Military 1,422, technicians 293. Payroll $14.5 million. Dispensary.

Memphis International Airport, Tenn. 38181-0026; within Memphis city limits. Phone (901) 369-4111; AUTOVON 966-8210. 164th Tactical Airlift Gp. (ANG). ANG occupies 85 acres. Altitude 332 ft. Military 957, technicians 166. Payroll $10.5 million. Clinic.

Meridian, Miss. (Key Field) 39302-1825; located at municipal airport near Highways 20 and 59. Phone (601) 693-5031; AUTOVON 694-9210. 186th Tactical Recon Gp. (ANG); host to 238th Combat Communications Sqdn. (ANG). Area 74 acres. Altitude 297 ft. Military 1,286, technicians 311. Payroll $14.3 million. 2-bed dispensary.

Minneapolis-St. Paul International Airport, Minn. 55450; in Minneapolis, near junction of Mississippi and Minnesota Rivers. AFRES base. Altitude 840 ft. ANG and AFRES have separate phones and facilities. ANG phone (612) 725-5011; AUTOVON 825-5681. 133d Tactical Airlift Wg. (ANG). ANG area 126 acres. Military 1,319, technicians 297. Payroll $12.7 million. AFRES phone (612) 725-5011; AUTOVON 825-5100. 934th Tactical Airlift Gp. (AFRES). AFRES area 300 acres. Reservists 999, technicians 135, civilians 225. Payroll $13.5 million. Other units include 210th Engineering and Installation Sqdn. (ANG); 237th Air Traffic Control Flt. (ANG); 133d Field Training Flt. (ANG); Navy Readiness Comd., Region 16; Naval Air Reserve Center; Marine Wg. Support Gp., Det. 47; Defense Investigative Service; USAF-CAP/NCLR and CAP MNLO; Det. 3, 1974th Teleprocessing Gp. (USAF).

Moffett Naval Air Station, Calif. 94035; 2 mi. N of Mountain View. ANG phone (415) 966-4700; AUTOVON 462-4700. 129th Aerospace Rescue and Recovery Gp. (ANG). Area 12 acres. Altitude 34 ft. Military 703, technicians 222. Payroll $11.3 million.

Montgomery, Ala. (Dannelly Field) 36196; 7 mi. SW of Montgomery. Phone (205) 284-7210; AUTOVON 742-9210. 187th Tactical Fighter Gp. (ANG). Hosts 232d Combat Communications Sqdn. Named for Ens. Clarence Dannelly, Navy pilot killed at Pensacola, Fla., during WW II. Area 42 acres. Altitude 221 ft. Military 1,198, technicians 312. Payroll $15.3 million. Dispensary.

Nashville Metropolitan Airport, Tenn. 37217-0267; 6 mi. SE of Nashville. Phone (615) 361-4600; AUTOVON 446-6210. 118th Tactical Airlift Wg. (ANG). Area 75 acres. Altitude 597 ft. Military 1,677, technicians 322. Payroll $15.9 million.

New Orleans Naval Air Station, La. (Alvin Callender Field) 70143-5400; 15 mi. S of New Orleans. Altitude 3 ft. ANG and AFRES have separate phones and facilities. ANG phone (504) 393-3392; AUTOVON 363-3399. 159th Tactical Fighter Gp. (ANG). ANG military 1,871, technicians 267. Payroll $16 million. AFRES phone (504) 393-3293; AUTOVON 363-3293. 926th Tactical Fighter Gp. (AFRES). Military 820, technicians 177. Payroll $10 million. NAS New Orleans was the first joint Air Reserve Training Facility. Named for Alvin A. Callender, who served with the British Royal Flying Corps during WW I and who was shot down over France in 1918. Area 3,245 acres. Dispensary.

Niagara Falls International Airport, N. Y. 14304-5000; 6 mi. E of Niagara Falls. Phone (716) 236-2000; AUTOVON 489-3011. AFRES base. 914th Tactical Airlift Gp. (AFRES); 107th Fighter Interceptor Gp. (ANG). Base activated Jan. 1952. Area 979 acres. Altitude 590 ft. AFRES: 243 technicians, 136 civilians, 872 Reservists. Payroll $14.9 million. ANG: 1,005 military, 345 technicians. Payroll $14.2 million.

Ontario International Airport, Ontario, Calif. 91761. Phone (714) 984-2705; AUTOVON 898-1895. 148th Combat Communications Gp. (ANG). Area 39 acres. Altitude 900 ft. Military 203, technicians 22. Payroll $9.2 million.

Otis ANG Base, Mass. 02542-5001; 7 mi. NNE of Falmouth. Phone (617) 968-4090; AUTOVON 557-4090. 102d Fighter Interceptor Wg. (ANG); 567th USAF Band (ANG). Military organizations on adjacent installations include Cape Cod Air Force Station (6th Missile Warning Sqdn., 2165th Communications Sqdn.); Coast Guard Air Station Cape Cod; Camp Edwards Army National Guard Installation; Headquarters Camp Edwards (ARNG); 26th Aviation Battalion (ARNG); 1st Battalion, 25th Marines (Reserve); Massachusetts National Cemetery (VA). Named for 1st Lt. Frank J. Otis, ANG flight surgeon and pilot killed in 1937 crash. Area 3,858 acres. Altitude 132 ft. ANG military 1,144, ANG technicians 317, plus 281 Title 5 Civil Service. Payroll $22.5 million.

Phelps Collins ANG Base, Mich. 49707; 7 mi. W of Alpena. Phone (517) 354-4141; AUTOVON 722-3760. Training site detachment. Facilities used by ANG and AFRES units for annual field training and by ARNG and Marine Reserve for special training. Named for Capt. W. H. Phelps Collins, American Flying Corps, killed in France Mar. 1918. Area 2,735 acres. Altitude 689 ft. Military 54, full-time support 52. Payroll through Wurtsmith AFB. Housing: 1,500 personnel. 14-bed hospital. Dispensary.

Phoenix, Ariz. (Sky Harbor International Airport) 85034. Phone (602) 244-9841; AUTOVON 853-9211. 161st Air Refueling Gp. (ANG). Area 51 acres. Altitude 1,230 ft. Military 1,262, technicians 262. Payroll $12.1 million.

Portland International Airport, Portland, Ore. 97218-2797. Phone (503) 288-5611; AUTOVON 891-1701. 142d Fighter Interceptor Gp. (ANG); 244th Combat Communications Sqdn. (ANG); 244th Combat Communications Flt. (ANG); 116th Tactical Control Sqdn. (ANG); Det. 5, 2036th Communications Sqdn. (AFCC); 12th Special Forces Gp. (USAR); Oregon Wg., CAP. Also host to 939th Aerospace Rescue and Recovery Gp. (AFRES) and 83d Aerial Port Sqdn. (AFRES). Area 273 acres. Altitude 26 ft. Military 1,794, technicians 419 (+ 96 civilians). Payroll $23.7 million.

Providence, R. I. (Quonset Point State Airport) 02852; 20 mi. S of Providence. Phone (401) 885-3960; AUTOVON 476-3210. 143d Tactical Airlift Gp. (ANG). Area 60 acres. Altitude 9 ft. Military 1,031, technicians 228. Payroll $11.7 million.

Puerto Rico International Airport, Puerto Rico 00914; E of San Juan. Phone (809) 728-5450; AUTOVON 860-9210. 156th Tactical Fighter Gp. (ANG). Base named for Lt. Col. José A. Muniz, killed in an aircraft accident July 4, 1960. Area 44 acres. Military 1,076, technicians 247. Payroll $13.9 million.

Reno, Nev. (Cannon International Airport—May ANG Base) 89502; 5 mi. SE of Reno at 1776 ANG Way. Phone (702) 788-4500; AUTOVON 830-4500. 152d Tactical Recon Gp. (ANG). Named for Maj. Gen. James A. May, state Adjutant General. Area 123 acres. Altitude 4,411 ft. Military 1,049, technicians 274. Payroll $12.8 million. Dispensary.

Richards-Gebaur AFB, Mo. 64030-5000; 17 mi. S of Kansas City. Phone (816) 348-2000; AUTOVON 463-1110. 442d Tactical Fighter Gp. (AFRES); Navy and Army Reserve units. Base activated Mar. 1944; named for 1st Lt. John F. Richards and Lt. Col. Arthur W. Gebaur, Jr. Richards was killed Sept. 26, 1918, in France, while on an artillery spotting mission; Gebaur, an F-84 pilot, was killed Aug. 29, 1952, over North Korea during his 99th mission. Area 620 acres; another 120 acres occupied by non-Air Force military units and federal agencies. Joint-use airport facility with Kansas City, Mo. Altitude 1,090 ft.

AFRES and active-duty USAF military 1,471, technicians/civilians 398. Payroll $13 million. On-base, Marine Corps-operated, all-service housing: 27 officer, 214 enlisted. Consolidated open mess and 300 transient quarters available.

Richmond, Va. (Byrd International Airport) 23150; 4 mi. SE of downtown Richmond. Phone (804) 222-8884; AUTOVON 274-8210. 192d Tactical Fighter Gp. (ANG). Airfield named for Adm. Richard E. Byrd, famous Arctic and Antarctic explorer. Area 143 acres. Altitude 167 ft. Military 997, technicians 275. Payroll $12.2 million.

Rickenbacker ANG Base, Ohio 43217; 13 mi. SSW of Columbus. Phone (614) 492-8211; AUTOVON 950-1110. Base transferred from SAC to ANG Apr. 1, 1980. 121st Tactical Fighter Wg. (ANG); 907th Tactical Airlift Gp. (AFRES); 160th Air Refueling Gp. (ANG); 2032d Communications Sqdn. (AFCC); Naval Air Reserve and Naval Construction (USNR). Base activated 1942. Formerly Lockbourne AFB; renamed May 7, 1974, in honor of Capt. Edward V. Rickenbacker, top US WW I ace and Medal of Honor recipient who died July 23, 1973. Area 2,016 acres. Altitude 744 ft. ANG military 1,836, technicians 406. Payroll $21.9 million.

Roslyn ANG Station, Roslyn, N. Y. 11576; 27 mi. E of New York City. Phone (516) 299-5201; AUTOVON 456-5201. 152d Tactical Control Gp.; 213th Engineering Installation Sqdn. Also hosts two Army National Guard units. Area 50 acres. Altitude 320 ft. Military 466, technicians 29. Payroll through Stewart IAP, N. Y.

Salt Lake City International Airport, Utah 84116; 3 mi. W of Salt Lake City. Phone (801) 521-7070; AUTOVON 790-9210. 151st Air Refueling Gp. (ANG). Also hosts ANG's 130th Engineering Installation Sqdn. and 106th and 109th Tactical Control Flts. Area 75 acres. Altitude 4,220 ft. Military 1,510, technicians 307 (+ 41 civilians). Payroll $15.7 million. Dispensary.

Savannah International Airport, Ga. 31402; 4 mi. NW of Savannah. Phone (912) 964-1941; AUTOVON 860-8210. 165th Tactical Airlift Gp. (ANG). Also field training site. Area 232 acres. Altitude 50 ft. Military 1,197, technicians 274. Payroll $14 million. Housing: 156 officer; 736 enlisted. 3-bed dispensary.

Schenectady County Airport, Scotia, N. Y. 12302-9752; 2 mi. N of Schenectady. Phone (518) 381-7300; AUTOVON 974-9221. 109th Tactical Airlift Gp. (ANG). Area 106 acres. Altitude 378 ft. Military 987, technicians 217. Payroll $10.7 million. Dispensary.

Selfridge ANG Base, Mich. 48045; 3 mi. NE of Mount Clemens. Phone (313) 466-4011; AUTOVON 273-0111. 127th Tactical Fighter Wg. (ANG); 191st Fighter Interceptor Gp. (ANG); 927th Tactical Airlift Gp. (AFRES). Also hosts Air Force, Navy Reserve, Marine Air Reserve, Army Reserve, Army units, and US Coast Guard Air Station for Detroit. Base activated July 1917; transferred to Michigan ANG July 1971. Named for 1st Lt. Thomas E. Selfridge, first Army officer to fly an airplane and first fatality of powered flight, killed Sept. 17, 1908, at Fort Myer, Va., when plane piloted by Orville Wright crashed. Area 3,727 acres. Altitude 583 ft. ANG military 2,014, ANG technicians 503 (+ 560 civilians). Payroll $36.9 million. Dispensary.

Sioux City Municipal Airport, Iowa 51110; 7 mi. S of Sioux City. Phone (712) 255-3511; AUTOVON 939-6210. 185th Tactical Fighter Gp. (ANG). Area 114 acres. Altitude 1,098 ft. Military 931, technicians 253. Payroll $11.2 million. Dispensary.

Sioux Falls, S. D. (Joe Foss Field) 57104; N side of Sioux Falls. Phone (605) 336-0670; AUTOVON 939-7210. 114th Tactical Fighter Gp. (ANG). Named for Brig. Gen. Joseph J. Foss, WW II ace, former governor of South Dakota, former National President of AFA, and founder of the South Dakota ANG. Area 145 acres. Altitude 1,428 ft. Military 927, technicians 249. Payroll $11.4 million.

Springfield, Ill. (Capitol Airport) 62707; NW of Springfield. Phone (217) 753-8850; AUTOVON 631-8210. 183d Tactical Fighter Gp. (ANG). Area 70 acres. Altitude 592 ft. Military 1,218, technicians 320. Payroll $14.3 million. Dispensary.

Springfield-Beckley Municipal Airport, Ohio 45501-1780; 5 mi. S of Springfield. Phone (513) 323-8653; AUTOVON 346-2311. 178th Tactical Fighter Gp. (ANG); 251st Combat Information Systems Gp. (ANG). Area 113 acres. Altitude 1,052 ft. Military 1,133, technicians 270. Payroll $15 million. 6-bed dispensary.

St. Joseph, Mo. (Rosecrans Memorial Airport) 64503; 4 mi. W of St. Joseph. Phone (816) 271-1300; AUTOVON 720-9210. 139th Tactical Airlift Gp. (ANG). Area 298 acres. Altitude 724 ft. Military 872, technicians 255. Payroll $9.9 million.

St. Louis International Airport, Mo. (Lambert Field) 63145. Phone (314) 263-6356; AUTOVON 693-6356. 131st Tactical Fighter Wg. (ANG). Area 50 acres. Altitude 589 ft. Military 1,587, technicians 342. Payroll $18.1 million.

Stewart International Airport, Newburgh, N. Y. 12550-6148; 4 mi. W of Newburgh, 15 mi. N of USMA (West Point). Phone (914) 563-3345; AUTOVON 247-3345. Hq. New York ANG; 105th Military Airlift Gp. (ANG); USMA subpost airport. Formerly Stewart AFB; acquired by state of New York in 1970. ANG area 328 acres. Altitude 491 ft. ANG military 1,551, technicians 390. Payroll $11.7 million. Dispensary.

Suffolk County Airport, Westhampton Beach, N. Y. 11978-1294; within corporate limits of Westhampton Beach. Phone (516) 288-4200; AUTOVON 456-7210. 106th Aerospace Rescue and Recovery Gp. (ANG). Area 70 acres. Altitude 67 ft. Military 736, technicians 218. Payroll $10.2 million.

Syracuse, N. Y. (Hancock Field) 13211-7099; 5 mi. NE of Syracuse. Phone (315) 458-5500; AUTOVON 587-9110. 174th Tactical Fighter Wg. (ANG). Base operations for Hancock ANG Base. 152d Tactical Control Gp.; 108th and 113th Tactical Control Flts. Area 764 acres. Altitude 421 ft. Military 1,355, technicians 359. Payroll $14.8 million. Dispensary.

Terre Haute, Ind. (Hulman Regional Airport) 47803; 5 mi. E of Terre Haute. Phone (812) 877-5210; AUTOVON 724-1210. 181st Tactical Fighter Gp. (ANG). Area 279 acres. Altitude 585 ft. Military 1,002, technicians 277. Payroll $12.6 million. 5-bed dispensary.

Toledo Express Airport, Swanton, Ohio 43558; 14 mi. W of Toledo. Phone (419) 866-2078; AUTOVON 580-2078. 180th Tactical Fighter Gp. (ANG). Area 79 acres. Altitude 684 ft. Military 966, technicians 253. Payroll $13 million. 4-bed clinic.

Truax Field, Madison, Wis. (Dane County Regional Airport) 53704-2591; 2 mi. N of Madison. Phone (608) 241-6200; AUTOVON 273-8210. 128th Tactical Fighter Wg. (ANG). Activated June 1942 as AAF base; taken over by Wisconsin ANG in Apr. 1968. Named for Lt. T. L. Truax, killed in a P-40 training accident in 1941. Area 153 acres. Altitude 862 ft. Military 1,038, technicians 270. Payroll $11.4 million. Housing: 7 transient. Dispensary.

Tucson International Airport, Ariz. 85734; within Tucson city limits. Phone (602) 573-2210; AUTOVON 853-4210. 162d Tactical Fighter Gp. (ANG). Area 49 acres. Altitude 2,650 ft. Military 1,187, technicians 600. Payroll $20.9 million.

Tulsa International Airport, Okla. 74115. Phone (918) 832-5208; AUTOVON 956-5297. 138th Tactical Fighter Gp. (ANG); 219th Electronic Installation Sqdn. Area 78 acres. Altitude 676 ft. Military 1,093, technicians 263. Payroll $12.6 million.

Van Nuys, Calif. (Van Nuys Airport) 91409. Phone (213) 781-5980; AUTOVON 873-6310. 146th Tactical Airlift Wg. (ANG); 147th Combat Communications Sqdn. (Contingency). Area 62 acres. Altitude 799 ft. Military 1,759, technicians 363. Payroll $19.3 million.

Volk Field ANG Base, Wis. 54618-5001; 90 mi. NW of Madison. Phone (608) 427-1210; AUTOVON 798-3210. ANG field training site featuring air-to-air and air-to-ground gunnery ranges and providing training for ANG flying units. Named for Lt. Jerome A. Volk, first Wisconsin ANG pilot killed in the Korean War. Area 2,366 acres. Altitude 910 ft. Military 58, technicians 54. Payroll $2.4 million. 6-bed dispensary.

Westfield, Mass. (Barnes Municipal Airport) 01085; 3 mi. N of Westfield. Phone (413) 568-9151; AUTOVON 636-1210/11. 104th Tactical Fighter Gp. (ANG). Area 133 acres. Altitude 270 ft. Military 970, technicians 262. Payroll $12.4 million.

Westover AFB, Mass. 01022-5000; 5 mi. NE of Chicopee Falls. Phone (413) 557-1110; AUTOVON 589-1110. AFRES base. 439th Tactical Airlift Wg. (AFRES). Also home of Army, Navy, and Marine Corps Reserve and Massachusetts Army National Guard. Base dedicated Apr. 6, 1940; named for Maj. Gen. Oscar Westover, Chief of the Air Corps, killed Sept. 21, 1938, in crash near Burbank, Calif. Area 2,500 acres. Altitude 244 ft. Reservists 2,130, technicians (AFRES and tenant units) 211, civilians 469. Payroll $17.5 million. Housing: 300 family quarters; 432 dormitory rooms; 44 VOQ (168 beds).

Willow Grove Air Reserve Facility, Pa. 19090; 14 mi. N of Philadelphia. Altitude 356 feet. ANG and AFRES have separate phones and facilities. ANG phone (215) 443-1500; AUTOVON 991-1500. 111th Tactical Air Support Gp. (ANG). ANG area 41 acres. Military 907, technicians 229. Payroll $9.1 million. AFRES phone (215) 443-1062; AUTOVON 991-1062. 913th Tactical Airlift Gp. (AFRES). AFRES area 162 acres. Reservists 856, technicians 147, civilians 122. Payroll $9.3 million. Other units include Army, Navy, and Marine Corps Reserve. Defense Contract Administration Services Region, Philadelphia; 92d Aerial Port Sqdn. (MAC) off-base tenant. Base activated Aug. 1958. Navy transient quarters available, but limited.

Will Rogers World Airport, Okla. 73169-5000; 7 mi. SW of Oklahoma City. Phone (405) 686-5210; AUTOVON 956-8210. 137th Tactical Airlift Wg. (ANG). Area 71 acres. Altitude 1,290 ft. Military 1,112, technicians 215. Payroll $12.1 million.

Wilmington, Del. (Greater Wilmington Airport) 19720; 5 mi. S of Wilmington. Phone (302) 322-3361; AUTOVON 455-3000. 166th Tactical Airlift Gp. (ANG); Army National Guard aviation company. Area 57 acres. Altitude 80 ft. Military 1,040, technicians 214. Payroll $10.6 million. 2-bed dispensary.

Windsor Locks, Conn. (Bradley International Airport) 06096; 15 mi. N of Hartford. Phone (203) 623-8291; AUTOVON 636-8310. 103d Tactical Fighter Gp. (ANG); Army National Guard aviation battalion. Named for Lt. Eugene M. Bradley, killed in P-40 crash Aug. 1941. Area 158 acres. Altitude 173 ft. Military 922, technicians 265. Payroll $12 million.

Youngstown Municipal Airport, Ohio 44473-5000; 16 mi. N of Youngstown. Phone (216) 392-1000; AUTOVON 346-1000. AFRES base. 910th Tactical Airlift Gp. (AFRES); 757th Tactical Airlift Sqdn. (AFRES). Other units include OL C, 2046th Communications Gp.; Defense Contract Administration Services. Base activated 1952. Area 230 acres. Altitude 1,196 ft. Reservists 837, technicians 136, civilians 218. Payroll $12 million. ■

A Guide to USAF's R&D Facilities

Principal AFSC R&D Facilities

From AFSC headquarters at Andrews AFB, Md., Gen. Lawrence A. Skantze, AFSC Commander, directs the operations of the command's divisions, development and test centers, ranges, and laboratories. These organizations are described below.

Product Organizations

Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio—ASD directs the design, development, and acquisition of aeronautical systems, such as fighters, bombers, transports, aerial tankers, tactical reconnaissance aircraft, manned vehicles, long- and short-range air-to-surface missiles, simulators, reconnaissance and electronic warfare systems, aircraft engines, and other aeronautical equipment. ASD comprises more than 11,000 military and civilians working in research, development, and acquisition programs. Scientists, engineers, logisticians, business and program managers, technicians, and support people make up the work force.

Current aircraft programs include the priority effort to acquire, test, and deploy the new B-1B strategic bomber, development of the Advanced Tactical Fighter (ATF) for the mid-1990s and beyond, full-scale development of the C-17 airlift aircraft, continued production and improvements to the F-15 Eagle and F-16 Fighting Falcon fighters, development and production of the F-15E dual-role fighter, which made its first flight in December 1986, development of the Advanced Technology Bomber (ATB), continued production of the C-5B, acquisition of executive-configured 747s for two new *Air Force One* Presidential airlift aircraft, development and production of the alternate fighter engine for F-15 and F-16 aircraft, and purchases, following leasing, of eighty C-21A and forty C-12F airlifters for operational support missions.

Missile systems efforts include development of the advanced cruise missile, production of the tactical infrared Maverick missile, which is capable of air strikes at night and in adverse weather, development of the new short-range attack missile (SRAM II) to replace the aging SRAM-A, and approval for high-rate production of the LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) system navigation pod and low-rate production for LANTIRN's targeting pod.

Technology modernization—an ASD strategy to help

aerospace manufacturers modernize their facilities to improve productivity—is a demonstrated success and has been expanded to include most major weapon system programs at ASD and at other AFSC product organizations as well.

ASD's 4950th Test Wing operates and maintains most of AFSC's inventory of specially modified aircraft for conducting test flights and gathering and analyzing test results. These include the Advanced Range Instrumentation Aircraft (ARIA), which deploy worldwide to receive, record, and retransmit telemetry data from missiles, satellites, and spacelaunch vehicles. The ARIA aircraft are maintained at Wright-Patterson AFB along with a fleet of test-bed aircraft, including C-141, C-18, C-135, T-39, and T-37 aircraft, to provide customers low-cost service for flight testing.

Also a part of ASD are the Air Force Wright Aeronautical Laboratories (AFWAL).

Air Force Wright Aeronautical Laboratories (AFWAL), Wright-Patterson AFB, Ohio—AFWAL includes four major organizations—the Flight Dynamics, Materials, Avionics, and Aero Propulsion Laboratories—and is organizationally located under ASD. AFWAL was established to enhance the integration of technologies across what formerly existed as four independent laboratories. AFWAL conducts and supports research, exploratory development, and advanced technology development in many fields and is responsible for selected engineering development efforts as well as the Air Force's Manufacturing Technology program.

At AFWAL, two programs are under way to develop artificially intelligent "expert systems" to help aircrews deal with the complexities of future aircraft. These include work on an electronic "pilot's associate" and an automatic target recognizer. The laboratories are also developing technologies being considered for the ATF. These include such new materials as composites and advanced metallics, innovative electronics for advanced cockpit automation, integrated fire and flight controls, advanced radars and sensors, vectored thrust, built-in test and support equipment, and low observables.

Air Force Avionics Laboratory conducts research and development in the areas of navigation, surveillance, reconnaissance, electronic warfare, fire control, weapon delivery, communications, system architecture, information and signal processing and control, subsystems integration software, and electromagnetic devices to provide a broad technology base for future systems and ensure application to Air Force aerospace needs. Avionics is defined as all of the electronics aboard aviation and aerospace systems.

In the area of electromagnetic device research and development, the intensive very-high-speed integrated circuit (VHSIC) triservice effort led by Avionics Laboratory is expected to yield orders-of-magnitude improvements in speed, size, power, and R&M capabilities.

The laboratory's work on an automatic target recognizer is relying on expert systems and parallel processing to recognize and analyze shapes automatically. This program is part of a larger research effort called ADRIES (Advanced Digital Radar Imagery Exploitation System), which is sponsored jointly by ASD, the Defense Advanced Research Projects Agency (DARPA), and the Army.

Aero Propulsion Laboratory conducts Air Force exploratory and advanced development programs in turbine engines, ramjets, fuels, turbine engine lubricants, aircraft fire protection, synthetic fuels, and flight vehicle power. It houses the unique Compressor Research Facility, which supports in-house and contracted efforts in addition to providing support to the Army, Navy, and NASA. Advanced turbine engine compressor, combustor, and turbine engine concepts and components are assessed by means of the Advanced Propulsion Subsystems Integration and the Advanced Turbine Engine Gas Generator advanced development programs.

Flight Dynamics Laboratory focuses primarily on developing flight-vehicle technologies, including structural design and durability, vehicle dynamics, vehicle equipment, environmental control, crew escape and recovery, survivability and vulnerability, flight control, crew station design, flight simulation, performance analysis, aerodynamics, configuration synthesis, and technology integration. Test-beds for flight-control and other technologies include the X-29A forward-swept wing (jointly with DARPA), AFTI/F-111 mission-adaptive wing, and AFTI/F-16. Additionally, design studies are under way for a short takeoff and landing (STOL) and maneuver technology demonstrator, an F-15 being modified by McDonnell Douglas for flight testing at Edwards AFB.

Materials Laboratory conducts the total Air Force program in materials exploratory development and manufacturing technology. Areas of current emphasis include thermal protection materials; composites and metals for high-temperature applications; fluids, lubricants, and fluid-containment materials; protective coatings; electronic and electromagnetic materials; laser-hardened materials; integrated computer-aided manufacturing, robotics, smart processing, and flexible automated batch manufacturing; and nondestructive evaluation.

Armament Division (AD), Eglin AFB, Fla.—The Division plans, researches, develops, and acquires conventional air armament and tests and evaluates armament and electronic combat systems and related equipments.

The major mission areas assigned to AD are nonnuclear systems research, development, and acquisition, test and evaluation of armament and electronic combat systems, and host and base support. This full spectrum of missions assigns to one organization cradle-to-grave responsibility for air armaments. The synergy is further enhanced by the using command tenant organizations assigned to Eglin AFB, Fla. While the Division develops and tests weapon systems, the Air Force Tactical Air Warfare Center and the 33d Tactical Fighter Wing, collocated at Eglin AFB, offer their expertise in the tactical applications of those weapons.

The research and technology and systems development and acquisition mission areas are organized under a single manager, the Deputy Commander for Development and Acquisition. He controls the efforts of AD's Air Force Armament Laboratory and the development plans, systems, engineering, acquisition, and acquisition logistics organizations. This single focal point ties together the basic research, exploratory development, advanced development, master planning, and conceptual, validation, and full-scale engineering development, production, and deployment phases of acquisition. The elements of integrated logistics support are provided by a joint AFSC and AFLC office.

AD's 3246th Test Wing, equipped with a fleet of approximately forty aircraft and highly instrumented ground facilities, manages the Division's test and evaluation program. To accomplish its mission, the wing uses several large land test ranges scattered throughout the 724-square-mile Eglin complex as well as 86,500 square miles of water ranges located in the adjacent Gulf of Mexico. Major tests on or above AD's ranges cover all kinds of equipment, including aircraft systems, subsystems, missiles, guns, bombs, rockets, targets and drones, high-powered radars, and airborne electronic countermeasures equipment. Equipment is tested in a variety of environments, and combat conditions are realistically simulated. One of the Test Wing's unique assets is the McKinley Climatic Laboratory, capable of testing military hardware as large as a bomber in environments ranging from minus 65 to plus 165 degrees Fahrenheit with 100 mph winds, icing, clouds, rain, and snow.

Also under the Test Wing is the 6585th Test Group located at Holloman AFB, N. M. Among its unique facilities are a 50,000-foot high-speed test track, two radar target scatter facilities (RATSCAT), and the Central Inertial Guidance Test Facility (CIGTF).

Air Force Armament Laboratory (AFATL), Eglin AFB, Fla.—AFATL is the principal Air Force laboratory conducting research and development in guided and unguided nonnuclear munitions, exploring the technology for future armament for America's defenses. Specific technologies under development include advanced seekers, missile airframes, guidance and control components, explosives, warheads, fuzes, guns, and ammunition. Additionally, kinetic energy launchers and guided projectiles are being developed to support the Strategic Defense Initiative program. The laboratory also provides technical support to system program offices in such areas as hardware-in-the-loop missile simulations and warhead vulnerability and lethality analysis. AFATL is organizationally assigned to the Armament Division at Eglin AFB.

Electronic Systems Division (ESD), Hanscom AFB, Mass.—ESD is responsible for developing, acquiring, and delivering electronic systems and equipment for the command control communications and intelligence functions of aerospace forces. More than 100 projects are currently under way, including modernization of the World-Wide Military Command and Control System, which is used by DoD to control its military forces; replacement of the Distant Early Warning (DEW) Line radars with new-technology sensors that require little on-site manning and that, in some cases, will operate unattended; radars in the four corners of the nation to detect attack by sea-launched ballistic missiles and to track satellites; upgrading of the Ballistic Missile Early Warning System in England, Greenland, and Alaska to meet the modern missile threat; an Air Force/Army radar to detect, track, and direct weapons against stationary or slow-moving ground and airborne targets; a triservice secure and survivable tactical communications network for air, ground, and sea forces; improvements to NORAD's Space Operations Center and Cheyenne Mountain Complex to facilitate the direction of the defense of North America; an unmanned low-frequency radio network throughout the US to pass emergency messages should the electromagnetic pulse from high-altitude nuclear detonations disrupt normal communications; a worldwide chain of optical satellite-tracking stations; the E-3 Sentry airborne radar/direction center for the Air Force, North Atlantic Treaty Organization, and Saudi Arabia; and an over-the-horizon backscatter radar for long-range (out to 1,800 miles) warning of aircraft approaching North America.

ESD manages the Department of Defense Electromagnetic Compatibility Analysis Center at Annapolis, Md., and maintains an office at Kapaun AS, Germany, for coordinating and managing many European-wide C^{3}I programs. ESD also manages the Strategic Defense Initiative battle management C^3 National Test-Bed.

Rome Air Development Center (RADC), Griffiss AFB, N. Y.—RADC is the principal organization charged with conducting Air Force research and development programs related to C^{3}I (command control communications and intelligence). RADC mission areas include communications, electromagnetic guidance and control, surveillance of ground and aerospace objects, intelligence data handling, information systems technology, artificial intelligence, battle management, ionospheric propagation, solid state sciences, microwave physics, and electronic reliability, maintainability, and compatibility. Reporting to the Commander, ESD, Hanscom AFB, Mass., RADC is also responsible for assisting in demonstrating and acquiring selected systems and subsystems within its areas of expertise.

Space Division (SD), Los Angeles AFS, Calif.—SD provides and manages the majority of the nation's military space systems. SD's responsibilities include providing and maintaining space-based communications, meteorological, navigation, and surveillance systems in support of combat forces on the ground, at sea, and in the atmosphere; developing spacecraft, launch vehicles, and ground-terminal equipment to maintain and improve military space capabilities; launching and controlling on-orbit satellites for DoD and other government agencies; developing space defense and survivability technology to ensure protection of the nation's space assets; managing DoD activities in the national Space Transportation System (Space Shuttle); operating national test ranges and launch facilities to support space and missile programs for the Air Force, DoD, NASA, and other agencies; operating a worldwide network of satellite tracking stations; and operating the Space and Missile Test Organization, the Air Force Satellite Control Facility, the Air Force Space Technology Center, and major field elements of SD that are described below.

To meet these global responsibilities, SD has 3,040 officer, 2,573 enlisted, and 4,623 civilian personnel. Aerospace Corporation, headquartered adjacent to SD, also devotes the principal efforts of its highly qualified, 2,347-member technical staff to SD programs.

Air Force Space Technology Center (AFSTC), Kirtland AFB, N. M.—AFSTC is under the command of Space Division, AFSC. The Space Technology Center directs three Air Force Systems Command laboratories: Air Force Weapons Laboratory at Kirtland AFB, Air Force Rocket Propulsion Laboratory, Edwards AFB, Calif., and Air Force Geophysics Laboratory, Hanscom AFB, Mass.

AFSTC integrates technology efforts to explore military space capabilities and the needs of future space systems.

The expertise of AFSTC headquarters and laboratory staffs provides a focus for information about space-related developments in such diverse areas as electronics hardening, laser research, rocket propulsion, rail guns, infrared sensors, and the earth and space environment.

The Center works through Air Force Systems Command and Space Command to provide research results for future systems needs and to identify key technology areas for long-range plans. In addition, AFSTC works closely with NASA and other military agencies on joint development programs.

Air Force Weapons Laboratory (AFWL), Kirtland AFB, N. M.—AFWL conducts Air Force Systems Command nonconventional weapons research and development in high-energy laser technology, advanced weapon concepts, and nuclear weapon technology, including nuclear survivability and vulnerability. AFWL also acts as the AFSC focal point for the technical aspects of nuclear safety and the development of nuclear hardness criteria for Air Force systems.

Air Force Rocket Propulsion Laboratory (AFRPL), Edwards AFB, Calif.—AFRPL is the Air Force technology center charged with planning and executing research, advanced development, and exploratory programs for rocket propulsion and interdisciplinary space technology. AFRPL supports ballistic missile, air-launched missile, and space-propulsion mission areas. The lab's national resource experimental areas are capable of supporting experimental rocket motor firings ranging in scope from satellite thrusters to heavy lift spacelaunch vehicles. AFRPL personnel study and develop the technologies involved with propellants, combustion, plume phenomenology, rocket propulsion materials and structures, solid-propellant rocket motors, liquid-propellant rocket feed systems and engines, electric and solar propulsion, propellant hazards, and related space technologies. AFRPL also conducts system support programs for other units and divisions of AFSC, Army, Navy, and NASA.

Air Force Geophysics Laboratory (AFGL), Hanscom AFB, Mass.—AFGL is the center for research, exploratory development, and advanced technology development involving earth, atmosphere, and space environments. AFGL scientists study the effects of the space environ-

ment on Air Force space vehicles, the interactions of the ionosphere and upper atmosphere with Air Force systems, the optical properties of the atmosphere, both as a transmission medium and as an emitter of radiation, techniques for measurement of the earth's gravity field and its crustal motions to determine their effects on ballistic missiles, and new and better ways to predict the weather and measure weather elements.

Air Force Satellite Control Facility (AFSCF), Onizuka AFS, Calif.—AFSCF develops, maintains, and operates for Space Division a worldwide network of tracking stations to perform on-orbit tracking, data acquisition, and command and control of DoD space vehicles.

Ballistic Missile Office (BMO), Norton AFB, Calif.—BMO is responsible for the planning, implementation, and management of Air Force programs to acquire ballistic missile systems and subsystems.

BMO is managing the development of the Peacekeeper Intercontinental Ballistic Missile (ICBM), which is continuing its perfect flight-test program at Vandenberg AFB, Calif. The Peacekeeper has met its scheduled initial operational capability of late December 1986 with ten missiles deployed to F. E. Warren AFB, Wyo.

BMO is also managing the research and development of the Air Force's newest ballistic missile, the Small ICBM. The new program office opened in May 1983 as part of the President's ICBM Modernization Program. Research and development is continuing after a full-scale development decision was completed in December 1986.

Another major BMO development program is the Advanced Strategic Missile Systems (ASMS). ASMS is responsible for providing advanced technology to ensure the effectiveness, survivability, and penetrability of strategic missile systems in response to evolving missions, threats, and technologies. ASMS provides support for operational systems, alternatives for future systems, and arms-control support.

BMO is also developing the rail-garrison basing mode for deploying the second fifty Peacekeeper missiles.

Test Organizations

Space and Missile Test Organization (SAMTO), Vandenberg AFB, Calif.—SAMTO has two specific functions. The first is to manage field-test and launch operations for all DoD-directed space programs and long-range ballistic research and development programs. The other is to develop, manage, and operate, through the Eastern and Western Space and Missile Centers, the national test ranges.

Western Space and Missile Center (WSMC), Vandenberg AFB, Calif.—WSMC is responsible for conducting launch and launch support of research and development ballistic missile testing and polar-orbiting space launches for DoD, USAF, and other agencies. Stretching halfway around the world from the California coast to the Indian Ocean, the Western Test Range is operated in support of ballistic and space test operations. The Range also supports East Coast Space Shuttle operational flight tests and other aeronautical tests employing the same sensors and data-gathering equipment used for ballistic and space booster flights. WSMC is responsible for planning and subsequent execution of the Peacekeeper research and development flight tests and will provide support for West Coast Space Shuttle operations, starting in 1992.

Eastern Space and Missile Center (ESMC), Patrick AFB, Fla.—ESMC is responsible for conducting launch and launch support activities of manned and unmanned space launches and ballistic missiles for the Air Force, DoD, foreign governments, and other government agencies. Support includes the initial assembly, checkout, and ground processing for launch of the Inertial Upper Stage for the Space Shuttle, all space launches requiring geosynchronous orbits, and the Trident II and Pershing II missile programs. In addition, it operates Patrick AFB. The Eastern Test Range extends more than 10,000 miles down the Atlantic into the Indian Ocean, where it joins the Western Test Range to form a worldwide network. Tracking and data-gathering stations are located at Jupiter, Fla., and on Antigua and Ascension Islands.

Air Force Flight Test Center (AFFTC), Edwards AFB, Calif.—AFFTC conducts and supports flight testing and evaluation of manned aircraft, research vehicles, and related propulsion, weapons, avionics, and flight-control systems within or entering the Air Force inventory. Similar tests and evaluation can also be carried out by AFFTC on aircraft belonging to other US military services and government agencies and aircraft and related systems of certain foreign governments.

AFFTC also tests and evaluates remotely piloted vehicles, Air Force versions of air- and ground-launched cruise missiles, plus crew, cargo, and special mission parachutes and extraction systems.

Test programs currently under way at AFFTC include developing and evaluating the B-1B bomber, the F-15 Eagle, the F-16 Fighting Falcon, and the T-46A trainer and follow-on testing and evaluation of the upgraded B-52 avionics and cruise-missile systems.

AFFTC operates the Air Force Test Pilot School at Edwards AFB, where experienced pilots and engineers are trained for flight-test and aerospace research work.

The Center has management responsibility for the Utah Test and Training Range (UTTR), a 2,700-square-mile facility in northwest Utah where many test and development flights of remotely piloted vehicles and cruise missiles are carried out. Units administering the UTTR are located at Hill AFB, Utah.

AFFTC is involved in the nation's Space Transportation System program, providing the landing site for all Space Shuttle test and evaluation flights and serving as a primary landing site for operational missions.

Arnold Engineering Development Center (AEDC), Arnold AFS, Tenn.—AEDC operates the world's largest and most advanced complex of aerospace flight-simulation test facilities—some forty aerodynamic and propulsion wind tunnels, rocket motor and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges, and other specialized units. Twenty-seven of the Center's test units have capabilities unmatched anywhere. Facilities can simulate flight conditions from sea level to altitudes around 1,000 miles and from subsonic velocities to those well over Mach 20 for some systems.

The Center's mission is to test aircraft, missile, and space systems at the flight conditions experienced during an operational mission. Testing helps developers qualify the systems for flight, improve designs, and establish performance levels before production and assists in troubleshooting problems with operational systems.

Testing done at the Center cannot completely replace a flight test, but can significantly reduce the amount of flight-test time and total development time and cost. Testing in ground-based facilities allows careful instrumentation of hardware and the precise control, observation, and repetition of test variables to determine impact on the test article. In most cases, a less-expensive model can be used in place of full-scale flight hardware. Failure cause can be determined and analysis carried out more easily with recoverable hardware. And flight tests can be conducted more safely and with greater confidence after the operational characteristics have been established during ground testing.

Arnold Center has contributed to practically every one of the nation's top-priority aerospace programs, including the Peacekeeper, Space Shuttle, F-15, and B-1. Customers include the National Aeronautics and Space Administration; the Federal Aviation Administration; the Air Force, Army, and Navy; private industry; allied foreign governments; and US government and educational institutions.

Laboratories

DCS/Science and Technology (DL), Andrews AFB, Md.—The DCS/Science and Technology provides policy, planning, and technical direction to programs of the command's research and development laboratories.

Laboratories directly under DL are:

Air Force Office of Scientific Research (AFOSR), Bolling AFB, D. C.—AFOSR is the single manager of Air Force basic research. It awards grants and contracts for basic research related directly to Air Force needs. Research is selected to support the search for new knowledge and the expansion of scientific principles. AFOSR is also responsible for the activities of the Frank J. Seiler Research Laboratory, the European Office of Aerospace Research and Development, and the AFOSR Liaison Office, Far East.

The Frank J. Seiler Research Laboratory (FJSRL), USAF Academy, Colo.—This laboratory is engaged in basic research in physical and engineering sciences, usually centering around chemistry, applied mathematics, and aerospace mechanics. The laboratory sponsors related research conducted by the faculty and cadets of the USAF Academy.

European Office of Aerospace Research and Development (EOARD), London, England—This unit links the Air Force and the scientific communities in Europe, Africa, and the Near East. It identifies foreign technology, engineering, and manufacturing advances that can be applied to USAF requirements.

The AFOSR Liaison Office, Far East (AFOSR/FE), Tokyo, Japan—This office is the Far East counterpart to the EOARD and provides liaison with the scientific and engineering communities of the Far East.

Special Organizational Considerations

Air Force Engineering and Services Center, Research and Development Division (AFESC/RD), Tyndall AFB, Fla.—AFESC/RD is organizationally assigned to Headquarters Air Force Engineering and Services Center. It acts as the Systems Command agent in executing civil engineering, environmental quality, and facilities energy RDT&E. AFESC/RD evaluates methods and techniques to detect, assess, control, and abate Air Force environmental problems. The Division also conducts civil engineering R&D to improve air base survivability, aircraft contingency launch and recovery surfaces, aircraft and tactical shelters, and air base equipment and facilities.

Special AFSC Organizations

Foreign Technology Division (FTD), Wright-Patterson AFB, Ohio—FTD acquires, evaluates, analyzes, and disseminates information on foreign aerospace technology in concert with other divisions, laboratories, and centers. Information collected from a wide variety of sources is processed by unique electronic data-handling and laboratory-processing equipment and analyzed by scientific and technical specialists.

Air Force Contract Management Division (AFCMD), Kirtland AFB, N. M.—AFCMD is responsible for DoD contract management activities in twenty-five major contractor plants and other contractor facilities assigned to the Air Force under the DoD National Plant Cognizance Program. AFCMD evaluates contractor performance and manages the administration of contracts executed by Air Force, Army, Navy, Defense Logistics Agency, NASA, and other government purchasing agencies.

Human Systems Division (HSD), Brooks AFB, Tex.—HSD manages and conducts research and development in aerospace biotechnology in support of the Air Force mission. HSD is responsible for the programs of the Air Force Human Resources Laboratory, the USAF School of Aerospace Medicine, the Air Force Drug Testing Laboratory, the USAF Occupational and Environmental Health Laboratory, and the Armstrong Aerospace Medical Research Laboratory. The USAF School of Aerospace Medicine provides specialized training for more than 5,000 health-care specialists each year. The school offers postgraduate professional education in a variety of medical disciplines. HSD's researchers and scientists at USAFOEHL, AAMRL, and USAFSAM are searching for ways to counter the potential hazards of working in and around the high-technology work place and ensuring maximum crew performance in the aerospace environment.

Air Force Drug Testing Laboratory (AFDTL), Brooks AFB, Tex.—Designated as a subordinate unit reporting directly to the Human Systems Division commander, AFDTL analyzes more than 250,000 urine specimens annually. AFDTL is the only Air Force agency that implements the Army-Air Force drug abuse detection program. It tests samples from all Air Force members stationed in the CONUS, Alaska, and the Panama Canal Zone and from Army members stationed at nine installations in the south central United States.

Air Force Human Resources Laboratory (AFHRL), Brooks AFB, Tex.—AFHRL manages and conducts research and exploratory and advanced development programs for manpower and personnel operations, technical training simulation, and logistics systems. The Manpower and Personnel and Training Systems Divisions are located at Brooks AFB. Other AFHRL divisions are the Logistics and Human Factors Division at Wright-Patterson AFB, Ohio, and the Operations Training Division at Williams AFB, Ariz.

Air Force Harry G. Armstrong Aerospace Medical Research Laboratory (AAMRL), Wright-Patterson AFB, Ohio—The Harry G. Armstrong Aerospace Medical Research Laboratory is part of the Human Systems Division. It conducts behavioral and biomedical research to enhance human performance under conditions of environmental stress. AAMRL also establishes design criteria and new biotechnology techniques to protect and sustain personnel in future aerospace systems. The four areas of laboratory research are occupational and environmental toxic hazards in Air Force operations, safety and aircrew effectiveness in mechanical force environments, man-machine integration technology, and manned weapon-system effectiveness.

USAF School of Aerospace Medicine (USAFSAM), Brooks AFB, Tex.—The school is part of the Human Systems Division. Its research mission includes both in-house and contractual work in the applied aspects of aeromedical research. The Crew Technology, Clinical Sciences, and Radiation Sciences Divisions are engaged in studies of biological, environmental, and dynamic conditions that may affect the health and efficiency of aircrews. The Epidemiology Division is a reference and consultant laboratory to Air Force medical facilities for disease assessment and surveillance. One of its principal responsibilities is to give advice and assistance in investigating disease outbreaks at Air Force installations. The school offers officer and enlisted aeromedical

education courses ranging from a residency in aerospace medicine to a flight nurse program to a training program for Air Force bioenvironmental specialists. USAFSAM's Hyperbaric Medicine Division is the lead DoD agency for studying hyperbaric treatment. It also provides a twenty-four-hour worldwide consultation service.

USAF Occupational and Environmental Health Laboratory (OEHL), Brooks AFB, Tex.—OEHL provides consultation and specialized laboratory services to support requirements of occupational, radiological, environmental health, and environmental quality programs.

AFSC NCO Academy/Leadership School, Kirtland AFB, N. M.—The Air Force Systems Command (AFSC) Noncommissioned Officer Academy and Leadership Schools are located at Kirtland AFB, N. M. The AFSC NCO Academy has been in continuous operation for more than thirty years—longer than any other Air Force NCO Academy. Both the Academy and Leadership School are important phases of the Air Force's four levels of professional military education offered to NCOs. ■

Guide to NASA's Research Centers

The National Aeronautics and Space Administration (NASA) operates a number of research, development, test, and evaluation (RDT&E) field centers that frequently participate in or coordinate their work with USAF R&D programs. Following is a descriptive listing of key NASA installations.

Ames Research Center, Moffett Field, Calif.—Programs at Ames involve research and development in aeronautics, life sciences, space sciences and applications, space technology, and new science and technology growing from aerospace programs. The Center's major program responsibilities are concentrated in theoretical and experimental fluid mechanics and aerodynamics, rotorcraft technology, high-performance aircraft technology, flight simulation, flight testing, computational fluid dynamics, fluid and thermal physics, space sciences, airborne sciences and applications, human factors and space biology, and ground and flight projects in support of aeronautics and space technology. Named for Dr. Joseph S. Ames (1864–1943), Chairman of the National Advisory Committee for Aeronautics (NACA) from 1927 to 1939.

Hugh L. Dryden Flight Research Facility, Edwards AFB, Calif.—Dryden Flight Research Facility is concerned with manned flight within and outside the atmosphere, including low-speed supersonic, hypersonic, and reentry flight and aircraft operations. Flight testing includes HiMAT (Highly Maneuverable Aircraft Technology), RPRVs (Remotely Piloted Research Vehicles), pivot-wing subsonic aircraft, digital fly-by-wire flight-control systems, and wake vortex alleviation methods. Dryden served as a Shuttle landing site for the first four orbital flights and thereafter as a contingency landing site. Named for Dr. Hugh L. Dryden (1898–1965), Director of NACA from 1949–58 and then Deputy Administrator of the new NASA.

Goddard Space Flight Center, Greenbelt, Md.—The Goddard Space Flight Center conducts a wide-ranging program in space science and applications. The GSFC manages the development of wholly integrated spacecraft, ranging from systems engineering to development, integration, and testing; the development and operation of both the ground network of tracking and data acquisition facilities and the Tracking and Data Relay Satellite System; scientific research, including both theoretical studies and development of significant scientific experiments flown on satellites; and the operation of a research airport located at Wallops Island, Va. Goddard is also the manager of the Delta launch vehicle. Named for Dr. Robert H. Goddard (1882–1945), the "father" of rocketry and the space age.

Jet Propulsion Laboratory, Pasadena, Calif.—Jet Propulsion Laboratory is operated for NASA under contract by the California Institute of Technology. The Jet Propulsion Laboratory is primarily responsible for the conduct of NASA automated missions concerned with deep space scientific exploration; tracking, data acquisition, reduction, and analysis required by deep space flight; and development of advanced spacecraft propulsion, guidance, and control systems. The Laboratory is also responsible for selected automated earth-orbital projects. Activities include a broad range of engineering, scientific, and management functions devoted to planetary exploration, physics and astronomy, space applications, spacecraft operations, operation of the Deep Space Network, and research and analysis.

Lyndon B. Johnson Space Center, Houston, Tex.—The Center designs, tests, and develops manned spacecraft and selects and trains astronauts. Mission Control for manned spaceflight is located at the Center, and responsibilities include operational planning, crew selection and training, flight control, and experiment/payload flight control for the Space Transportation System. Definition and development of in-flight biomedical experiments are included in the life sciences research responsibilities of the Center. The Center is named for the late President Johnson.

John F. Kennedy Space Center, Fla.—The principal role of the Center includes Space Shuttle launch preparation, launch, landing, and refurbishment, Spacelab and Spacelab payloads ground processing, cargo/experiment integration and processing, upper stages ground processing, and operation and maintenance of ground-support equipment. The Center is also responsible for launch preparation, checkout, and launch of the current inventory of expendable launch vehicles. Kennedy is also responsible for the operation of the KSC Space Transportation System (STS) Resident Office, located at Vandenberg AFB, Calif. The Resident Office supports the Air Force in the design, construction, and activation of the Space Shuttle Vandenberg launch and landing site, provides support for all NASA Deployable Payload Operations, and assists the KSC Cargo Projects Office in planning for all STS cargo operations at Vandenberg. The two principal Shuttle launching and landing sites are at Kennedy and at Vandenberg AFB, Calif.

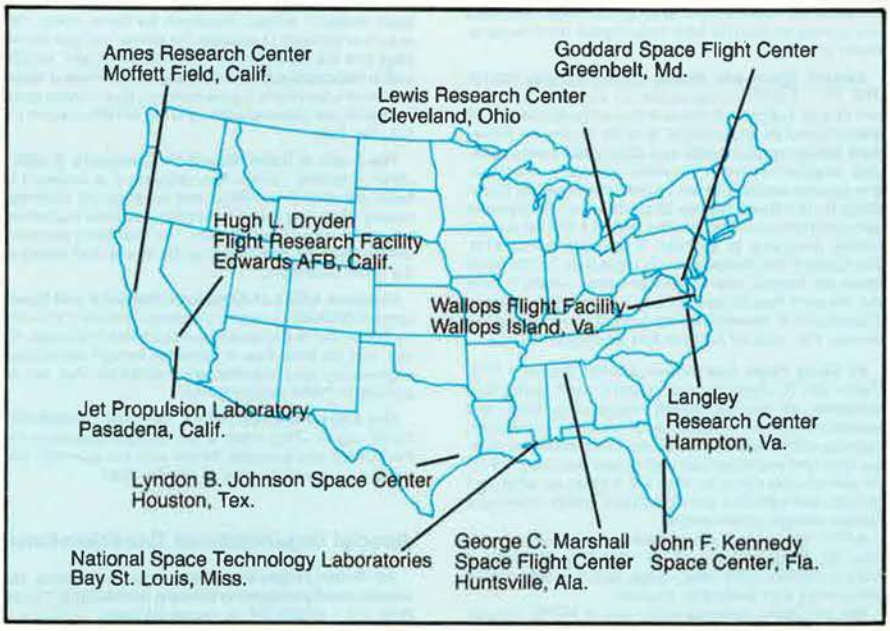
Langley Research Center, Hampton, Va.—Langley's primary mission is research and development of advanced concepts and technology for future aircraft and spacecraft systems, with particular emphasis on environmental effects, performance, range, safety, and economy. The aeronautical research program is directed at pursuing basic and applied research opportunities leading to increases in performance, efficiency, and capability. Major research disciplines include aerodynamics; operations and airworthiness; acoustics and noise reduction; structures and materials; flutter, aeroelasticity, dynamic loads, and structural response; fatigue and fracture; electronic and mechanical instrumentation; and flight dynamics and control. Named for Samuel P. Langley (1834–1906), astronomer and aerodynamicist who pioneered in the theory and construction of heavier-than-air craft.

Lewis Research Center, Cleveland, Ohio—LeRC was established as an aircraft engine research laboratory for aircraft propulsion systems. Since then, LeRC has developed many unique facilities for testing full-scale aircraft engines and engine components, chemical rocket engines, electric propulsion systems, space and terrestrial power generation systems, and space communication systems. Lewis is the lead center for aeronautical propulsion and power-transfer technologies, including engine materials and structures, tribology, bearings, seals, inlets, nozzles, propulsion system integration, compressors, turbines, transmissions, propellers, instrumentation, and controls. Lewis also manages the Atlas and Centaur launch vehicle systems and development of the Shuttle Centaur Cryogenic Upper Stage for the Space Transportation System. Named for Dr. George W. Lewis (1882–1948), NACA Director of Aeronautical Research from 1924–47.

George C. Marshall Space Flight Center, Huntsville, Ala.—Marshall serves as NASA's primary propulsion development center. It is also responsible for a wide range of space payloads, manned spaceflight systems, and space science activities. The Marshall Center has responsibility for the development, testing, and production of the Space Shuttle main engines, solid rocket boosters, and external tanks. It has NASA responsibility for upper stages, the Orbital Maneuvering Vehicle, and the Orbital Transfer Vehicle. Marshall manages Spacelab development activities for NASA and also manages Spacelab missions from control facilities at Marshall. It is NASA's lead center for the development and orbital verification of the Hubble Space Telescope. Marshall also has major responsibilities for development of the Space Station. In addition, it has special capabilities in materials processing in space and for the development of space science experiments. It manages NASA's Michoud Assembly Facility in New Orleans and NASA's Slidell Computer Complex in Slidell, La. It is named for Gen. George C. Marshall, wartime Army Chief of Staff, Secretary of State, and winner of the Nobel Peace Prize.

National Space Technology Laboratories, Bay St. Louis, Miss.—NSTL is NASA's prime static test facility for large liquid-propellant rocket engines and propulsion systems. NSTL plays a key role in the development and acceptance testing of the Space Shuttle main engines and main propulsion system development testing and also conducts applied research and development in the fields of remote sensing, environmental sciences, and other selected applications. NSTL manages the installation and provides support and facilities to collocated elements of other agencies, including the Department of Defense, Department of Interior, Department of Commerce, the Environmental Protection Agency, and the Department of Transportation.

Wallops Flight Facility, Wallops Island, Va.—Wallops, a part of Goddard Space Flight Center, is responsible for managing NASA's Suborbital Sounding Rocket Projects from mission and flight planning to landing and recovery, including payload and payload carrier design, development, fabrication, and testing; experiment management support; launch operations; and tracking and data acquisition. Launch vehicles used by Wallops include the four-stage Scout rocket with orbital capability. Wallops also manages the NASA balloon program and is responsible for operating the National Scientific Balloon Facility at Palestine, Tex. ■



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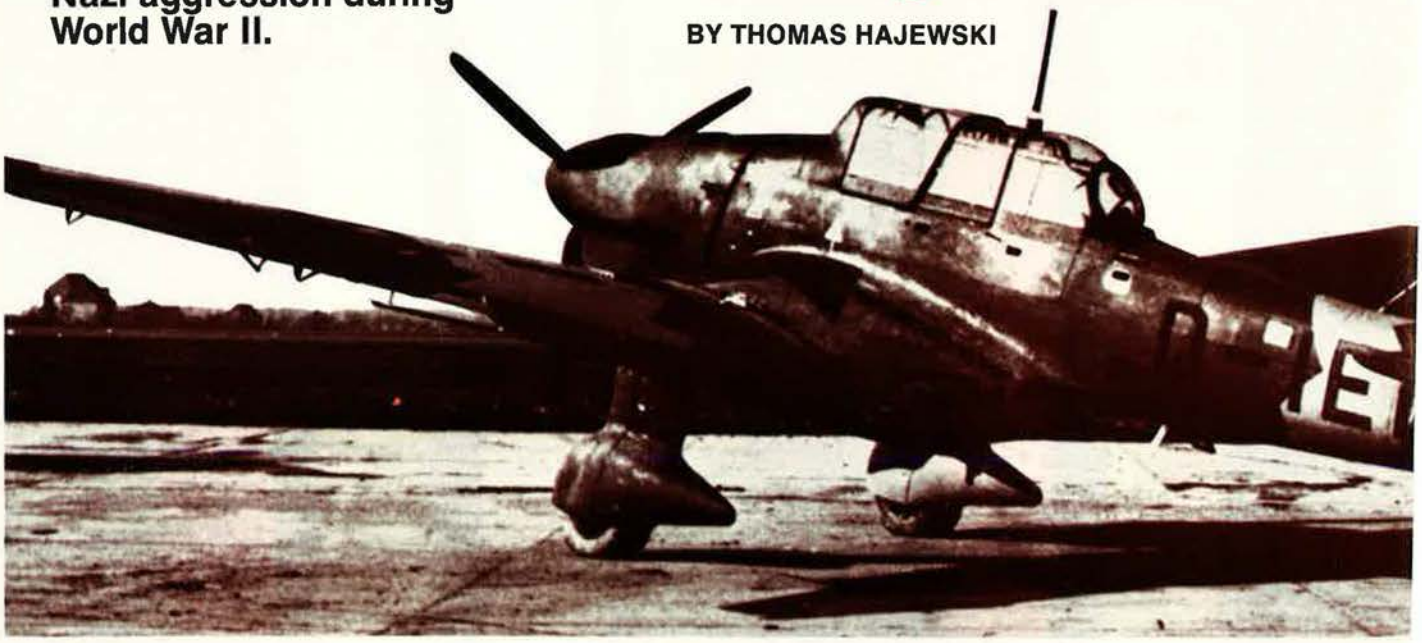
An aerobatics demonstration during the 1931 Cleveland Air Show convinced German flyer Ernst Udet of the military worth of a new type of maneuver and led him to support the development of the aircraft that would become synonymous with Nazi aggression during World War II.

The STUKA Story

BY THOMAS HAJEWSKI



In January 1942, during the state funeral for Ernst Udet, World War I fighter ace and *Generalluftzeugmeister* (Director General of the Luftwaffe) Hermann Göring spoke eloquently about the fallen hero's deeds. He praised his accomplishments in the Great War, his sixty-two air victories—second only to Baron von Richthofen—and his total dedication in helping to build Hitler's air force. Yet Göring's highest praise was bestowed on his former comrade's support for and development of a specific type of aircraft, the offensive weapon without which the Blitzkrieg tactics used in Poland, France, and later Russia during the first years of the war would have been impossible.

This new plane was dubbed a *Sturzkampfflugzeug,* literally a "diving fighting plane," a designation originally used by the Germans for any aircraft used as a dive-bomber. Only later was it specifically applied to the Junkers Ju-87. In the military jargon of the day, the longer *Sturzkampfflugzeug* was shortened to *Stuka,* the aircraft that has become synonymous with German aggression in World War II.

Both the Junkers Ju-87 Stuka as well as the technique of dropping bombs while plunging earthward at speeds often in excess of 350 mph had an unusual, highly controversial developmental history. More than once the entire project was nearly scrapped. German prewar propaganda and secrecy have clouded so much of this interesting phase of aviation history that even now, nearly fifty years after the beginning of World War II, new facts regarding the Stuka and its development are coming to light.

Prowess of the Hawk

On September 27, 1933, Ernst Udet was at the Curtiss-Wright factory in Buffalo, N. Y., supervising the disassembly and crating of two brand-new Curtiss BFC-1 Hawk aircraft for shipment to Germany. Udet had actually seen the spunky double-winger for the first time two years before, at the Cleveland Air Show, and was greatly impressed by the trim craft's maneuverability and steep diving ability.

During the show, the Hawk (called the *Falken* by the Germans) plunged nearly vertically like a stone, pulled out of its dive only a few hundred feet above the ground, only to begin its upward climb anew and repeat the same series of maneuvers to the cheering of the crowd below.

Udet appreciated what such a plane would mean to his own program of aerobatics (he was an accomplished stunt flyer, one recognized worldwide for his heart-stop-

The German Ju-87B, shown here in prewar markings, played an integral part in German Blitzkrieg tactics. (Photo courtesy of United States Air Force Museum)

ping performances) and was afraid that some last-minute problem or difficulty with the American authorities might prevent him from acquiring the Hawks.

The military significance of the plane must also have seemed matter of fact to the veteran airman. The Hawk could dive at a target on the ground or at a warship at sea and, *aiming with the aircraft itself,* strike its objective with a single, well-placed bomb. It would continue to remain a mystery to Udet why the American military had not yet exploited the dive-bomber to any appreciable extent up to this point.

Wanting the planes for his own show and actually purchasing them, however, were two different matters. Together, the pair of Hawks cost more than $30,000, an amount decidedly beyond the reach of the flamboyant, fast-spending Udet. How could he possibly raise such a sum?

Political changes within Germany and the rise to power of the National Socialists provided an answer. Hermann Göring, himself a decorated pilot in World War I, became Hitler's *Reichskommissar für Luftfahrt* (Chief of Aviation) and secretly began to build a new Luftwaffe. Hearing of Udet's interest in the new American craft and himself cognizant of its possible military applications, Göring told Udet to purchase the Hawks. The Nazi party would pay the bill, he said.

When the two planes were crated and ready for shipment, Udet hesitatingly assured the Curtiss-Wright sales director that payment would be forthcoming as soon as he had contacted the proper German authorities.

"But, Mr. Udet," the American replied, "the money has already been deposited in our bank!" The next day both planes were in the hold of a freighter and on their way to Hamburg.

Göring had placed only one stipulation on the sale: Both craft were to be given a thorough testing and structural analysis by Luftwaffe engineers before being handed over to Udet for his stunt-flying program, a condition to which Udet quickly agreed.

The Tests Begin

Testing of the Hawks began in December 1933 at the Luftwaffe base at Rechlin, north of Berlin, with Udet, at this point still a civilian, at the controls during the initial flights. The tremendous stresses on both machine and pilot became evident from the outset. Udet had to be physically lifted from the cockpit after the first dives, so completely had the spine-wrenching plunges and pullouts exhausted him. Further test dives by other pilots produced similar results. The maneuvers approached the maximum limits endurable by both man and machine.

The *Technisches Amt* (Technical Branch) of the Luftwaffe was quick with its decision—the plane and the concept of near-vertical dive-bombing were rejected outright as being impractical, dangerous, and completely unsuitable for military application, a verdict that for the moment seemed overwhelmingly decisive and irreversible.

Undaunted, Udet took possession of the two Hawks and continued to fly them while perfecting his diving technique to the point where he was ready to incorporate the maneuver into his aerobatics show the following summer. However, during one of his last practice runs over Berlin's Tempelhof Airport, the Hawk failed to respond to the controls at the end of a steep dive.

Just before the plane tore into the ground, Udet bailed out, his parachute opening scant yards from certain death. As on a dozen previous occasions in his life, the veteran flyer was again able to walk away from a crash. This time, however, several days of recuperation in a hospital seemed to indicate that his own personal luck might be taking the same course as his dream of sustained vertical diving with an aircraft.

It remains a matter of speculation exactly to what extent Udet was aware at this time of the Luftwaffe's already decisive commitment to the concept of the dive-bomber and of parallel developments regarding it in other parts of the world. There is little doubt that certain circles within the new German Air Force were keenly aware of the military effectiveness of the Stuka and were secretly pushing for the development of suitable aircraft that could be adapted for dive-bombing. In fact, the United States Navy had been conducting similar tests with near-vertical bombing during the early 1930s, and it is a matter of record that the Japanese Navy was doing the same.

The German firms Junkers and Heinkel, specifically interested in foreign export contracts, had begun development in their Swedish and Russian branch factories of aircraft types that would be capable of dropping bombs while diving. Junkers had fitted its K-47 two-seater with dive brakes, and Heinkel produced its He-50 double-winger for possible Japanese export. Both had been thoroughly tested at Lipetsk in the Soviet Union and had proven so successful in support of ground troops that improved models of both planes were requested. Further testing of vertical bombers was given top priority.

Considering the fact that Ger-

many was in violation of the Versailles Treaty by pursuing military aircraft development and testing since as early as 1926, the secrecy surrounding its dive-bomber program is understandable. Could Udet have been uninformed of what was going on in more official circles of the new Luftwaffe? Had Göring engineered a public rejection of Udet's demonstration dives in the Hawk as an additional cover-up, further shielding from foreign powers what direction German aircraft research and development was, in actuality, taking?

There seems little doubt that Udet's vision of a military aircraft suitable for dive-bombing had already been preordained by certain factions within the new Luftwaffe.

New Designs

By 1933, German Heinkel He-50 aircraft were being organized into dive-bomber groups, and in the same year, the firms of Fieseler and Henschel were ordered to begin designing an aircraft specifically as a dive-bomber. The engineers were clear from the first as to exactly what the new plane's capabilities had to be in order to play a role in future combat situations.

The aircraft would have to be sturdy enough to withstand dives of up to 350 mph. It would have to be equipped with dive brakes to prevent exceeding this speed, considered at the time to be a maximum at which plane and pilot could safely function.

Finding a suitable engine would present further problems, for no powerplant greater than 600 hp could be made available in the near future. This meant that the aircraft would be especially vulnerable to attacking enemy fighters because of its relatively slow speed in level flight and especially while pulling out of a dive.

To counter this, it was decided to provide space for a second crew member, a machine gunner, whose job it would be to provide covering fire against enemy aircraft attacking from the rear. Step by step, with traditional German thoroughness, each technical problem was worked out until, by early 1935, Luftwaffe designers had a definite idea of the new bomber's specifications.

One of the opponents to the direction Stuka design was taking was the head of the developmental section within the Luftwaffe's Technical Branch, Maj. Wolfram Freiherr von Richthofen, a cousin of the famous World War I ace. It was his contention that existing aircraft types being considered for use as dive-bombers, such as the He-50, Hs-123, and the Fi-98, as well as planes still on the drawing boards, were or would all be vastly underpowered and thus unable to avoid pursuit by enemy fighters. Since dive-bombing accuracy could only be assured from heights of less than 3,000 feet, this would also make the Stuka too easy a target for enemy ground flak. Also, he believed, pilot stress would be far too great.

Richthofen proposed a larger, multiengine, much faster aircraft, one able to speed away from attacking fighters and much less vulnerable to antiaircraft fire from the ground. Planes like the Junkers Ju-88 or the Messerschmitt Me-210 were the types he envisioned, but these would only make their appearances years in the future. Germany would need a production-line dive-bomber much sooner.

Proponents of the present Stuka program, its design engineers and especially Generalmajor Walther Wever, *Generalstabchef der Luftwaffe* (Chief of Staff), shared few of Richthofen's apprehensions. They saw in the new plane a great opportunity to improve the accuracy of bombs dropped. A few Stukas could achieve much better results than an entire squadron of horizontal bombers, a proposal that appealed to traditional German efficiency and thrift and one that would be crucial in light of Germany's limited natural resources.

Because Germany lacked overseas sources of raw materials, self-sufficiency would again, as in World War I, become the watchword. A few well-placed bombs would be much more effective and far less wasteful than many haphazardly dropped.

Despite dissenting voices, the Technical Branch decided to proceed with the dive-bomber's design, and in April 1935, the firms of Arado, Blöhm und Voss, Heinkel, and Junkers were requested to begin work on dive-bomber prototypes.

Junkers already had a clear advantage. Two years earlier, the company's chief engineer had designed an aircraft, the Ju-87, which fit Luftwaffe specifications. Construction of the prototype could begin at once, and many of the new plane's features could be directly implemented from those of the company's earlier K-47 and K-48 models, planes that had already proven successful in vertical dive tests.

As a result, only a few months were needed to build the first Ju-87 V-1 (*Versuchsmodell Nr. 1*—Prototype Number One), and by the fall of 1935, the plane was already being put through a grueling series of dives, each one a degree steeper than the previous. Despite the crash of the plane several months later after its rudder and stabilizer shredded during a dive of more than eighty degrees, Junkers engineers were quick to follow with further improved models, the V-2 and V-3.

Still the Stuka Advocate

In January 1936, Udet entered the Luftwaffe as a colonel. Officially his title was *Inspekteur der Jagdflieger* (Inspector of Fighter Aircraft), yet unofficially, still a major Stuka advocate, he would now be in a position to supervise personally his real area of interest—dive-bomber development.

In March, comparative testing began at Rechlin. Arado's design, the Ar-81 double-winger, had no chance against the Junkers Ju-87 or the Heinkel He-118, both monoplanes. The Heinkel was a sleek design, featuring retractable landing gear. Capable of carrying a 500-kg bomb in a fuselage bay, it was thirty mph faster than the Junkers, which had nonretractable gear and carried its bomb load externally. But the Junkers was a sturdier aircraft and, unlike the Heinkel, could dive at an angle of eighty degrees, a prerequisite for accurate bomb-aiming.

Richthofen, still head of the Technical Branch, preferred the He-118, Udet the Ju-87. The problem was neatly resolved, however, on June 10, 1936, when Richthofen was promoted to chief of staff of the newly formed Condor Legion and transferred to Spain. Udet took over his position as head of the Technical Branch. Later that same month, Udet himself took the controls of the He-118 and proceeded to put it

through yet another dive test. The propeller sheared off, and again Udet had to bail out before the plane crashed. Udet, therefore, had made the final decision himself: His preference, the Ju-87, would become the Luftwaffe's new operational dive-bomber.

Orders for 262 Ju-87A-1s were placed immediately, and by 1937, three Stukas had been sent to Spain and were actively engaging in combat missions against Republican units. More Stukas were to follow. The precision with which the planes were able to strike ground targets impressed even the still-less-than-optimistic Richthofen, and he ordered the crews of the three Ju-87s to be changed often in order for as many flyers as possible to gain experience in the aircraft.

Further Stuka successes in Spain continued to stimulate dive-bomber research and development. The Sudetenland crisis of 1938 caused the Luftwaffe to form additional dive-bomber groups, using older aircraft until more Ju-87s became available. These included the He-45, He-50, He-51, and especially the Hs-123, a plane that closely resembled the Curtiss Hawk and one that was used extensively by the Germans in the initial stages of the war.

Junkers factories increased their production, and soon, faster, more updated Ju-87Bs began to replace the older A models. This newer plane had a 1,150-hp engine, which resulted in a maximum bomb-carrying capacity of 1,000 kg. Despite a relatively short action radius of 125 miles at 180 mph, the planes were more than adequate for the ground-support missions they were required to perform.

By the time hostilities broke out with Poland on September 1, 1939, the Luftwaffe had more than 300 Ju-87B and thirty Hs-123 aircraft ready for deployment as operational dive-bombers.

The Neuhammer Catastrophe

On August 15, 1939, just two weeks before the planned invasion of Poland, an event took place that was again to cast serious doubt on the feasibility of using Stukas in a major combat role. At Cottbus airdrome in Silesia, Stuka squadron 76, under the command of Hauptmann Walter Sigel, was preparing for a practice dive-bombing run over the military training area at Neuhammer, only a few minutes' flying time away. Cement practice bombs fitted with smoke charges would be dropped on clearly outlined ground targets, a demonstration that was to be observed by a team of high-ranking Luftwaffe officers.

The latest early-morning weather bulletin from the target area was received, and Sigel issued final attack orders to his pilots. The objective was concealed under a cloud bank approximately 3,000 feet thick, beneath which the planes would have another 3,000 feet in which to identify their targets, aim and release their bombs, and pull up—a maneuver they had all practiced many times before. When the routine briefing was concluded, the aircrews saluted smartly and ran to their aircraft. Within minutes, the group of Ju-87B Stukas was airborne, in formation, and racing toward the target area.

Flying in at 12,000 feet, the Stukas approached their objective. At a few minutes past 6:00 a.m., Hauptmann Sigel gave the order to assume attack formation. He himself led the first group of three bombers. On the left was his adjutant Oberleutnant Eppen, and on the right his technical officer Oberleutnant Müller. After them followed the other planes, arranged in three groups.

Sigel dived, allowing his plane's nose simply to drop toward the target beneath the thick cloudbank. He immediately went from bright morning sunlight into a milky-white, frothy haze. Plunging earthward, both pilot and gunner strained their eyes to make out the outlines of the targets on the ground directly beneath the clouds. Forehead bathed in sweat, Sigel silently counted off the seconds. The next

Here, Germans service a Ju-87 during the early days of the war. Despite its shortcomings, the Stuka was able to plunge toward its earthbound targets at speeds often in excess of 350 mph. (Photo courtesy of the United States Air Force Museum)

instant would surely bring them through the haze.

Suddenly the cloudy whiteness before the Stuka's windscreen darkened into the green-brown of the earth. Instead of the 3,000 feet of clear sky he was expecting, he emerged from the clouds only a few hundred feet from destruction, his entire formation just seconds behind him!

This Ju-87 Stuka crew took part in the German retreat from Czechoslovakia in order to avoid onrushing Russian forces as the war ground toward its end. These men surrendered to a US Ninth Air Force tactical reconnaissance group. (USAF photo)

He instinctively wrenched the control stick backward with all his might and screamed into his microphone: "Pull up, pull up, ground fog, ground fog!"

Literally feet above the ground, Sigel's Stuka sliced through a small clearing between two stands of pines. He managed to pull out, looking hurriedly behind him. On his left, Eppen's Stuka crashed into the trees. Müller, on the right, plunged into the earth in a ball of flame and smoke.

All nine Stukas of the second group, led by Oberleutnant Goldmann, rammed into the ground. Some planes of the third chain managed to hear their commander's warning in time; the others either smashed into the ground or overestimated their pullout loops and crashed upside down into the forest. The last group heard the warning and reacted in time. All of them were able to save themselves.

As the surviving aircraft attempted to regroup above the cloud layer, numbed by what had just taken place, ominous pillars of dark smoke filtered up from below.

Adding Up the Cost

In one fateful blow, the Luftwaffe had lost twenty-six young flyers in thirteen aircraft. Perhaps ironically, Generalleutnant Wolfram von Richthofen was one of the eyewitnesses to the tragedy. Receiving word of the Neuhammer catastrophe, Hitler reportedly stared silently out of his study window for ten minutes. Could the superstitious Führer have been contemplating calling off his invasion plans because of the scale of the tragedy? Would all Stukas be grounded and their roles in the forthcoming Blitzkrieg be canceled?

That afternoon, a tribunal assembled to investigate the disaster. Its verdict: The ground fog must have developed between when the initial weather report was received and when the dive-bombing attack took place. The mission commander, Hauptmann Sigel, had done everything possible to warn his men after recognizing the danger. No charges were pressed. If Hitler voiced any opinions about what had happened, they remain unrecorded.

Stuka squadron 76 was quickly brought up to its full complement with spare aircraft borrowed from other groups and played a major role in the initial attacks on Poland beginning on September 1. Its planes bombed bunkers, major highways, trains, troop concentrations, and bridges. The catastrophe at Neuhammer was quickly forgotten in the tumult of war.

The Ju-87 Stuka started World War II as an integral part of the new German Blitzkrieg. As armored units rapidly advanced on enemy troops and defensive works, Stukas dropped bombs, often with a high degree of accuracy, on specific targets identified by tank commanders on the ground. These well-coordinated attacks had devastating results in Poland and especially in the initial assaults on the Low Countries and France the following spring.

Yet the plane's shortcomings, as correctly foreseen by Richthofen, rapidly became evident during the Battle of Britain, when Stuka losses to Spitfire and Hurricane fighters rose to such an extent that Göring had to restrict their use to night-bombing missions only.

In other theaters of action, the plane was used extensively with moderate success, despite mounting losses to faster Allied fighters. Armed with its bomb (which was released by a swinging mechanism from beneath the fuselage to avoid shearing off the propeller) and fitted with high-pitched sirens (which the Germans called "Jericho trumpets"), the Stuka was a target only the most steel-nerved antiaircraft gunner could continue to hold in his sights.

In the Mediterranean, the plane was used effectively against British shipping, and in Russia, fitted with two 37-mm high-velocity cannon, it became a formidable antitank weapon. A total of 4,881 Ju-87 Stukas was produced during the six-year period of the war. None remains in flyable condition today. ■

Dr. Thomas Hajewski is a faculty member and Professor of German in the Pennsylvania State University system. He is the author of many articles and book reviews dealing with German literature and culture. His interest in Ernst Udet and the conception of the dive-bomber is the result of acquiring an old Cleveland Air Show program from the 1930s, which carried a feature on the German aviator.

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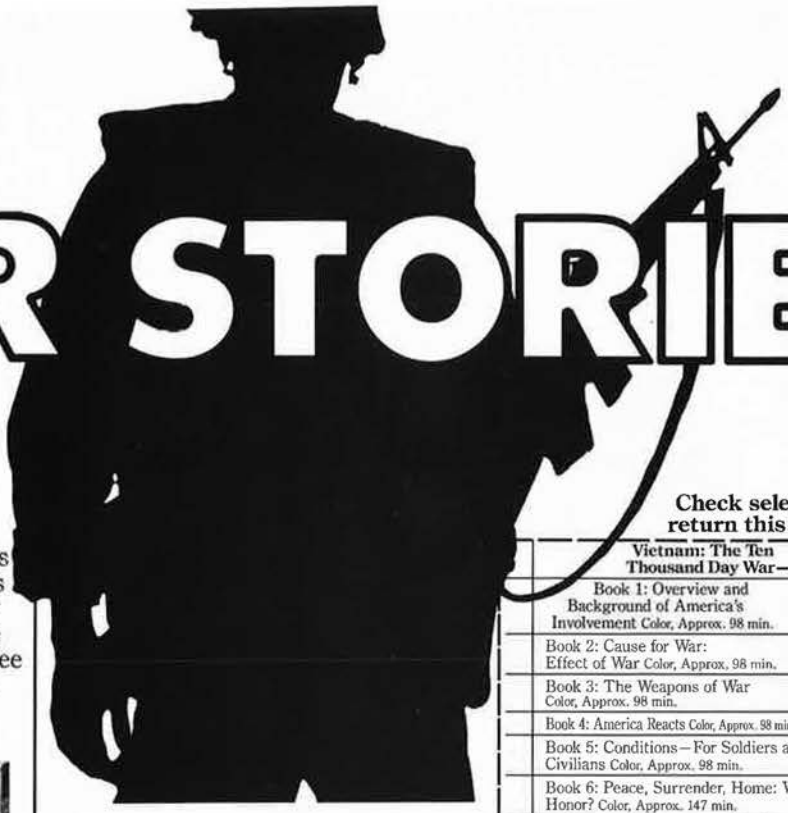

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THE AFA COUNCILS

BY TONI KUZMA
COUNCIL COORDINATOR/MILITARY RELATIONS

At the heart of AFA activity is the dedicated volunteer, and AFA's advisors and the members of AFA's Advisory Councils are vibrant examples of this volunteer spirit. As representatives of AFA's diverse constituencies, they advise the AFA President on issues of concern to their constituencies and help to set the AFA agenda for the coming year.

AFA President Sam E. Keith, Jr., has selected the following volunteers to serve as advisors during 1987 because of their demonstrated interest and expertise in areas significant to AFA's mission: Brig. Gen. Robert A. Buethe, Jr., Medical Advisor; Maj. Gen. William L. Copeland, USAFR, Air Force Reserve Advisor; Dr. Kenneth Daly, Junior AFROTC Advisor; Lt. Gen. John P. Flynn, USAF (Ret.), Veterans Advisor; Capt. Steven F. Maurmann, Junior Officer Advisor; Col. Charlie B. Moore, Senior AFROTC Advisor; CMSAF Sam E. Parish, USAF (Ret.), Retiree Council Advisor; CMSgt. Norman T. Parnes, Enlisted Advisor; Edward J. Philbin, Air National Guard Advisor; Kenneth A. Rowe, Civil Air Patrol Advisor; and Pat L. Schittulli, Civilian Personnel Advisor.

In addition, the Junior Officer and Enlisted Advisors chair Advisory Councils comprised primarily of active-duty members who represent each of the major commands. The Enlisted Council also includes the Air Force's Outstanding Airmen from the previous year.

These Councils meet throughout the year to work on projects geared to the needs of their associates and to gather information on Air Force personnel issues. During the National Convention, AFA's elected

AFA Policy Advisors


Buethe, Copeland, Daly, Flynn, Maurmann


Moore, Parish, Parnes, Philbin, Rowe, Schittulli

leadership relies on their input in drafting the Defense Manpower Policy Paper, which highlights AFA's position on issues directly affecting Air Force people.

This year, the Enlisted Council is compiling a list of Order of the Sword recipients. The Council hopes eventually to publish this first-ever list of those people honored with this salute.

In addition to spotlighting personnel concerns affecting junior officers, the JOAC anticipates this year that it will complete an update of a project that was well received some ten years ago—a guide to the effective and productive operation of base-level company grade advisory councils.

The Enlisted Council includes CMSgt. Norman T. Parnes (Chairman), SSgt. Daniel L. Anderson, MSgt. Earl D. Anderson, MSgt. Ronnie W. Baker, SMSgt. Donald L. Carlock, SSgt. John M. Castle, SMSgt. James R. Craig (liaison), MSgt. (SMSgt. selectee) Richard H. Foster, SMSgt. (CMSgt. selectee) Timothy L. Gomez, TSgt. (MSgt. selectee) Charles R. Grove, Jr., MSgt. Judith Guidas, SSgt. Maryellen M. Hammock, TSgt. (MSgt. selectee) Rosemary T. Johnston, SMSgt. (CMSgt. selectee) Michael I. Lampe, MSgt. James E. Lokovic, TSgt. Ramona K. Longerbeam, TSgt. Roy E. Merritt, MSgt. Reta A. Muasau, SSgt. Richard E. Toczek, and SMSgt. Lenier B. Webb. CMSAF James C. Binnicker, coincidentally a former AFA Enlisted Council Chairman, now serves as the Enlisted Council Advisor.

The Junior Officer Advisory Council includes Capt. Steven F. Maurmann (Chairman), Capt. Gary L. Brinner, Capt. Joseph L. Brown, Capt. James S. Dalrymple, 2d Lt. Kathryn A. Day, Capt. Peggy A. Dionne, Capt. Robert B. Hartzell, Capt. Raymond L. Lynn, Capt. Joel R. Maynard, Capt. John W. McLendon, Capt. David H. Mickelson, Capt. Janice L. Mitchell, Capt. Toivo H. Nei, Capt. David E. Schmitz, Capt. Steven A. Simon, 1st Lt. Thomas R. Smith, Capt. William D. Smith, Capt. Danny D. Swank, and Capt. Colleen G. Toussaint (liaison). Brig. Gen. Maralin K. Coffinger, USAF Director of Personnel Plans, is JOAC Advisor. ■

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VIEWPOINT

Semi-Flexible Response

By Gen. T. R. Milton, USAF (Ret.), CONTRIBUTING EDITOR

Europeans dislike nuclear weapons on their soil. They also dislike conventional weapons in their defense budgets. The nukes conceal the inflexibility of NATO's Flexible Response strategy.

Three and a half years ago, cruise missiles and Pershing IIs began arriving in Europe. It is easy to forget that the decision to deploy these weapons was not the result of a US initiative, but was in response to pressure from our allies for nuclear modernization in NATO. What they really wanted, buried in the usual circumlocution of the alliance, was a reaffirmation in visible form of the US commitment to Europe's defense.

For whatever reason, the deployment of these missiles is well under way despite second thoughts and demonstrations. A grubby contingent has camped for years outside Greenham Common, the cruise missile base in England, in noisy, and noisome, protest. The Dutch, acting in their self-assigned role as Europe's conscience, have agonized over their decision to allow these engines of destruction into the Netherlands. Even the Sicilians have managed a protest, if a halfhearted one. NATO's nuclear modernization, in short, has not been without its problems. And if Labor wins the next British election, Neil Kinnock has promised to evict the American nuclear forces.

Now comes Mr. Gorbachev with an offer that our side seemingly cannot refuse, since it is essentially the one made by President Reagan at Reykjavik last fall. That initiative failed—providentially, in the opinion of many—because of Russian insistence on a halt to SDI testing. This time, there are no strings, or at least none showing.

After Reykjavik's anticlimactic finish, Gen. Bernard Rogers said the US proposal to remove all medium-range nuclear missiles from Europe gave him gas pains. This statement by the Supreme Allied Commander, Europe, reinforced his reputation for wearing his NATO rather than his US hat, and it may not have endeared him to the Administration. In any case, General Rogers is being replaced this June after a record eight years as SACEUR.

Without question, Gorbachev has scored public relations points in Europe by playing back this American arms-reduction proposal. To many people, a nuclear arms reduction seems an end in itself, guaranteed to diminish the threat of a nuclear holocaust. The problem lies in the reason for General Rogers's gas pains: reducing or eliminating nuclear arms in Europe without doing anything about the conventional imbalance simply puts NATO at a greater disadvantage.

In 1967, the alliance adopted, with considerable reluctance, a strategy of flexible response. This strategy, known as MC 15/3, had been pushed by Secretary of Defense Robert McNamara as a means of moving away from reliance on nuclear weapons. Alliance reluctance stemmed from the instinctive knowledge that NATO defense budgets would never support the kind of conventional force growth needed to stand off Warsaw Pact forces on equal terms.

Flexible response notwithstanding, then, nukes remained the necessary unpredictable quotient in the NATO strategy. If ultimate reliance on nuclear weapons and all the destruction that would bring to the world appeared irrational, so be it. An element of irrationality appears to have been a successful deterrent.

Nevertheless, elimination of theater nuclear missiles is now a serious proposal and must be dealt with at Geneva.

If logic, rather than emotion, governs our arms-control behavior there, the subject of conventional force readjustments should be on the table. There is no chance that NATO's conventional forces will increase to meet the conventional threat, nor is there much chance that the present forces will have their readiness enhanced by stockpiles adequate for a prolonged nonnuclear conflict. Even the NATO alert system is more of a testament to NATO's democratic structure than it is an efficient means of mobilizing the national forces into an allied command.

Seventeen years ago, in what can only be described as a "Lucky Pierre" situation, I rendered an initial report on Mutual and Balanced Force Reductions (MBFR) to the NATO foreign ministers in Rome. The report was the product of an allied working group I had chaired. Our effort was roundly denounced by the United States, then praised by the British and a few other allies, while I glumly pondered my future. Now, seventeen years later, mutual and balanced force negotiations are in progress, if that is not too strong a word. Like medieval theologians arguing the dimensions of angels, the MBFR negotiators are still debating the size of each other's forces.

Doing away with NATO's nukes without addressing MBFR will, it would seem, simply expose the ephemeral nature of the flexible response strategy. Beyond that, there are other difficulties, not least the necessity for no-notice verification inspections.

The Soviets are notoriously touchy when anyone comes nosing around their military installations. Major Nicholson's murder while carrying out his military liaison duties in East Germany is proof enough of that. They will have to make a radical change in this paranoid attitude before verification would have any meaning. For that matter, the European allies might raise serious objections of their own to Soviet inspection crews moving freely wherever they chose.

And so, there are things to consider before the no-nukes crowd can celebrate, unless some sort of nuclear reduction must be made, no matter what. ■

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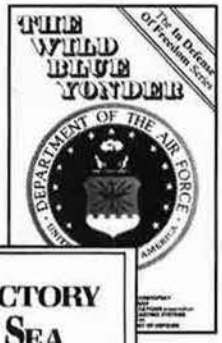

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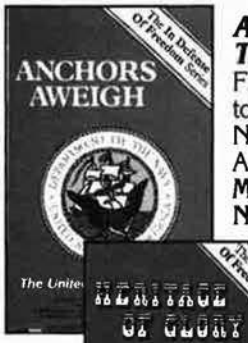

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Key Element

Airlift, by David Wragg. Presidio Press, Novato, Calif., 1986. 159 pages with photos and index. $25.

As modern warfare has become more and more dependent on logistics, with greater distances involved than ever before, so has it become necessary for the swift deployment—or redeployment—of soldiers and their materiel. Over the past several decades, air transport has thus come to be regarded as an increasingly key element in the operations of the world's major air forces and armies.

Today, a wide variety of airplanes—from transports to converted bombers to helicopters to gliders—is used by major air forces for air transport. In fact, more aircraft types have been used for air transport than for any other form of military aviation.

This somewhat neglected branch of military aviation is examined here by British aviation writer David Wragg, who takes a wide-lens, international view of military "airlines" through the years. The narrative is lively and informative, and the book is liberally illustrated.

From its shaky start in World War I to recent overt and covert airlifts in the Middle East and Central America, Wragg details all the major combat airlift operations—and peacetime relief missions—around the world in military air transport's first eight decades. It makes intriguing reading.

For instance, the author points out that the concept of troop transport by air surfaced almost before aviation got off the ground. In 1908, Rudolf Martin, a German military expert, suggested the construction of a fleet of 50,000 Wright B biplanes to carry a force of 100,000 men for an invasion of England. The invasion force would land in Kent, in southeastern England. This was a year before Louis Blériot flew across the English Channel.

Later, during World War I, the ever-prophetic Billy Mitchell proposed the parachuting of an infantry division to seize the city of Metz in 1919. But the Armistice of 1918 obviated what could have been history's first airborne assault.

Air transport was largely pioneered during World War I by the Royal Flying Corps and its successor, the Royal Air Force. One early airlift took place during the Mesopotamian campaign of 1916, when the RFC flew 140 sorties in six days to supply a beleaguered British garrison.

In a more significant effort in 1918, the RAF—then six months old—mounted an air supply operation to save Belgian and French troops cut off in the Houthulst Forest. Armstrong-Whitworth F.K. 8 biplanes and Airco D.H. 9 bombers were used for the first successful air supply missions in history. Sandbags were filled with rations and soil (to cushion the impact) and dropped over the sides of the planes by the observers. The RAF also delivered sixty boxes of ammunition. From October 1 to October 4, No. 82 and No. 218 Squadrons flew almost 200 sorties. Only one D.H. 9 was lost, and the Belgians and French were able to hold out until relieved.

The author continues his survey of airlift history, examining, among other developments, early British airlifts in the Middle East during the 1920s, Russian pioneering efforts with gliders and paratroops in the 1930s, the Luftwaffe's massive airlift of Franco's troops from Morocco to Spain during the Spanish Civil War, the brilliant German glider assault on the Eben Emael fortress in Belgium in 1940, Allied supply and troop drops in Burma and the Pacific and the shuttle missions over the "Hump" to China, the tragic Anglo-American airborne invasion of Holland in 1944, the round-the-clock allied shuttle of supplies to sustain West Berlin in the historic 1948–49 airlift, aerial supply missions in Korea, Vietnam, and Afghanistan, the long air bridge to the Falkland Islands during Britain's brief war with Argentina, and the recent international relief missions to Ethiopia.

The author concludes his examination of airlift with a look at modern equipment and systems in the West and in Warsaw Pact countries and an informed glance at future trends in air transport.

A former British newspaper correspondent and the author of nine other books on aviation history, Mr. Wragg has produced a book that is soundly researched and concisely written. It is a valuable addition to aviation literature.

—Reviewed by Michael D. Hull. Mr. Hull is a veteran of the British Army and a journalist with the Springfield Newspapers in Massachusetts.

An Enduring Fascination

Into the Teeth of the Tiger, by Donald S. Lopez. Bantam Books, New York, N. Y., 1986. 248 pages. $2.95.

The China-Burma-India theater of World War II spawned its own genre of aviation literature, reflecting the unusual nature of the campaign, a kind of guerrilla war of the air. Even to those for whom it is history, the CBI theater remains a source of fascination. *Into the Teeth of the Tiger* is the latest entry in this genre.

Donald Lopez's effort, part of the Bantam War Books series, is an informative and readable account of his time in China. By strict definition, Mr. Lopez was not a "Flying Tiger" of the American Volunteer Group, his missions occurring after the AVG disbanded in 1942. His chronological account, though written for entertainment and adventure, aptly conveys the central paradox of the air war over China. The most productive time in the war for our fighters and bombers came while the Chinese were losing huge chunks of territory to the Japanese. It was common for pilots of the Fourteenth Air Force to bid farewell to their bases by bombing them so as to impede the advance of the enemy.

The first part of the book chronicles young Lopez's Stateside flight training and his fascination with airplanes. The descriptions of aerobatics and of "rat racing," or playing follow-the-

AIRMAN'S BOOKSHELF

leader, are pretty standard stuff, though his comment that it "seemed unfair to be paid for it" is corny enough to be sincere.

The narrative moves quickly to Asia, to Karachi and the British Officers' Club, where Lopez first encounters the exotic isolation peculiar to the CBI. Logistics in the CBI was nothing short of remarkable—it took six gallons of fuel to deliver one gallon over the Himalayas, the "Hump" to the airmen in China. As with many other veterans, Lopez found that the squalor of the streets and the constant presence of beggars in India contrasted sharply with the polite, industrious nature of the Chinese.

Lopez was assigned to the 23d Fighter Group, 75th Fighter Squadron, which was commanded by AVG veteran Tex Hill. Hill was already somewhat of a legend because of his prominence in Robert L. Scott's book *God Is My Copilot*. Lopez settled in to the life of a CBI fighter pilot, engaging in night raids against rats, whiling away countless hours of boredom, and springing into action with the sudden gongs of the *jing bao*, or Chinese air raid warning. The bouts of dysentery, the poor meals of rice, and the cravings for such luxuries as Spam became the stuff of his CBI experience.

Descriptions of aerial combat in many war memoirs often seem contrived. Lopez, a veteran of eight combat missions before he even saw an enemy plane, avoids this pitfall. His story of that first encounter is probably the most dramatic in the book and testament to the discipline of US pilots and the durability of the P-40. The author goes on to detail Fourteenth Air Force techniques for strafing, dive bombing, and the use of parafrags, or small bombs with parachutes.

Lopez praises the Chinese guerrilla forces throughout the book. Their resourcefulness in creating a warning "net" and in helping downed pilots avoid capture, often at great risk to themselves, was extraordinary.

Like many other observers, Mr. Lopez is highly critical of the Chinese regular forces, which offered, for the most part, minimal resistance to the Japanese. The Chinese-trained airmen served mainly as comic relief by

his account. He places most of the blame for their poor performance on the Chinese military leaders and speculates that Chiang Kai-shek deliberately husbanded his forces in order to be prepared for the looming civil war with the Communists. It's refreshing to see this judgment by a veteran Flying Tiger.

You come away from this story with some real feeling for the characters in Lopez's squadron. One can't help but empathize when a close friend survives his 100 missions only to be killed in a jeep accident while waiting to be shipped home. Another harrowing incident involved the mercy killing of a bomber crewman. The ethical considerations of a live-or-die situation on the other side of the world are brought home in stark relief.

Donald Lopez has done a fine job of telling an entertaining and true story of his career with the Flying Tigers. There is still much interest in the subject, perhaps because the situation was so extraordinary, even romantic, and because the symbols of the AVG and Fourteenth Air Force are so ingrained in our culture. Unlike every other front in World War II, we never had the decisive advantage in material and brute strength. I suspect there are still lessons about the nature of guerrilla warfare in the modern age that US leaders could learn from the Flying Tigers experience.

The most popular museum in Washington, D. C., is the National Air and Space Museum, where Donald Lopez heads the Aeronautics Department. One of the more popular exhibits, on display since the opening day, is a P-40, resplendent in its shark's teeth markings and the insignia of Lopez's squadron. It has become a powerful and intriguing symbol, and this book helps explain why.

—Reviewed by David L. Caskey. Mr. Caskey is a Library Assistant with the US House of Representatives and an associate member of the Fourteenth Air Force Association.

New Books in Brief

The Development of Strategic Air Command 1946–1986, by J. C. Hopkins and Sheldon A. Goldberg. Compiled under the auspices of the Office of the Historian, Strategic Air Command, this fortieth-anniversary history chronicles, in year-by-year fashion, the development of this nation's air-breathing strategic strike force. Subjects detailed in this command overview include assigned resources, command leadership, organization and operations, bases, and bombing, weapons loading, and missile competitions. Students of the development of US strategic airpower will value this compendium as an authoritative sourcebook. With photos. Available from Office of the Historian, Hq. SAC/HO, Offutt AFB, Neb. 68113-5001, 1986. 280 pages. $5.70.

Victory Denied, by Dudley Saward. This briskly written book traces how developing airpower matured into a force that ultimately, the author contends, brought about the downfall of the Third Reich. By charting in tandem the rise of Hitler and the evolution of airpower, the author sets the stage for his discussion of the Allies' strategic air offensive against Germany. He argues convincingly that Allied successes after the Overlord invasion were "unquestionably due to the long and efficiently executed strategic bomber offensive" by American and British forces and cites the judgment of German Field Marshal Albert Kesselring: "Allied airpower was the greatest single reason for the German defeat." Readers coming to the subject for the first time will be entertained as well as enlightened by this well-researched work. With photos, bibliography, and index. Franklin Watts, New York, N. Y., 1987. 376 pages. $18.95.

Into the Jaws of Death

Two helicopters were already down, but Capt. John McTasney's crew decided they could get the recce team out in a daring night save.

BY JOHN L. FRISBEE
CONTRIBUTING EDITOR

THERE are enough stories of heroism by Aerospace Rescue and Recovery crews in Southeast Asia to fill a book. One of the most memorable took place on the night of November 8–9, 1967, before the huge Jolly Green Giant helicopters flown by ARRS crews were equipped with infrared and other sophisticated electronic gear for night rescue operations.

That afternoon, an Army reconnaissance team operating a few miles west of the A Shau valley had been ambushed and surrounded. Two Army helicopters were shot down while trying to extract the survivors. At 2300 hours, a 37th ARR Squadron HH-3E Jolly Green took off from Danang to attempt a night rescue. It was joined en route by another HH-3E. The primary chopper was flown by Capt. John B. McTasney, a 1963 graduate of the Air Force Academy; his backup was Capt. Gerald Young *(see "Valor," July '85 issue).*

Captain McTasney's crew located the besieged men on a steep hillside. The enemy had set up heavy automatic weapons around the few survivors. Two A-1E Sandys were reported on the way to strafe and bomb enemy positions, but could not be contacted by radio. Army UH-1 gunships at the scene were low on fuel. The terrain ruled out a landing. Extracting the men with a penetrator was not feasible because of the long hover time required. McTasney could, perhaps, get the nose wheel and one main gear on the slope, hoping his rotor blades would clear the ground above, and hover while taking the survivors aboard, some of them wounded.

Captain McTasney went over the situation with his crew—copilot Capt. Jerry Clearman, flight engineer Sgt. Al Malone, and rescue specialist Sgt. John Stemple. They decided they could pull it off. It was a team decision, says John McTasney, now a colonel at Hq. Military Airlift Command, and a team effort all the way.

The HH-3E took the first of many hits as it touched down, the area lighted by flares from a C-130. While Sergeants Malone and Stemple fired at muzzle flashes, the Army troops ran from cover. But the surviving troops headed for the wrong side of the helicopter and had to be led by Stemple to the cargo door.

During the "several minutes" that that took, the Jolly Green hung there, a fat, illuminated, motionless target that the most inept enemy gunner could hardly miss.

Both generators and the interphone were knocked out, two fuel lines were cut, and the cargo compartment was flooded with fuel. Warning lights flashed, sparks lit the bird's interior, and the engine instruments fluctuated wildly.

Before Captain McTasney, no longer able to hold position, had to pull away from the hillside, Stemple and Malone got three men aboard, one of them shot as he came through the door. Only enough fuel remained in the tanks to let them reach the strip at Khe Sahn in a mountainous area that was unfamiliar to the crew.

Some combat veterans will tell you that the most nerve-wrenching part of a mission is not always the fire fight, when adrenaline flows, but the withdrawal over enemy territory in a battle-damaged plane with the imminent possibility of fire, explosion, or loss of control. As the minutes dragged by, Captain Clearman got the generators back on line. Using a flashlight, Malone and Stemple stopped the flow of fuel into the cargo compartment by bending the broken lines and then administered medical aid to the wounded men.

Two miles out of Khe Sahn, contact with the tower was finally established. Bad news. No approach aids were operating, and the outpost was dark, except for two repair lights on the runway. Captain McTasney spiraled down into the bowl at Khe Sahn, guided only by those two faint lights.

Then, at 200 feet, the number two engine flamed out. Enough power was left to slow the rate of descent and forward speed, but that was all. With landing lights on, McTasney and Clearman could see radio towers above and a dirt road directly ahead. In a cloud of dust that reduced visibility to zero, Captain McTasney put the big bird down on the edge of the ramp for a rough but safe landing. Another mission completed, another save, but for their Jolly Green, the war was over.

Rescue and Recovery crews are credited with saving 3,883 lives in Southeast Asia. It will surprise no one who was there that a quarter of all Air Force Crosses, one of twelve Medals of Honor, and many Silver Stars were awarded to ARRS crewmen. One of those Air Force Crosses went to Capt. John McTasney for his heroism on that November night in 1967. Silver Stars were awarded to the other members of his crew—the other members of a valiant team that flew willingly into the jaws of death so that others might live. ■

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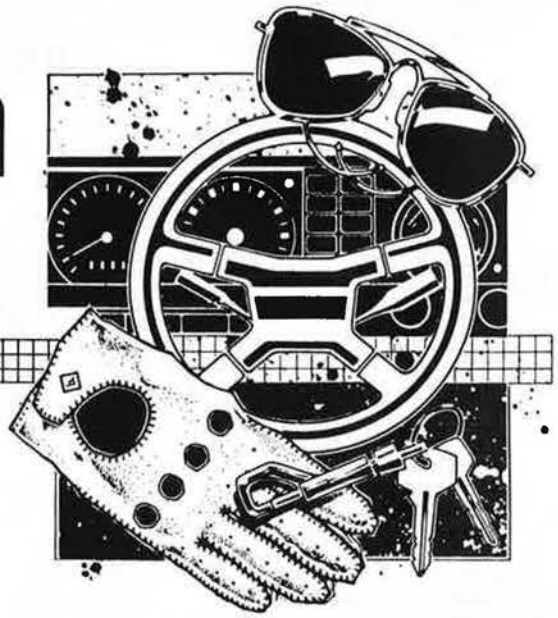

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To have an America of the future continuing to be at the forefront of technological development in the free world, we must educate ourselves, our leaders and our vital successor generation about this nation's rich aerospace heritage and the ever increasingly important role aerospace will play in our lives.

That's just what the Aerospace Education Foundation has been doing for the last thirty years and with your continued generosity and support, we will continue to spread the word through valuable aerospace education outreach programs.

Some of the past accomplishments of the Foundation are indeed noteworthy. For many years, the Foundation was involved in educational technology transfer—taking Air Force technical courses and adapting them to Community College curricula. Fifty-eight courses were distributed to over 10,000 end users. The program resulted in the accreditation of the Community College of the Air Force and firmly established the value of the Community College system in our nation. To perpetuate our nation's rich aerospace heritage, the Foundation established the Theodore von Karman collection at the United States Air Force Academy and has been involved in a series of publishing projects. The most recent project, VALOR, is a compilation of stories from AIR FORCE Magazine recounting the valorous acts of airmen since the beginning of manned flight.

The current programs of the Foundation also make valuable contributions to a greater understanding of aerospace. The Foundation's Roundtable program brings together experts who discuss the most important aerospace concerns of our time. Videotapes of the Roundtable programs are distributed and broadcast worldwide to extend the educational outreach of the program. With over twenty-five such programs to its credit, the Foundation is continuing to produce this program with key national leaders who believe that our citizens should have relevant, balanced information to make the demanding decisions required of all of us in a free society.

Also concerned about the educational preparation of our future generation of leaders, the Foundation sponsors an annual Air Force Junior ROTC contest to challenge the minds of these future Air Force leaders.

The Foundation is now initiating Partners in Education programs in communities where educational resources require augmentation and assistance. By bringing all factions of the community together, the Foundation has provided a valuable catalyst to instill an awareness that excellence in education is the responsibility of the entire community.

The Foundation is working to develop significant aerospace education programs of service including scholarships, teacher workshops, and national initiatives designed to increase the technological and scientific literacy of educators, students and citizens alike. To accomplish these goals we need your help. You can support this valuable work by becoming a sustaining member of the Aerospace Education Foundation. Memberships are $25 for Sustaining Annual Members and $250 for Sustaining Life Members. All contributions to the Foundation are tax deductible.

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AFA INTERCOM

By Robin Whittle, AFA DIRECTOR OF COMMUNICATIONS

Steele Chapter Honors DCSs

Taking unique advantage of its proximity to the Pentagon, AFA's Donald W. Steele, Sr., Memorial Chapter in northern Virginia has initiated a program honoring an Air Force Deputy Chief of Staff at its quarterly meetings. On February 11, Lt. Gen. Leo Marquez, DCS for Logistics and Engineering, was the featured guest, drawing a sell-out crowd of 400-plus. Last fall, an equally large audience turned out to honor Lt. Gen. Bernard Randolph, DCS for Research, Development, and Acquisition.

Chapter officials say the program has worked well in bringing AFA members up to date on key issues as well as on current staffing and programming of the various Air Staff offices.

In the two Chapter meetings, the DCSs emphasized the importance of reliability and maintainability (R&M) in both planned and fielded weapon systems and stressed the critical importance of a total commitment by industry to the success of R&M.

"Broken equipment and unusable systems don't deter war or prevail on the battlefield. R&M translates hardware on the ramp into improved sortie rates, increased mobility, decreased manpower, and lower costs. All that adds up to more warfighting capability and, hence, more deterrence," said General Marquez in quoting Air Force Chief of Staff Gen. Larry Welch on the R&M issue.

Outlining a number of initiatives already taken, General Marquez said the results "will revolutionize the ways the Air Force approaches R&M. Increased combat capability through R&M is a reality both today and in the future." On the same issue, General Randolph said during last fall's meeting, "It means we will only buy systems that operate reliably and can be reasonably maintained or repaired in the field." He noted that the Air Force halted a $250 million program for a radar warning receiver because the proposed system did not offer significant R&M improvement over the older one in use. "We still need a new system, however, and two companies are now competing for the contract."

Steele Chapter officials say the DCS luncheon program is a success, and plans are to host Lt. Gen. Harley A. Hughes, DCS for Plans and Operations. The program is also appreciated by the DCSs. "It is a rare occasion when we get to reflect on the enormity of the task we face here at the Air Staff and on the progress we are making. The troops are doing a great job," General Marquez said.

As a token of appreciation, the Chapter contributes funds to the charity or cause of the speaker's choice. Steele Chapter President Dick Kavanagh says this idea has been well received. Chapter Secretary Mary Anne Thompson presented a check to General Marquez made out to the Logistic Education Foundation of the Society of Logistics Engineers.

While proximity to the Pentagon is an asset few other chapters can draw on, Steele Chapter Vice President and Communications Director John Craig recommends that other field units take a long, hard look at their communities for unique resources and assets that can be put to good use in support of the AFA mission.

Lt. Gen. Leo Marquez, DCS, Logistics and Engineering, admires a contribution made by the Donald W. Steele, Sr., Memorial Chapter to the Society of Logistics Engineers. The presentation was made by Chapter Secretary Mary Anne Thompson at the Chapter's second luncheon in a series honoring key Air Staff members. See text.

San Bernardino Area Chapter Salutes Women

San Bernardino community leaders turned out to honor five exceptional women at the San Bernardino Area Chapter's "Salute to Women" held February 12 at the National Orange Show Empire Room Restaurant.

Two honorees were unable to attend—First Lady Nancy Reagan and Dolores Hope, wife of entertainer Bob Hope, noted singer and actress in her own right, and "the lady in charge of Bob's success," quipped program emcee Gerry Newcombe. The other three honored at the luncheon were Evlyn Wilcox, Evelyn "Pinky" Brier, and Delphia Dummitt.

Evlyn Wilcox is Mayor of San Bernardino and served as president of AFA's San Bernardino Area Chapter in 1981. Evelyn Brier, the first female flight instructor in the US, was a charter pilot for forty-three years (and never suffered a mishap during her career). Dubbed San Bernardino's "living legend," she owned the Tri-City Airport until 1979. Delphia Dummitt, program support supervisor in TRW's Ballistic Missile Office

INTERCOM

prior to retiring last September, is a longtime community, business, and AFA leader.

The five were invested as Jimmy Doolittle Fellows by Aerospace Education Foundation President Eleanor P. Wynne, M. D., a woman of comparable accomplishment. Dr. Wynne noted General Doolittle's contributions as an engineer, designer, tactician, strategist, advisor, writer, lecturer, and corporate executive and declared: "It is in recognition of comparable traits that I invest the following women as recipients of General Jimmy Doolittle Fellowships in this, the San Bernardino Chapter's 'Salute to Women.'"

Three of the five exceptional women honored by the San Bernardino Chapter are shown here with Chapter President Phil Arvizo. They are, from left, Evelyn "Pinky" Brier, flight instructor; Mayor Evlyn Wilcox, a former Chapter official; and Delphia Dummitt, former aerospace industry executive. See accompanying item.

A highlight of the Salute was an address by Brig. Gen. Maralin K. Coffinger, former Norton AFB Commander and current Director of Personnel Plans at Hq. USAF. Citing the accomplishments of the five honorees, General Coffinger praised their exemplary contributions to society.

Many barriers to women in civilian and military life, General Coffinger noted, have fallen in recent years. For example, ninety-seven percent of Air Force career fields are now open to women, she pointed out. The General stressed that women must prepare themselves professionally for opportunities that require painstaking preparation and qualification.

In a poignant closing, General Coffinger referred to the newest national holiday, which honors Dr. Martin Luther King and his dream of a society in which individuals would be judged by the content of their character rather than by their color or creed. In the same year that Dr. King revealed his vision on the steps of the Lincoln Memorial in Washington, General Coffinger entered the Air Force as a commissioned second lieutenant. She also had a dream—"that I and other women like me would have a fair and equal chance to contribute to the defense of our nation." General Coffinger concluded, "I stand before you not just as a woman, but as an officer who is extremely proud to represent the United States Air Force. For me, that is the greatest honor of all."

Also recognized during the luncheon were outstanding enlisted personnel from Norton AFB. Those honored included SMSgt. Martin C. Carter, Jr., 63d Avionics Maintenance Squadron; SSgt. Budd K. Willis, 63d Supply Squadron; and SrA. William Jenkin, 63d Transportation Squadron, last year's "Airman of the Year" in the California AFA competition. Capt. William Greenough of the 63d Civil Engineering Squadron was also recognized as the Company Grade Officer of the Year.

Distinguished guests included Col. Marvin Ervin, 63d Military Airlift Wing Commander; City Council members Esther Estrada, Jack Strickler, Gordon Quiel, and Jack Reilly; City Clerk Shauna Clark; Phyllis Poulos (representing Assemblyman Eaves); several local Chamber of Commerce officials; and many others, including "Miss San Bernardino" Mary Johnson. Gerry Newcombe, San Bernardino Area Chapter Program Vice President and luncheon emcee, also serves as San Bernardino's Fire Chief.

Other Chapter officials involved in the luncheon, in addition to organizer and Chapter President Phil Arvizo, included Jon Boursaw, Executive Vice President; Norm Miner, Administrative Vice President; Jim Davidson, Aerospace Education and Youth Activities Vice President; CMSgt. Bob Schenck, Young Astronaut Program Manager; Ed Dvorak, Charity Operations Vice President; Jackie Bunn,

Participants in the Wisconsin Aviation Hall of Fame induction included, from left, famed test pilot Scott Crossfield; Harriet Pillsbury, whose uncle, Gen. Billy Mitchell, was inducted posthumously; and inductees Steve Wittman, air racer, and Paul Poberezny, founder of the Experimental Aircraft Association. See text for additional details.

Communications Vice President; Gene Moneymaker, Communications Vice President and Director; Don Blose, Speakers' Bureau Vice President; Sue Noreen, Community Relations Vice President; Don McEllistrim, Treasurer and Finance Vice President; Jim King, Membership Vice President; and Jim Elder, Missile Systems Group Vice President.

"Through our Bob Hope Charity Golf Tournament and other Chapter fund-raising events, we are able to contribute to AFA's Aerospace Education Foundation via the General Jimmy Doolittle and General Ira Eaker Fellowship Programs," Chapter President Phil Arvizo said. Over the years, the Chapter has contributed $17,000 to the Foundation, naming seventeen individuals as honorees. In addition to the latest five, Doolittle or Eaker Fellows sponsored by the Chapter include former Sen. Barry Goldwater, Gen. Jimmy Doolittle, Maj. Gen. Leigh Wade, Col. William "Pete" Knight, Brig. Gen. Chuck Yeager, Col. Joe Engle, and Gen. Duane Cassidy, among others.

On the Scene

Former Wisconsin AFA President **Chuck Marotske** is Vice President of the new Wisconsin Aviation Hall of Fame. He reports a very successful first induction ceremony, which honored three outstanding contributors to the field of aviation: the late **Gen. Billy Mitchell,** World War I hero and airpower advocate, whose legacy led to AFA's founding by one of his followers, Gen. H. H. "Hap" Arnold; **Paul Poberezny,** founder of the Experimental Aircraft Association and reportedly the only person in the world to hold all seven military pilot wings (glider, service pilot, rated pilot, liaison pilot, senior pilot, Army aviator, and command pilot); and air racer **S. J. "Steve" Wittman,** who operated an Army and Navy flight school during World War II and who, as the designer of twelve airplanes, holds several aviation-related patents. The three were inducted during a banquet at the Experimental Aircraft Association Aviation Center in Oshkosh. "Plans are to induct three individuals each year along the lines set by the National Aviation Hall of Fame in Dayton," Mr. Marotske said.

In Virginia, AFA National Director **Jon Donnelly** reports the induction of four people into the Old Dominion Aviation Hall of Fame. **William M. Davenport, Sr., W. Calvin Falwell, T. Fleetwood Garner,** and **Philbert L. "Doc" Gammage** were honored for their contributions to the development of aerospace technology or to the development of aviation and space in Virginia, Mr. Donnelly said. **Gov. Gerald Baliles** joined more than 300 members of the Virginia Aeronautical Historical Society for the ceremony.

Then-Florida Highlands Chapter President Roy Whitton (right) presents an AFA certificate of appreciation to Maj. Gen. John E. Long, USA, Commander of the Army-Air Force Exchange Service, thanking him for addressing an early morning Chapter meeting at "a remote duty station." See details below.

Florida AFA Vice President **Roy Whitton** has an excellent suggestion for chapters that can't get the gang out for a meeting. "Move your speaker around the community, booking him or her before as many groups as possible. AFA members can still attend, while you've maximized exposure to key issues."

Mr. Whitton practices what he preaches. As this goes to press, he has booked Air University's National Security Briefing Team at Sebring High School and has worked with local educators to get students bused from Avon Park and Lake Placid High Schools for the presentation. Then it's on to the Rotary Club for a luncheon address, followed by a Commander's Call at the Avon Park Test Range at 2:30 p.m. At 4:30 p.m., the Team is scheduled to address South Florida Community College.

This itinerary shows excellent advance work and is sure to produce payoffs for AFA.

In other Florida news, **Maj. Gen. John E. Long,** USA, Commander of the Army-Air Force Exchange Service headquartered in Dallas, Tex., recently visited the isolated Air Force range at Avon Park at the invitation of AFA's Florida Highlands Chapter. The more than 100,000-acre Air Force range, the most active in Tactical Air Command's Ninth Air Force, is located ten miles from the closest city and more than three hours by car from the nearest major exchange at MacDill AFB, Tampa.

Escorted by Range Commander **Lt. Col. Robert Smith,** General Long was given a tour of the range and was introduced to military personnel and AFA members at an early morning meeting. Mr. Whitton, then-President of the Florida Highlands Chapter, presented General Long an AFA Certificate of Appreciation "for visiting this remote duty station to see firsthand the exchange facilities and how they might be improved for the welfare of the more than 200 active-duty personnel as well as the more than 16,000 military retirees in this area."

Tennessee AFA President **Jack Westbrook** addressed the Daughters of the American Revolution (DAR) recently on the importance of understanding the US Constitution and the national security implications of an American public that is uninformed about complex defense issues. "Our schools simply must instill the analytical equipment in young people's minds to ensure that future generations can 'provide for the common defense'—one of the most basic tenets of our Constitution," the AFA leader said.

"Our future security is inextricably linked to our technological prowess and our ability to remain on the cutting edge of what is technologically feasible," Mr. Westbrook said. There is also an urgent need for a historical perspective with respect to the founding and growth of our country and the threats it faces from the enemy without and from our own ignorance within. "The world won't stand still while we endlessly debate our own percep-

AFA State Contacts

Following each state name are the names of the communities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the appropriate contact.

ALABAMA (Auburn, Birmingham, Gadsden, Huntsville, Mobile, Montgomery, Selma): **Robie Hackworth,** 206 Dublin Circle, Madison, Ala. 35758 (phone 205-539-4920).

ALASKA (Anchorage, Fairbanks): **Theron L. Jenne,** 2501 Banbury Drive, Anchorage, Alaska 99504 (phone 907-377-3360).

ARIZONA (Green Valley, Phoenix, Sedona, Sierra Vista, Sun City, Tucson): **Robert A. Munn,** 7042 Calle Bellatrix, Tucson, Ariz. 85710 (phone 602-747-9649).

ARKANSAS (Blytheville, Fayetteville, Fort Smith, Little Rock): **Thomas P. Williams,** 4404 Dawson Drive, N. Little Rock, Ark. 72116 (phone 501-758-6885).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Los Angeles, Merced, Monterey, Novato, Orange County, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, Sunnyvale, Vandenberg AFB, Yuba City): **Robert L. Griffin,** P. O. Box 5008, Vandenberg AFB, Calif. 93437 (phone 805-866-3501).

COLORADO (Boulder, Colorado Springs, Denver, Fort Collins, Grand Junction, Greeley, Littleton, Pueblo): **Jack G. Powell,** AFAFC/AJ, Denver, Colo. 80279-5000 (phone 303-370-4787).

CONNECTICUT (Brookfield, East Hartford, Middletown, Storrs, Stratford, Torrington, Waterbury, Westport, Windsor Locks): **Joseph Zaranka,** 9 S. Barn Hill Rd., Bloomfield, Conn. 06002 (phone 203-242-2092).

DELAWARE (Dover, Milford, Rehoboth Beach, Wilmington): **Horace W. Cook,** 112 Foxhall Drive, Dover, Del. 19901 (phone 302-674-1051).

DISTRICT OF COLUMBIA (Washington, D. C.): **Denny Sharon,** 1501 Lee Highway, Arlington, Va. 22209-1198 (phone 703-247-5820).

FLORIDA (Avon Park, Brandon, Broward County, Cape Coral, Daytona Beach, Fort Walton Beach, Gainesville, Homestead, Jacksonville, Leesburg, Miami, Naples, Neptune Beach, New Port Richey, Orlando, Panama City, Patrick AFB, Port Charlotte, Redington Beach, Sarasota, Tallahassee, Tampa, West Palm Beach, Winter Haven): **Donald T. Beck,** 1150 Covina St., Cocoa, Fla. 32927 (phone 305-636-7648).

GEORGIA (Athens, Atlanta, Columbus, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **Robert W. Marsh, Jr.,** P. O. Box 542, Springfield, Ga. 31329 (phone 912-964-1941, ext. 254).

GUAM (Agana): **Michael C. Wilkins,** Box CV, Agana, Guam 96910 (phone 671-646-5259).

HAWAII (Honolulu, Puunene): **Don J. Daley,** P. O. Box 3200, Honolulu, Hawaii 96847 (phone 808-525-6296).

IDAHO (Boise, Mountain Home, Twin Falls): **Chester A. Walborn,** 510 E. 13th North, Mountain Home, Idaho 83647 (phone 208-587-7185).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, Moline, Peoria, Springfield-Decatur): **Walter G. Vartan,** 230 W. Superior Court, Chicago, Ill. 60610 (phone 312-477-7503).

INDIANA (Bloomfield, Fort Wayne, Grissom AFB, Indianapolis, Lafayette, Marion, Mentone, South Bend, Terre Haute): **Bill Cummings,** 12031 Mahogany Drive, Fort Wayne, Ind. 46804 (phone 219-672-2728).

IOWA (Des Moines, Sioux City): **Carl B. Zimmerman,** 608 Waterloo Bldg., Waterloo, Iowa 50701 (phone 319-232-2650).

KANSAS (Garden City, Topeka, Wichita): **Cletus J. Pottebaum,** 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-683-3963).

KENTUCKY (Lexington, Louisville): **Bryan J. Sifford,** c/o Ronnie W. McGill, 3409 Brunswick Rd., Lexington, Ky. 40503-4310 (phone 606-234-1642).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **Paul J. Johnston,** 1703 W. Medalist Drive, Pineville, La. 71360.

MAINE (Bangor, Loring AFB, N. Berwick): **Alban E. Cyr, Sr.,** P. O. Box 160, Caribou, Me. 04736 (phone 207-496-3331).

MARYLAND (Andrews AFB area, Baltimore, Rockville): **William T. Reynolds,** 11903 Chesterton Drive, Upper Marlboro, Md. 20772 (phone 301-249-5438).

MASSACHUSETTS (Bedford, Boston, East Longmeadow, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Leo O'Halloran,** 420 Bedford St., Suite 290, Lexington, Mass. 02173 (phone 617-264-4603).

MICHIGAN (Alpena, Battle Creek, Detroit, Kalamazoo, Marquette, Mount Clemens, Oscoda, Petoskey, Southfield): **William Stone,** 7357 Lakewood Drive, Oscoda, Mich. 48750 (phone 517-724-6266).

MINNESOTA (Duluth, Minneapolis-St. Paul): **Earl M. Rogers, Jr.,** 325 Lake Ave., S., Duluth, Minn. 55802 (phone 218-727-8711).

MISSISSIPPI (Biloxi, Columbus, Jackson): **R. E. Smith,** Route 3, Box 282, Columbus, Miss. 39701 (phone 601-327-4071).

MISSOURI (Kansas City, Richards-Gebaur AFB, Springfield, St. Louis, Whiteman AFB): **Raymond W. Peterman,** 11315 Applewood Drive, Kansas City, Mo. 64134 (phone 816-761-7453).

MONTANA (Bozeman, Great Falls): **Ed White,** 2333 6th Ave., S. Great Falls, Mont. 59405 (phone 406-453-2054).

NEBRASKA (Lincoln, Omaha): **Donald D. Adams,** FirsTier Inc., 17th & Farnam, Omaha, Neb. 68102 (phone 402-348-7905).

NEVADA (Las Vegas, Reno): **Victor Hollandsworth,** 3720 Falcon Way, Reno, Nev. 89509 (phone 702-826-1326).

NEW HAMPSHIRE (Manchester, Pease AFB): **Robert N. McChesney,** Scruton Pond Rd., Barrington, N. H. 03825 (phone 603-664-5090).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Middlesex County, Newark, Old Bridge, Trenton, Wallington, West Orange, Whitehouse Station): **Jim Young,** 513 Old Mill Rd., Spring Lake Heights, N. J. 07762 (phone 201-449-8637).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Louie T. Evers,** P. O. Box 1946, Clovis, N. M. 88101 (phone 505-762-1798).

NEW YORK (Albany, Bethpage, Brooklyn, Buffalo, Chautauqua, Griffiss AFB, Hudson Valley, Nassau County, New York City, Niagara Falls, Patchogue, Plattsburgh, Queens, Rochester, Rome/Utica, Suffolk County, Syosset, Syracuse, Westchester, Westhampton Beach, White Plains): **Maxine Z. Donnelly,** 18 Jackson Place, Massapequa, N. Y. 11758 (phone 516-795-2746).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Greensboro, Kitty Hawk, Raleigh): **J. E. Smith,** P. O. Box 765, Princeton, N. C. 27569 (phone 919-936-9361).

NORTH DAKOTA (Concrete, Fargo, Grand Forks, Minot): **Ruth Ziegler,** #5 16th St., N. W., Minot, N. D. 58701 (phone 701-839-2465).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield, Newark, Youngstown): **John Boeman,** 10608 Lake Shore Blvd., Bratenal, Ohio 44108 (phone 216-249-8970).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **Terry Little,** 4150 Timerlane, Enid, Okla. 73703 (phone 405-234-9624).

OREGON (Eugene, Portland): **Hal Langerud,** 10515 S. W. Clydesdale Terrace, Beaverton, Ore. 97005 (phone 503-644-0645).

PENNSYLVANIA (Allentown, Altoona, Beaver Falls, Coraopolis, Drexel Hill, Erie, Harrisburg, Homestead, Indiana, Johnstown, Lewistown, Mon-Valley, Philadelphia, Pittsburgh, Scranton, Shiremanstown, State College, Willow Grove, York): **David L. Jannetta,** P. O. Box 643, Altoona, Pa. 16603 (phone 814-943-8023).

PUERTO RICO (San Juan): **Fred Brown,** 1991 Jose F. Diaz, Rio Piedras, P. R. 00928 (phone 809-790-5288).

RHODE ISLAND (Warwick): **Thomas R. Portesi,** 102d Tactical Control Squadron, N. Smithfield ANG Station, Slatersville, R. I. 02889 (phone 401-762-9100).

SOUTH CAROLINA (Charleston, Clemson, Columbia, Myrtle Beach, Sumter): **Harry E. Lavin,** 28 Little Creek Rd., The Forest, Myrtle Beach, S. C. 29577 (phone 803-272-8440).

SOUTH DAKOTA (Rapid City, Sioux Falls): **Jim England,** Route 8, Box 3980, Rapid City, S. D. 57702 (phone 605-342-2200).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Jack K. Westbrook,** P. O. Box 1801, Knoxville, Tenn. 37901 (phone 615-523-6000).

TEXAS (Abilene, Amarillo, Austin, Big Spring, College Station, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Ollie R. Crawford,** P. O. Box 202470, Austin, Tex. 78720 (phone 512-331-5367).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Marcus C. Williams,** 4286 S. 2300 West, Roy, Utah 84067 (phone 801-627-4490).

VERMONT (Burlington): **Ralph R. Goss,** 8 Summit Circle, Shelburn, Vt. 05482 (phone 802-985-2257).

VIRGINIA (Arlington, Charlottesville, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Charles G. Durazo,** 1725 Jefferson Davis Highway, Suite 510, Arlington, Va. 22202 (phone 703-892-0331).

WASHINGTON (Bellingham, Seattle, Spokane, Tacoma, Yakima): **Charles Burdulis,** N. 5715 Sutherlin, Spokane, Wash. 99208 (phone 509-327-8902).

WEST VIRGINIA (Huntington): **Ron Harmon,** 1600 Core Rd., Parkersburg, W. Va. 26101 (phone 304-485-2088).

WISCONSIN (Madison, Milwaukee): **Gilbert Kwiatkowski,** 8260 W. Sheridan Ave., Milwaukee, Wis. 53218 (phone 414-463-1849).

WYOMING (Cheyenne): **Irene G. Johnigan,** 503 Notre Dame Court, Cheyenne, Wyo. 82009 (phone 307-775-3641).

tions of the future," Mr. Westbrook said.

In other Tennessee AFA news, Mr. Westbrook reports that Tennessee AFA chapters and members contributed generously to fund a posthumous General Jimmy Doolittle Fellowship for **Tim Myers,** an AFA under-forty director at the time of his death in an aircraft accident last summer. His widow, **Kim Myers,** will attend AFA's National Convention this September to receive the honor in behalf of her husband.

AFA's recently reorganized Ozark Chapter in Springfield, Mo., got excellent press coverage in the *Leader & Press* following its recent election of new officers. Among the new Ozark Chapter officers are **John Lacy,** President; **Otis Lytle,** Vice President; **Gene Itschner,** Secretary; **L. D. Pyle,** Treasurer; **J. L. Cantrell,** Membership Chairman; **W. N. Peck,** Communications Director; **H. C. Strawn,** Programs Director; and **Joe Gregg,** Committees Chairman. ■

Edward P. (Ted) Curtis—1897–1987

The guiding hand behind the formation of AFA, retired USAAF Maj. Gen. Edward P. (Ted) Curtis, died March 13 at a nursing facility in his home town of Rochester, N. Y. He was ninety.

In 1945, at the urging and later formal request of Gen. H. H. "Hap" Arnold, Mr. Curtis organized the Air Force Association. When the organization was incorporated on February 4, 1946, Mr. Curtis became the first chairman of the board. He was also instrumental in persuading Jimmy Doolittle to serve as AFA's first president.

Mr. Curtis had left Williams College in 1917, two months before the US entered World War I, to become an ambulance driver in France. He then switched to the Air Service and served as a pilot with the 95th Aero Squadron, becoming one of America's first aces, with six aerial victories. After the Armistice, he served as an aide to Brig. Gen. Billy Mitchell.

Mr. Curtis joined the Eastman Kodak Co. in 1920, becoming head of the motion picture film department before leaving in 1940 to join the staff of Gen. Carl A. Spaatz, then the AAF's chief of plans. He landed with invading American forces in North Africa in 1942 and soon became chief of staff of the Northwest African Air Force. He later served with Twelfth Air Force in Italy and then, in England, again with Spaatz, as chief of staff for US Strategic Air Forces. He was promoted to major general in 1945. His decorations included the Croix de Guerre, the Distinguished Service Cross, the Legion of Merit, the Silver Star, and the Bronze Star.

Edward P. (Ted) Curtis

He returned to Kodak after the war and in 1963 retired as a corporate vice president. He served on the company's board of directors until 1969.

At the request of President Dwight D. Eisenhower, Mr. Curtis directed a study that resulted in the formation of the Federal Aviation Administration, leading to better traffic and safety controls for the nation's airways and closer cooperation between civil and military aviation. For this work, Mr. Curtis was awarded the 1957 Collier Trophy and received AFA's H. H. Arnold Award and was designated AFA's "Airpower Man of the Year."

A permanent member of AFA's Board of Directors, Mr. Curtis was active in AFA affairs until the early 1960s. He served as General Chairman of the AFA-sponsored World Congress of Flight held in Las Vegas, Nev., in 1959.

Mr. Curtis is survived by his wife Agness, a son, and two daughters.

INTERCOM

UNIT REUNIONS

Boat Squadrons
AAF/USAF boat squadron personnel who served in boat crew positions in any capacity will hold a reunion on October 2–3, 1987, in Orlando, Fla. **Contact:** Wayne "Moon" Mellesmoen, 204 Gregory Rd., West Palm Beach, Fla. 33405. Phone: (305) 588-5504.

Caterpillar Ass'n
The Caterpillar Association of the US will hold its fiftieth-year anniversary reunion on August 7–8, 1987, at the Ramada Inn in Milwaukee, Wis. **Contact:** Johnny Brown, P. O. Box 1321, Kenosha, Wis. 53141. Phone: (414) 658-1559.

Ellington Navigators Ass'n
Former navigators who trained or taught at Ellington AFB, Tex., will hold a reunion on July 1–5, 1987, in Houston, Tex. **Contact:** Maj. Clarke S. Lampard, USAF (Ret.), 5830 Robin Hill Dr., #2, Lakeport, Calif. 95453.

Flying Control Tower Veterans Ass'n
Flying control tower veterans who served during World War II will hold a reunion on October 14–18, 1987, in Pittsburgh, Pa. **Contact:** Lou Dubnow, 1189 Galesmoore Ct., Westlake Village, Calif. 91361. Phone: (805) 497-1964.

NEACP
The National Emergency Airborne Command Post (NEACP) and 1st Airborne Command Control Squadron (1st ACCS), also known as "Nightwatch" and "Silver Dollar," are planning to hold a twenty-fifth-year anniversary celebration on August 13–15, 1987. (These are new dates because of changed operational commitments.) **Contact:** Col. Francis J. Ludwig, USAF, OJCS/NEACP, Offutt AFB, Neb. 68113-5000. Phone: (402) 294-6291.

Pampa Army Airfield
Pampa Army Airfield personnel will hold a reunion on August 13–15, 1987, in Pampa, Tex. **Contact:** Nina Spoonemore, P. O. Box 2015, Pampa, Tex. 79065.

Strategic Support Squadrons
Former members of strategic support squadrons will hold a reunion on October 8–12, 1987, at the Travelodge Main Gate East Motel in Orlando, Fla. **Contact:** Joseph Musil, 2299 Conway Blvd., Port Charlotte, Fla. 33952. Phone: (813) 625-4866.

Weather Recon Squadrons
Members of the 1st, 3d, 30th, and 53d Weather Reconnaissance Squadrons who served in the North Atlantic between 1943 and 1946 will hold a reunion on June 28–29, 1987, in St. Louis, Mo. **Contact:** Doug Dickinson, P. O. Box 146, Trumbull, Conn. 06611. Phone: (203) 929-9000.

A-1 Skyraider Ass'n
The A-1 Skyraiders will hold a reunion on October 2–3, 1987, in San Antonio, Tex. **Contact:** Reuben M. Ware, P. O. Box 633, Randolph AFB, Tex. 78148. Phone: (512) 828-2062.

BAD 2 Ass'n
BAD 2 (Base Air Depot) members who were stationed in Warton, England, during World War II will hold a reunion on October 29–November 1, 1987, in Harrisburg, Pa. **Contact:** Ralph G. Scott, 228 W. Roosevelt Ave., New Castle, Del. 19720.

3d Composite Squadron
Members of the 3d Composite Squadron will hold a reunion on August 20–23, 1987, at Offutt AFB, Neb. **Contact:** Col. Nester E. Cole, USAF (Ret.), 2732 Warwick Dr., Bloomfield Hills, Mich. 48013.

4th Fighter Squadron
The 4th Fighter Squadron will hold its reunion on July 16–18, 1987, in Scottsdale, Ariz. Members of the 2d and 5th Fighter Squadrons are also welcome. **Contact:** Spike Myers, 7791 E. Osborn Rd., Apt. 27, Scottsdale, Ariz. 85251. Phone: (602) 994-8954.

19th Bombardment Ass'n
The 19th Bombardment Association will hold regional reunions on June 4–6, 1987, at the Holiday Inn in King of Prussia, Pa., and on October 1–3, 1987, at the Holiday Inn in Midwest City, Okla. **Contact:** Herbert A. Frank, 90-13 201st St., Hollis, N. Y. 11423. Phone: (718) 465-5740 (Pennsylvania reunion). Conrad A. Marvel, 5337 E. Zion Pl., Tulsa, Okla. Phone: (918) 835-9909 (Oklahoma reunion).

Coming Events

May 8–9, **Maryland State Convention,** Andrews AFB . . . May 9, **Connecticut State Convention,** Vernon . . . May 16, **Oregon State Convention,** Portland . . . May 16, **Tennessee State Convention** . . . May 22, **Idaho State Convention,** Mountain Home AFB . . . June 5–7, **New York State Convention,** Albany . . . June 5–7, **Washington State Convention,** Spokane . . . June 12–14, **Georgia State Convention,** Rome . . . June 13, **Louisiana State Convention,** Barksdale AFB . . . June 19–21, **New Jersey State Convention,** Cape May . . . June 19–21, **Ohio State Convention,** Warren . . . June 20, **Montana State Convention,** Malmstrom AFB . . . June 26–27, **Oklahoma State Convention,** Tinker AFB . . . July 17–18, **Wisconsin State Convention,** Milwaukee . . . July 17–19, **Mississippi State Convention,** Biloxi . . . July 17–19, **Pennsylvania State Convention,** Harrisburg . . . July 17–19, **Texas State Convention,** Dallas . . . July 18, **Nevada State Convention,** Tonopah . . . July 31–August 1, **Colorado State Convention,** Lowry AFB . . . July 31–August 2, **Florida State Convention,** MacDill AFB . . . July 31–August 1, **Missouri State Convention,** Kansas City . . . August 7–9, **Arkansas State Convention,** Fort Smith . . . August 19, **Delaware State Convention,** Dover AFB . . . August 20–23, **California State Convention,** Vandenberg AFB . . . August 21–23, **Utah State Convention,** Salt Lake City . . . August 28–30, **Arizona State Convention,** Sedona . . . August 29, **Illinois State Convention,** Glenview NAS, Chicago . . . August 29, **Indiana State Convention,** Fort Wayne . . . September 14–17, **AFA National Convention and Aerospace Development Briefings and Displays,** Washington, D. C.

UNIT REUNIONS

Reunion Notices

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.

22d Bomb Group
The 22d Bomb Group will hold a reunion on July 22–26, 1987, in Oshkosh, Wis. **Contact:** John E. Clark, Box 4734, Patrick AFB, Fla. 32925. Phone: (305) 636-5004.

26th Fighter Squadron
The 26th Fighter Squadron, 51st Fighter Group ("China Blitzers"), will hold a reunion on September 10–12, 1987, at the Hilton Inn East in Columbus, Ohio. **Contact:** William D. Van Dyke, 1715 Weiler Ave., Columbus, Ohio 43207. Phone: (614) 443-4416.

P-38 Lightning
P-38 Lightning air and ground crews will hold a reunion on May 13–16, 1987, in Los Angeles, Calif. **Contact:** Joe Kuhn or Dave Skilling, P. O. Box 727, Sun Valley, Calif. 91353-0727. Phone: (805) 255-6618 (Kuhn) or (805) 259-6805 (Skilling).

39th Troop Carrier Squadron
Veterans of the 39th Troop Carrier Squadron who served in the Southwest Pacific from 1943–45 will hold a reunion on May 22–23, 1987, in Des Moines, Iowa. **Contact:** Verne Simpson, 6871 N. W. 86th, Johnston, Iowa 50131.

Class 42-H
Class 42-H (Victorville) will hold a memorial dedication in August 1987 at Lindsey AS, Germany, in honor of former 42-H member Capt. Darrell R. Lindsey. **Contact:** Lt. Col. Edward J. Komyati, USAF (Ret.), 7508 Cromwell Dr., #3-E, Clayton, Mo. 63105-2960. Phone: (314) 725-8327.

Class 43-B
Pilot Class 43-B (Pampa, Tex.) will hold a minireunion in conjunction with the Pampa Army Airfield reunion on August 13–15, 1987, in Pampa, Tex. **Contact:** Cliff Conrad, 3770 S. Loop East, Houston, Tex. 77021. Phone: (713) 747-0683.

57th Fighter Group
Members of the 57th Fighter Group will hold a reunion on October 8–10, 1987, in Atlanta, Ga. **Contact:** Raymond C. Clark, 6542 Deerings Lane, Norcross, Ga. 30092.

Class 58-10
Navigators of Class 58-10 (Harlingen AFB, Tex.) will hold a reunion on July 31, 1987, near Hartford, Conn. **Contact:** Walter Gillis, 42 Village Lane, Burlington, Conn. 06013. Phone: (203) 283-8261.

59th Air Police Squadron
Members of the 59th Air Police Squadron who were stationed at Burtonwood, England, from 1950–56 will hold a reunion on August 6–8, 1987, at the Coach House Inn in Memphis, Tenn. **Contact:** Charles Arendall, P. O. Box 27336, Memphis, Tenn. 38127. Phone: (901) 353-4467.

Class 70-07A
Members of Class 70-07A (Red Martin's Group) will hold a reunion on June 26–28, 1987, in Phoenix, Ariz. **Contact:** Lt. Col. Haines Gridley III, USAF, 2757 Apple Orchard Lane, Riverside, Calif. 92506. Phone: (714) 788-8787. AUTOVON: 947-4065.

76th/77th Air Rescue Squadrons
Members of the 76th and 77th Air Rescue Squadrons who served at Hickam AFB, Hawaii, in the early 1950s have scheduled a reunion for September 1987 in Honolulu, Hawaii. **Contact:** Don Searle, 4932 Arbor Ridge, San Antonio, Tex. 78228. Phone: (512) 681-6233.

81st Troop Carrier Squadron
The 81st Troop Carrier Squadron will hold a reunion on September 24–27, 1987, in Portsmouth, N. H. **Contact:** T. W. Bonecutter, 620 Randolph St., Wilmington, Ohio 45177. Phone: (513) 382-4351.

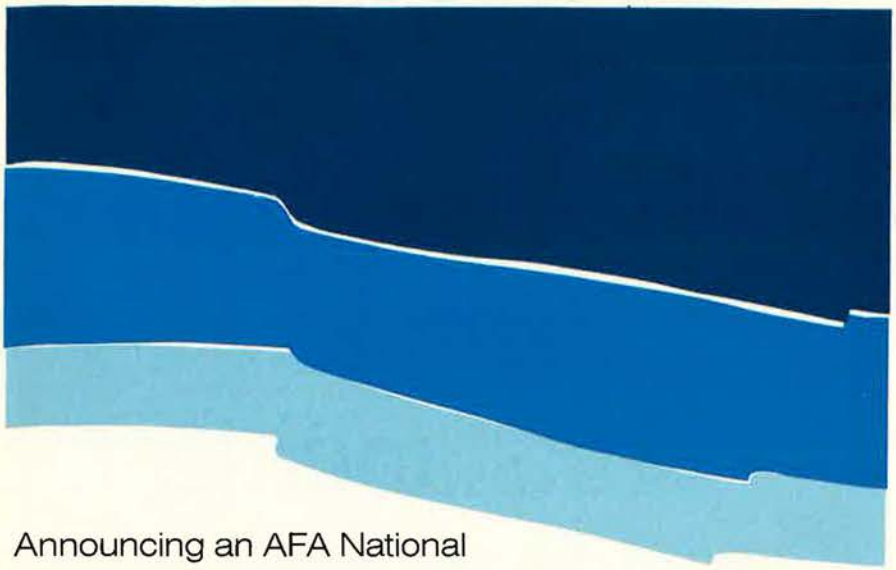
87th Fighter Interceptor Squadron
The 87th Fighter Interceptor Squadron is planning to hold a reunion in June 1987 in San Antonio, Tex. **Contact:** Frank Wisneski, 3140 Springmeadow Dr., Colorado Springs, Colo. 80901. Phone: (303) 576-4277.

95th Bomb Group Ass'n
The 95th Bomb Group will hold a reunion on September 14–19, 1987, in Colorado Springs, Colo. **Contact:** Joel A. Bunch, 8730 Guilford Ave., Indianapolis, Ind. 46240.

100th Bomb Group Ass'n
The 100th Bomb Group will hold a reunion on September 6–9, 1987, at the Hyatt Regency Hotel in Long Beach, Calif. **Contact:** John Miller, 2005 Jansen Ave., Las Vegas, Nev. 89101. Everett E. Blakely, 10860 Crebs Ave., Northridge, Calif. 91326. Phone: (818) 360-0923. Bob Wolff, 5074 Calvin Ave., Tarzana, Calif. 91356. Phone: (818) 343-5209.

104th Tactical Fighter Group
The 104th Tactical Fighter Group will celebrate its fortieth anniversary with a celebrity golf tournament, social event, and air show on June 12–14, 1987, at Barnes Airport in Westfield, Mass. **Contact:** Col. David R. Cummock, USAF (Ret.), 174 South Blvd., West Springfield, Mass. 01089.

188th Fighter Squadron
Members of the 188th Fighter Squadron of the New Mexico Air National Guard



Announcing an AFA National Symposium . . .

The Military Imperatives in Space

MAY 21, 1987—9:00 AM-6:00 PM

WHO: The Air Force Association, in conjunction with the United States Space Command.

WHAT: A survey of the many national security concerns in space as well as in-depth discussions on the national aerospace plane, military and commercial space-launch vehicles, space-based radar, and new power sources for space operations.

WHERE: Clarion Hotel
2886 South Circle Drive
Colorado Springs,
Colorado 80906
(303) 576-5900

Make your plans NOW to attend! For more information, call Dorothea Barnes or Dottie Flanagan at (703) 247-5800.

SYMPOSIUM KEYNOTE ADDRESS

Gen. John L. Piotrowski
Commander in Chief
United States Space Command

LUNCHEON SPEAKER

Gen. James A. Abrahamson
Director, Strategic Defense
Initiative Organization

SPEAKERS
(listed alphabetically)

Lt. Gen. Aloysius G. Casey
Commander, Space Division, AFSC

Gen. John T. Chain, Jr.
Commander in Chief, Strategic Air Command

Dr. Robert C. Duncan
Director, DARPA

Dr. William R. Graham
Science Advisor to the President

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Department of Energy/Defense Programs

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DCS/Research, Development & Acquisition

Maj. Gen. Robert A. Rosenberg
Director, Defense Mapping Agency

Rear Adm. Richard H. Truly, USN
Assoc. Administrator for Space Flight (NASA)

REGISTRATION FORM
A 1987 Air Force Association
National Symposium

"The Military Imperatives in Space"

Clarion Hotel
Colorado Springs, Colorado
May 21, 1987

NAME (Print): _____

TITLE: _____

AFFILIATION: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

TELEPHONE: (Code) _____ (No.) _____

I am enclosing my check for $250, payable to the Air Force Association, to cover the Symposium fee for an AFA individual or Industrial Associate member. This fee includes one (1) luncheon and one (1) dinner ticket. (Note: fee for non-member is $275.)

_____ Mark here if an extra guest luncheon ticket is desired. Enclose $40 for the additional ticket.

_____ Mark here if an extra guest dinner ticket is desired. Enclose $70 for the additional ticket.

Mail this form to:
Air Force Association
Attn: Miss Flanagan
1501 Lee Highway
Arlington, VA 22209-1198
(703) 247-5800

The Twenty-Eighth Annual Outstanding Squadron Dinner

May 23, 1987, at The Broadmoor, Colorado Springs, Colo.

Saluting the 1987 Outstanding Squadron at the United States Air Force Academy. Cosponsored by the Air Force Association and its Colorado Springs-Lance Sijan Chapter.

More than 700 guests—including parents and friends of the cadets, together with aerospace, AFA, and governmental leaders from throughout the country—will pay tribute to the top Academy Squadron, selected for excellence in all elements of cadet life, from academic standings and military leadership to intramural athletics. This is the Academy's most prestigious award of the year.

Reception 6:00 p.m., Dinner 6:45 p.m.; The International Center of The Broadmoor.

Dress: Black tie for civilians
Summer Mess Dress for military
Cost: $70 single, $130 per couple

Hotel reservations may be made direct with: The Broadmoor, Colorado Springs, Colo. 80901, telephone (303) 634-7711. Singles from $125 to $165, Doubles from $135 to $175; or The Clarion Hotel, 2886 S. Circle Drive, Colorado Springs, Colo. 80906, telephone (303) 576-9000. Singles from $55 to $65, Doubles from $65 to $75; or the Antlers Plaza (under the Broadmoor management and providing regular shuttle service to and from The Broadmoor), Chase Stone Center, Colorado Springs, Colo. 80903, telephone (303) 473-5600. Singles $67.00, Doubles $72.00, all hotels subject to 7.6% tax. Be sure to mention AFA when writing or calling for reservations.

A golf tournament will be conducted at The Broadmoor on Friday, May 22. Please write AFA for details.

Dinner Reservation Form

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

Attn: D. Flanagan

Please make the following reservations for me at AFA's 1987 Outstanding Squadron Dinner:

_____ Singles @ $70 $ _____

_____ Couples @ $130 $ _____

Enclosed is my check for $ _____

Please send information on the golf tournament.

Name _____

Address _____

City _____ State _____ Zip _____

Telephone ( ) _____

(NMANG) will hold a fortieth-year anniversary reunion on June 6–7, 1987, in Albuquerque, N. M. **Contact:** R. E. Casteel, N. Star Rte., Box 1121, Corrales, N. M. 87048. Phone: (505) 898-1216.

315th Fighter Squadron
Members of the 315th Fighter Squadron, 324th Fighter Group, will hold a reunion on June 5–7, 1987, in Denver, Colo. **Contact:** Eugene J. Orlandi, 311 3d St., East Northport, N. Y. 11731. Phone: (516) 368-9193.

319th Bomb Group
The 319th Bomb Group will hold a reunion on August 16–20, 1987, at the Ramada Inn in Grand Forks, N. D. **Contact:** Neal A. Baker, 1831 S. Park Lane, Denison, Tex. 75020. Phone: (214) 465-0513.

351st Bomb Group
The 351st Bomb Group, including the 508th, 509th, 510th, and 511th Bomb Squadrons, stationed in Polebrook, England, will hold a reunion on July 2–5, 1987, at the Holiday Inn in Norfolk, Va. **Contact:** Ben Schohan, 398 Catawba Ave., Westerville, Ohio 43081. Phone: (614) 882-8410.

354th Fighter Group
Members of the 354th Fighter Group will hold a reunion on October 8–11, 1987, at the Key Bridge Marriott Hotel in Arlington, Va. **Contact:** David B. O'Hara, 301 Stoneybrooke Dr., Cheswick, Pa. 15024. Phone: (412) 274-5912.

359th Fighter Group
The 359th Fighter Group, including the 368th, 369th, and 370th Fighter Squadrons and other units stationed at East Wretham, England, will hold a reunion on August 27–29, 1987, in Ogdensburg, N. Y. **Contact:** Larry Bouchard, 306 Proctor Ave., Ogdensburg, N. Y. 13669. Tony Chardella, 105 Mohawk Trail Dr., Pittsburgh, Pa. 15235.

362d Fighter Group
The 362d Fighter Group will hold a reunion on October 5–9, 1987, in Orlando, Fla. **Contact:** Tom Pantoliano, 1315 Pinar Dr., Orlando, Fla. 32825. Phone: (305) 277-1573.

367th Fighter Group Ass'n
The 367th Fighter Group, including the 392d, 393d, and 394th Fighter Squadrons, will hold a reunion on August 27–30, 1987, in Colorado Springs, Colo. **Contact:** Jack T. Curtis, 437 Cedar Dr., Beaver Shores, Rogers, Ark. 72756. Phone: (501) 925-1796.

404th Fighter Group
Members of the 404th Fighter Group will hold a reunion on September 17–19, 1987, in New York, N. Y. **Contact:** John Zore, 25 Saratoga Ave., North Babylon, N. Y. 11704. Phone: (516) 491-5139.

417th Night Fighter Squadron
The 417th Night Fighter Squadron will hold its reunion on June 12–13, 1987, at the Belton Inn in Dayton, Ohio. **Contact:** Robert Perkins, Box 239, Rte. 2, Lancaster, N. H. 03584.

UNIT REUNIONS

440th Troop Carrier Group
Members of the 440th Troop Carrier Group, including the 95th, 96th, 97th, and 98th Troop Carrier Squadrons and attached units, will hold a reunion on October 1–4, 1987, in Milwaukee, Wis. **Contact:** Don Orcutt, 3205 S. W. 325th St., Federal Way, Wash. 98023. Phone: (206) 838-0883.

452d Bomb Wing
Members of 452d Bomb Wing who served in Korea will hold a reunion on August 8, 1987, at the Reserve Center in Los Alamitos, Calif. **Contact:** Gene Hoffman, P. O. Box 3785, Long Beach, Calif. 90803.

485th Bomb Group
Members of the 485th Bomb Group, Fifteenth Air Force, will hold a reunion on September 23–27, 1987, in Phoenix, Ariz. Members have also scheduled a plaque-dedication ceremony on September 29, 1987, at the USAF Academy in Colorado Springs, Colo. **Contact:** E. L. Bundy, 5773 Middlefield Dr., Columbus, Ohio 43220.

1503d MATS
The 1503d Military Air Transport Squadron, which served at Haneda AB, Japan (1950–54), will hold a reunion on August 14–16, 1987, in Dayton, Ohio. **Contact:** Lloyd G. Lucus, 3128 Stoney Dr., Lafayette, Ind. 47905. Phone: (317) 474-4194.

1866th Facility Checking Squadron
The 1866th Facility Checking Squadron will hold its twenty-fifth-year anniversary reunion on July 16–19, 1987, at Scott AFB, Ill. **Contact:** Maj. Michael Siebert, USAF, Project Officer, 1866th FCS (AFCC), Scott AFB, Ill. 62225-6349.

7531st Air Base Squadron
Members of the 7531st Air Base Squadron who served in Bovingdon, England, will hold a reunion in October 1987. **Contact:** Maj. Jesse B. Tindall, USAF (Ret.), 4670 Banyon Tree Dr., Tucson, Ariz. 85749.

Class 43-E
I would like to hear from members of Aviation Cadet Class 43-E for the purpose of planning a reunion. Please contact the address below.

Paul Murphy
7013 Bellrose N. E.
Albuquerque, N. M. 87110
Phone: (505) 884-5687

Class 48-C
I would like to hear from members of Class 48-C who are interested in holding a reunion in 1988. Please contact the address below.

Michael Loyd
62 Lakeview Dr.
Daly City, Calif. 94015

AFA's NEW EAGLE SERIES Group Life Insurance

Up to $350,000 Protection for Your Family!

CHOOSE FROM:

- **The High Option *PLUS* Plan now pays benefits up to $350,000.00**
- **The High Option Plan now pays benefits up to $262,500.00**
- **The Standard Plan now pays benefits up to $175,000.00**

Important Benefits and Features

Eligibility—All members of the Air Force Association under age 65 are eligible to apply for this coverage . . . and, once insured, to apply for higher levels of coverage.

Flying and Non-Flying Personnel—All insured members of the same age are provided the same amount of coverage regardless of whether or not they are on flying status and regardless of whether or not they are killed in an aviation accident! There is no age restriction for full benefits and there is no benefit or cost difference for those on flying status. AFA's new Eagle Series Life Insurance program eliminates all these differences and provides strong, reliable coverage for *all* members at the *same* cost.

Coverage to Age 75—Insurance provided under this group program may be retained at the same low group rate to age 75.

War Related Death Benefits—Unlike many programs that severely restrict coverage in the event of war or act of war, AFA's program provides full benefits for war related deaths except for aircraft crew members who are killed in aviation accidents. In such circumstances the death benefit is 50% of the scheduled benefit amount.

Guaranteed Conversion Provision—At age 75 (or if you wish, upon termination of AFA membership) your coverage is convertible, within 31 days of the date you become eligible, to any permanent plan of insurance then being offered by United of Omaha, regardless of your health at that time. The maximum amount convertible is the amount of your group coverage at the time of conversion.

Under the Family Plan, the spouse's coverage is also convertible to permanent insurance in the event the member dies. The application for such coverage must be made within 31 days of the member's death. Children's coverage under the Family Plan, however is not convertible, but upon attaining age 21, each insured child is automatically eligible to apply for a $10,000 Whole Life Insurance policy. This policy includes a guaranteed issue benefit which provides the insured the right to purchase additional coverage at standard rates on future dates specified in the policy.

Disability Waiver of Premium—If you become totally disabled at any time prior to age 60 for a period of at least nine months while your coverage remains in force, you may apply for the Disability Waiver of Premium Benefit. Upon approval, your Eagle Series insurance will remain in force without further payment of premiums for as long as you continue to be totally disabled.

Dividend Policy—AFA has continuously provided program improvements in addition to paying substantial year end dividends based on actual program experience.

Effective Date of Coverage—All certificates are dated and take effect on the last day of the month in which your application for coverage is approved and coverage runs concurrently with AFA membership.

Termination of Coverage—Your coverage can be terminated only if you are no longer an Air Force Association member in good standing, if you do not pay your premium, if the AFA Master Policy is discontinued, or on the first renewal date following your 75th birthday.

Professionally Administered—AFA's Eagle Series Insurance program is administered by the Association's staff of professionally trained insurance personnel with extensive experience in group insurance programs and requirements.

Convenient Payment Plan—Premium payments may be made directly to AFA in quarterly, semi-annual, or annual installments, or by monthly government allotment. If you make payments directly to AFA, the Association will mail renewal statements approximately 30 days in advance of each premium due date. For active duty and retired personnel, however, AFA recommends that payments be made automatically by monthly government allotment (payable to the Air Force Association) so as to prevent any possible lapse in coverage.

Exceptions—Group Life Insurance: Benefits for suicide or death from injuries intentionally self-inflicted while sane or insane shall not be effective until coverage has been in force 12 months. Benefits for a war related aviation accident in which the Insured was serving as pilot or crew member of the aircraft involved are 50% of the scheduled amount of coverage.

The insurance coverage described in this plan is provided under a group insurance policy issued by United of Omaha Life Insurance Company to the First National Bank of Minneapolis as trustee of the Air Force Association Group Insurance Trust.

Schedule of Benefits

Choose the Plan that Fits Your Family's Needs for Security

Member's Attained Age	High Option *PLUS* Plan Premium $20 a Month COVERAGE	High Option Plan Premium $15 a Month COVERAGE	Standard Plan Premium $10 a Month COVERAGE
20-24	$350,000	$262,500	$175,000
25-29	300,000	225,000	150,000
30-34	220,000	165,000	110,000
35-39	160,000	120,000	80,000
40-44	100,000	75,000	50,000
45-49	60,000	45,000	30,000
50-54	40,000	30,000	20,000
55-59	28,000	21,000	14,000
60-64	18,000	13,500	9,000
65-69	8,000	6,000	4,000
70-75	5,000	3,750	2,500

The above schedule of benefits will be paid in the event of any death except that one half (50%) of the benefits will be paid in the event of a war related aviation accident.

Optional Family Coverage

(May Be Added To Standard, High Option or High Option PLUS Plan)
Premium: $2.50 Per Month

Member's Attained Age	Life Insurance Coverage for Spouse	Life Insurance Coverage for Each Child
20-39	$20,000	$4,000
40-44	15,000	4,000
45-49	10,000	4,000
50-54	7,000	4,000
55-59	5,000	4,000
60-64	3,000	4,000
65-69	2,000	4,000
70-74	1,000	4,000

Between the ages of six months and 21 years, each child is provided $4,000 coverage. Children under 6 months are provided with $250 coverage once they are 15 days old and discharged from the hospital.

Upon attaining age 21, children covered under this group insurance program may, provided satisfactory evidence of insurability is submitted, request coverage (in most states) under a $10,000 permanent individual life insurance policy with guaranteed purchase options.

PLEASE RETAIN THIS MEDICAL INFORMATION BUREAU PRENOTIFICATION FOR YOUR RECORDS

Information regarding your insurability will be treated as confidential. United of Omaha Life Insurance Company may, however, make a brief report thereon to the Medical Information Bureau, a nonprofit membership organization of life insurance companies, which operates an information exchange on behalf of its members. If you apply to another Bureau member company for life or health insurance coverage, or a claim for benefits is submitted to such a company, the Bureau, upon request, will supply such company with information in its file.

Upon receipt of a request from you, the Bureau will arrange disclosure of any information it may have in your file. (Medical information will be disclosed only to your attending physician.) If you question the accuracy of information in the Bureau's file, you may contact the Bureau and seek a correction in accordance with the procedures set forth in the Federal Fair Credit Reporting Act. The address of the Bureau's information office is P.O. Box 105, Essex Station, Boston, Mass 02112, Phone (617) 426-3660.

United of Omaha Life Insurance Company may release information in its file to other life insurance companies to whom you may apply for life or health insurance, or to whom a claim for benefits may be submitted.

APPLICATION FOR AFA
GROUP LIFE INSURANCE

Full name of member _____
Rank Last First Middle

Address _____
Number and Street City State ZIP Code

Date of Birth (Mo. Day Yr.)	Height	Weight	Social Security Number	Flying Status
				☐ Yes ☐ No

This insurance is available only to AFA members

☐ I enclose $18 for annual AFA membership dues (includes subscription ($14) to AIR FORCE Magazine). ☐ I am an AFA member.

Name and relationship of primary beneficiary _____

Name and relationship of contingent beneficiary _____

Please indicate below the Mode of Payment and the Plan you elect:

Mode of Payment	Plan of Insurance: Standard Plan		High Option Plan		High Option PLUS Plan	
	Member Only	Member and Dependents	Member Only	Member and Dependents	Member Only	Member and Dependents
Monthly government allotment (only for military personnel). I enclose 2 months premium to cover the necessary period for my allotment (payable to Air Force Association) to be established.	☐ $ 10.00	☐ $ 12.50	☐ $ 15.00	☐ $ 17.50	☐ $ 20.00	☐ $ 22.50
Quarterly. I enclose amount checked.	☐ $ 30.00	☐ $ 37.50	☐ $ 45.00	☐ $ 52.50	☐ $ 60.00	☐ $ 67.50
Semi-Annually. I enclose amount checked.	☐ $ 60.00	☐ $ 75.00	☐ $ 90.00	☐ $105.00	☐ $120.00	☐ $135.00
Annually. I enclose amount checked.	☐ $120.00	☐ $150.00	☐ $180.00	☐ $210.00	☐ $240.00	☐ $270.00

Names of Dependents To Be Insured	Relationship to Member	Dates of Birth (Mo. Day Yr.)	Height	Weight

Have you or any dependents for whom you are requesting insurance ever had or received advice or treatment for: kidney disease, cancer, diabetes, respiratory disease, epilepsy, arteriosclerosis, high blood pressure, heart disease or disorder, stroke, venereal disease or tuberculosis? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance been confined to any hospital, sanatorium, asylum or similar institution in the past 5 years? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance received medical attention or surgical advice or treatment in the past 5 years or are now under treatment or using medications for any disease or disorder? Yes ☐ No ☐

If YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, EXPLAIN FULLY including date, name, degree of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I apply to United of Omaha Life Insurance Company for insurance under the group plan issued to the First National Bank of Minneapolis as Trustee of the Air Force Association Group Insurance Trust. Information in this application, a copy of which shall be attached to and made a part of my certificate when issued, is given to obtain the plan requested and is true and complete to the best of my knowledge and belief. I agree that no insurance will be effective until a certificate has been issued and the initial premium paid.

I hereby authorize any licensed physician, medical practitioner, hospital, clinic or other medically related facility, insurance company, the Medical Information Bureau or other organization, institution or person, that has any records or knowledge of me or my health, to give to the United of Omaha Life Insurance Company any such information. A photographic copy of this authorization shall be as valid as the original. I hereby acknowledge that I have a copy of the Medical Information Bureau's prenotification information.

Date _____, 19__ _____
Member's Signature

Application must be accompanied by a check or money order. Send remittance to:
Insurance Division, AFA, 1501 Lee Highway, Arlington, Virginia 22209-1198.

AFA Air Force Association

United of Omaha

Group Policy GLG-2625
United of Omaha Life Insurance Company
Home Office Omaha Nebraska

FORM 3767GL App REV. 10-79

5/87

Apply Today! If You Have Questions, Call TOLL FREE: 1-800-858-2003.

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"There I was..."

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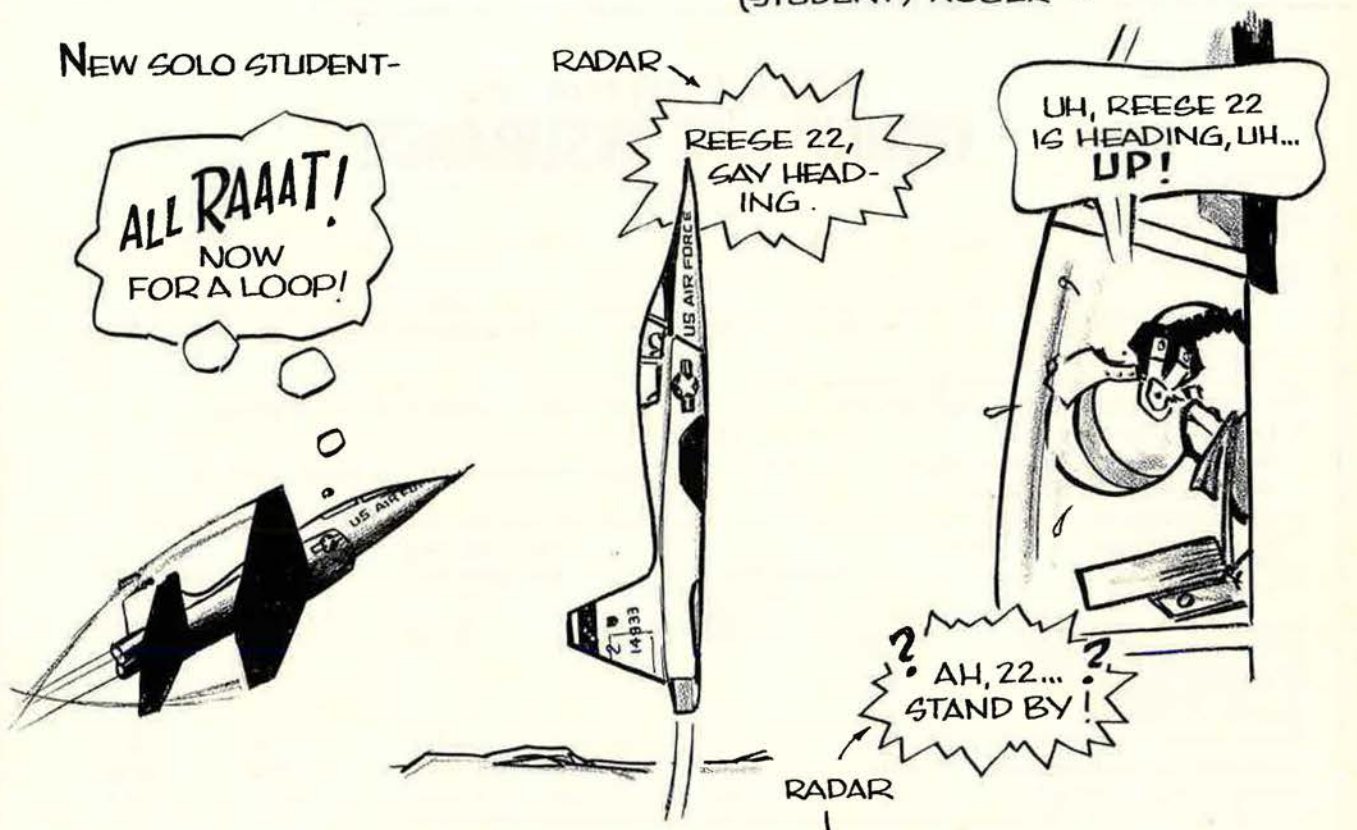

THANKS TO MAJ. CHRIS GLAESER, LANCASTER CA.

Bob Stevens

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