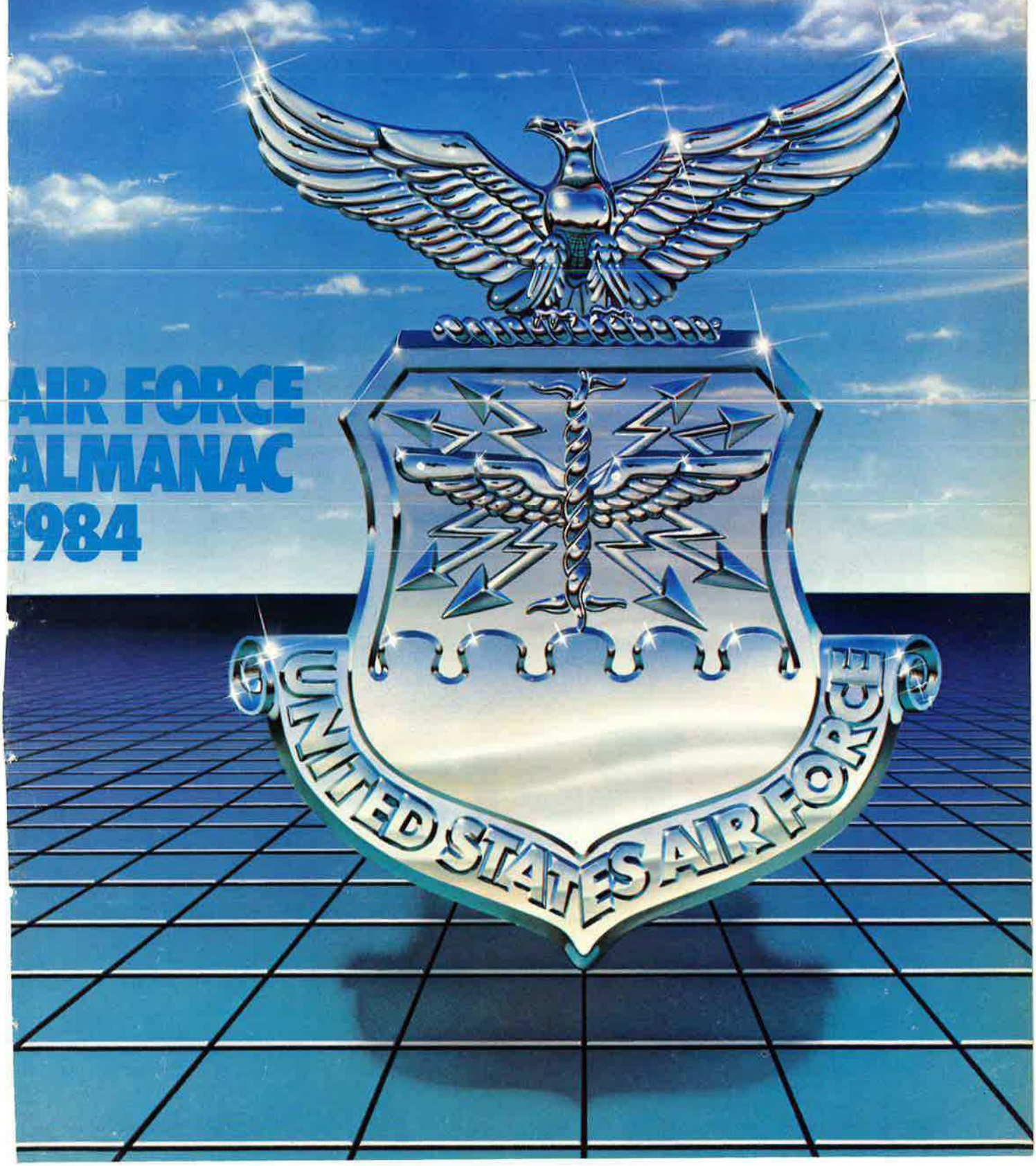
AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



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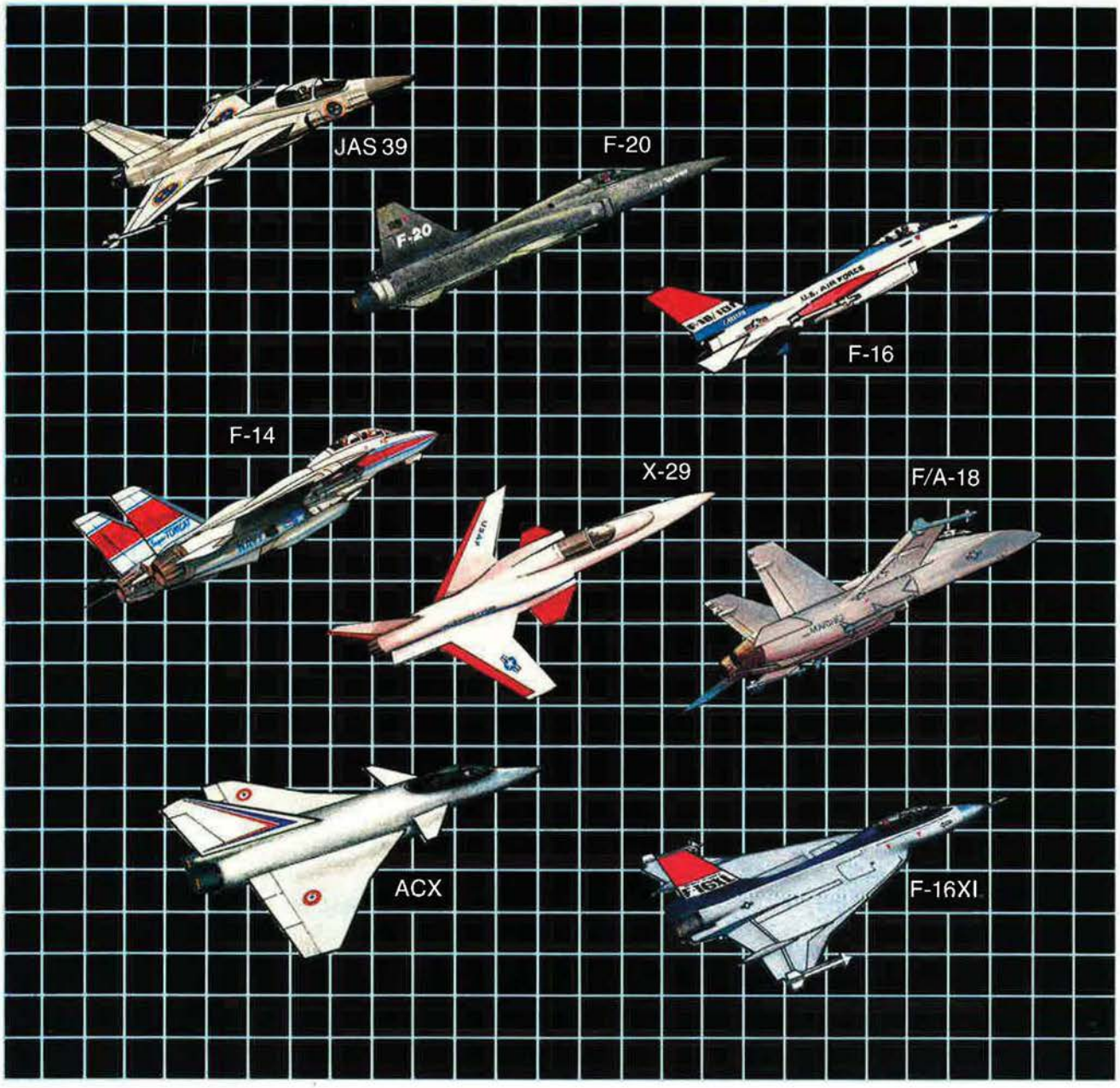

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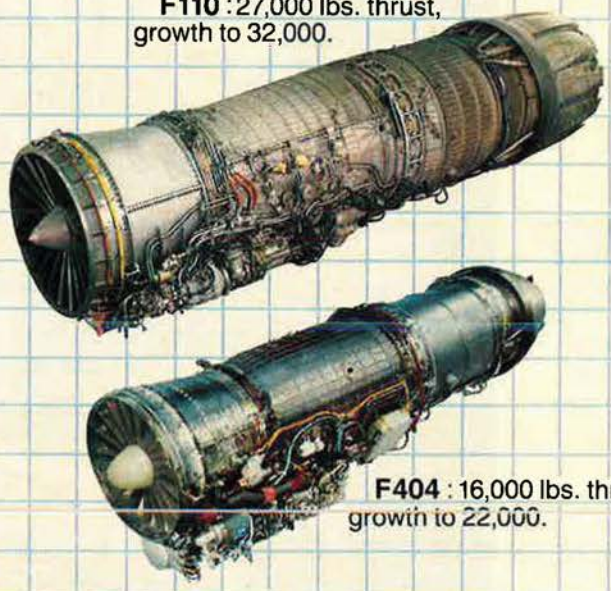

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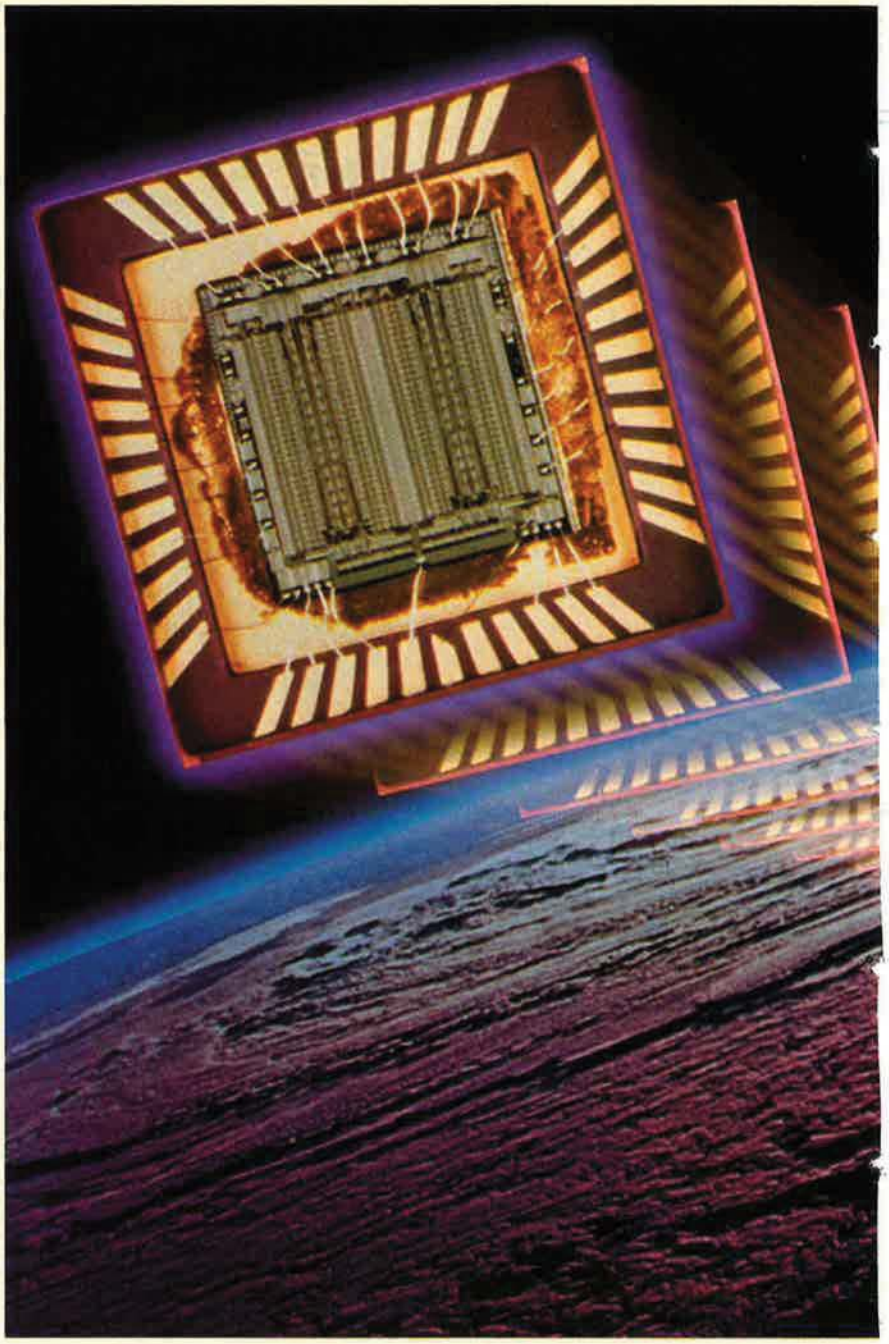

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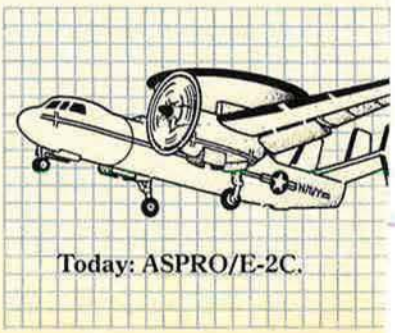

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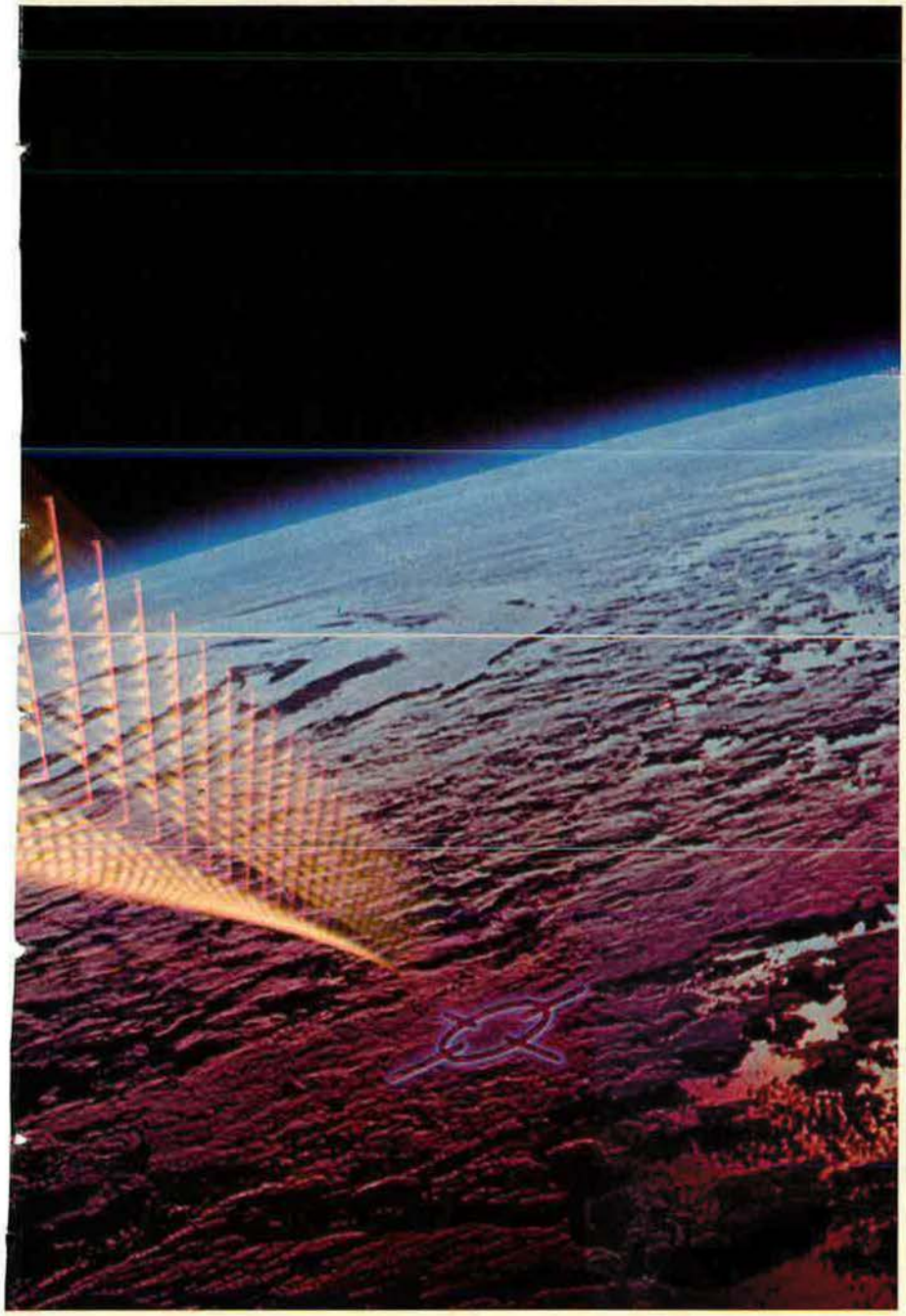

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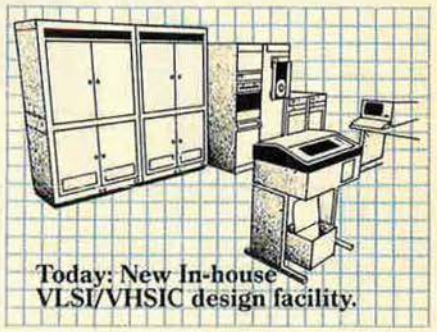

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MAY 1984
VOLUME 67, NUMBER 5

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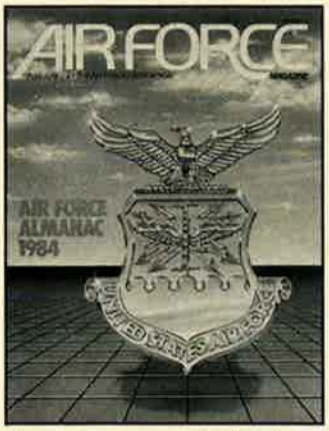

About the cover: The Air Force emblem sets the mood for this year's Air Force Almanac. Cover design by William A. Ford, Art Director, rendered with airbrush by artist John Porter.

Air Force Almanac 1984

Reports from the Major Commands

Reports from the SOAs and DRUs

An Air Force Almanac

Departments

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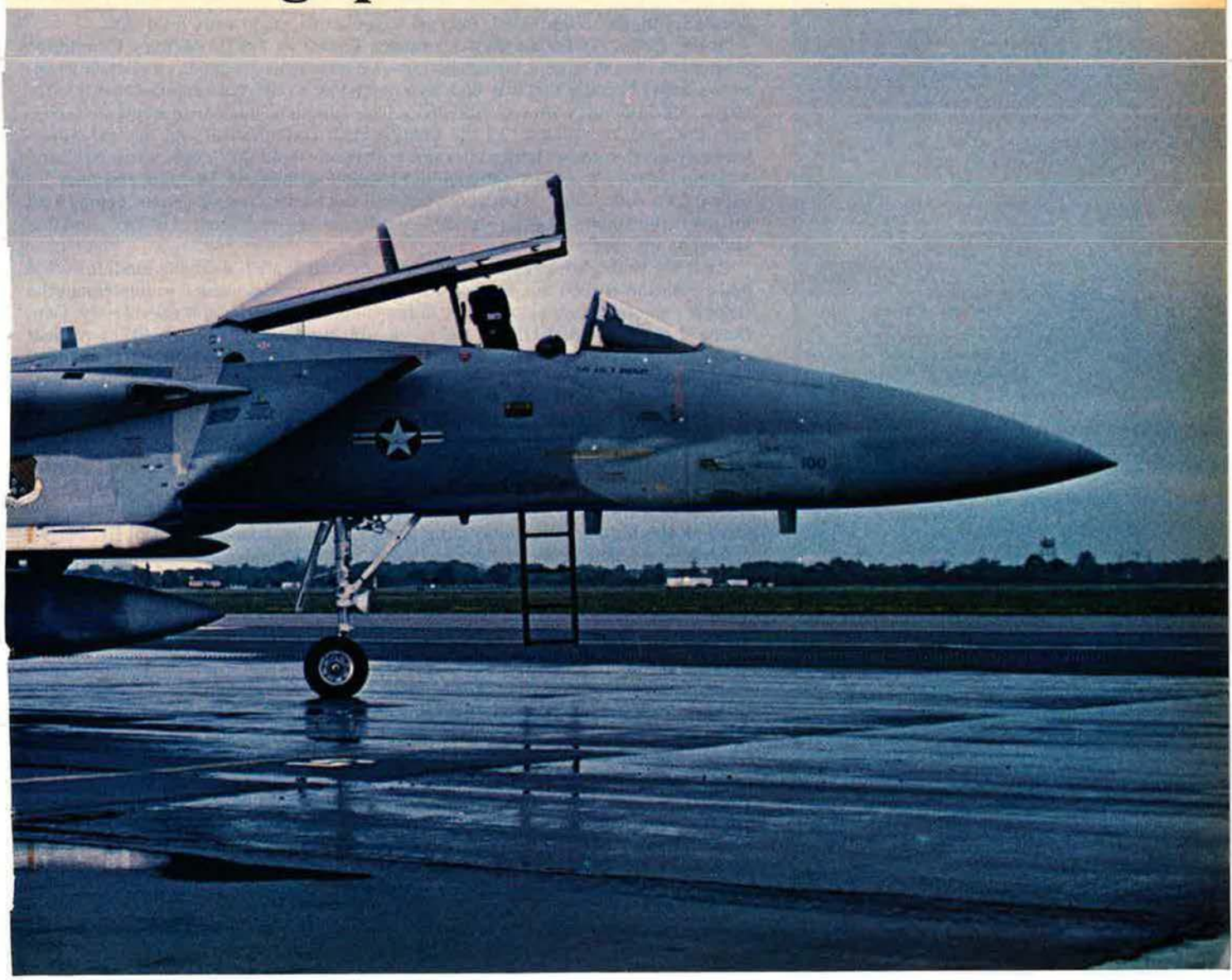

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AN EDITORIAL

What NATO Doesn't Need

ELSEWHERE in this issue, my respected colleague Ross Milton analyzes NATO and concludes that, by and large, the problems the Alliance faces today are the same ones it has always faced. Not everyone agrees with that view. It is sadly ironic that even as NATO observes its thirty-fifth anniversary of success, a growing number of people are ready to give up on it, restructure it in fundamental ways, or change its basic strategy.

The current pessimism reflects fears and animosities generated in opposition to NATO's decision last year to proceed with deployment of Pershing IIs and ground-launched cruise missiles in response to Soviet refusal to remove their intermediate-range, multiple-warhead SS-20s threatening all of NATO Europe. Paul Nitze, US representative to the INF negotiations, observes that while the Soviets failed decisively in their attempt to split the NATO member *governments* on that deployment decision, they succeeded in playing on the emotions of the *public* throughout the Western world. The task for NATO's statesmen is to see to it that we in the West are sensitive to those fears but are not stampeded by them. Certainly, the NATO situation does not require self-inflicted, internal wounds that might truly do us in.

In the 1950s, NATO adopted a strategy, known as NATO Military Committee Document 14/2, of large-scale retaliation—meaning heavy reliance on nuclear weapons—mainly because this was seen as a much lower-cost, convenient substitute for large, well equipped conventional forces. This simplistic nuclear strategy was a cop-out—and was short-lived. As the multifaceted, conventional and nuclear Soviet threat evolved, member nations became concerned about the "nuclear tripwire" and a clamor arose for a more rational and credible strategy of "flexible response"—calling for a wider range of both conventional and nuclear responses, in keeping with the nature and intensity of an attack. The new strategy was adopted in 1967, and was known as MC 14/3.

Over the years, however, NATO nations procrastinated, delaying modernization and expansion of their nuclear and conventional forces as needed to implement the flexible response strategy properly. Meanwhile, the Soviets built relentlessly. Gen. Bernard Rogers, SACEUR, is right—we are too dependent on NATO's nuclear response for our defense. The so-called "nuclear threshold" in Europe is low today because NATO nations have failed to provide for the full range of conventional weapon systems and supply levels that our strategy requires. It is this failure—not Western saber rattling or anything else—that is at the heart of the pessimism about NATO; it is this failure that is feeding public fears concerning our ability to deter attack—or handle it, if it comes.

The United States cannot leave NATO or threaten to diminish its vital participation because it hears harsh words said or because it would like its allies to bear a greater share of the burden. Certainly, these are issues to be addressed seriously, but we cannot simply pick up our marbles and come home. We are an interdependent, global nation, with major global interests and tremendous global responsibilities. We cannot escape our role as the leading partner in the Alliance. While we are not ideally suited for that role and do not aspire to it, what European nation is better suited for it? And which of our allies would be more effective and acceptable to all the others as leader?

Basic NATO strategy is sound. It is our implementation that is flawed. Again, General Rogers is right; what NATO needs are force improvements and force levels to keep the strategy credible. The general military and political structure of the Alliance, which has served remarkably well for thirty-five years, is also sound. So far, no one has come forward with a realistic and workable proposal that is better.

The times call for responsible leadership—real international statesmanship—to control the drift toward accommodation and toleration and to counteract the divisiveness of those who would drive us apart or weaken our Alliance. It is blatant hypocrisy to blame our ills on our strategy rather than on ourselves. There is no need for radical change or disruptive new ideas.

—RUSSELL E. DOUGHERTY, EDITOR IN CHIEF AND PUBLISHER

Lightning-Fast Information: Collins JTIDS Class 2 Terminals

JTIDS, the Joint Tactical Information Distribution System, will soon be a reality as the Collins Government Avionics Division of Rockwell International and Singer's Kearfott Division complete full-scale development and begin production of Class 2 terminals.

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- 40 years of Collins experience in RF systems and 20 years of tactical data link experience, including Link 4 and Link 11.
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Singer and Rockwell are committed to providing the Air Force and Army the lightning-fast information they need. To find out more about the JTIDS program and Rockwell's role in it, contact:

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AIRMAIL

Responsibility and Reason

I thought your lead editorial in the March '84 issue, "The Responsibility To Be Responsible," was excellent, suggesting, despite some candid reservations about whether the media had performed up to the highest standards in recent times, that media and military should seek some reasonable accommodation and understanding for the good of both.

The important thing at the present time is a dialogue in reasonable tones of voice, and that constructive reasonableness pervaded your piece.

Bill Monroe
NBC News
Washington, D. C.

Dead Center

Congratulations on another outstanding Soviet Aerospace Almanac issue. Your article "Beyond Andropov" *(March '84, p. 62)* provided such useful insight that I have asked everyone on my staff to read it. Author Edgar Ulsamer is to be commended for writing a piece on such a difficult subject that was so high in content and thoughtful analysis, yet with such a low fog index.

Too many others have tried to say too much and thereby said too little. Mr. Ulsamer hit the mark dead center.

Lt. Col. Gene E. Townsend, USAF
Editor, *Airman* Magazine
San Antonio, Tex.

• *Colonel Townsend served as the Education With Industry officer on the staff of* AIR FORCE *Magazine during 1979–80.*—THE EDITORS

Clear Goals

I just received the March '84 issue and enjoyed all of it. I am writing in response to the article by Robert W. Komer on "The Neglect of Strategy." I offer the following comment.

One usually determines a particular goal, develops a strategy to obtain it, and uses tactics to implement the strategy. Armchair historians like myself use the example of Hitler's goal of gaining more oil for his war machine; the strategy was to divert troops south toward Stalingrad and troops under Rommel in Africa in a two-pronged drive on the Mideast. Tactics varied from theater to theater, but the goal and the strategy remained constant.

The Soviets have an avowed goal of world domination; their strategy varies from place to place, as do their tactics. What then is the US goal? It seems to vary from week to week, crisis to crisis, administration to administration.

I suffered through the move out of France in 1966–67. I read all the JCS plans, US strategic thinking, saw what was happening, and then looked at reality on the ground. The only thing all these factors had in common was that it was 1966.

One of the main criticisms of the Vietnam War was that we had no clear strategy. Our goals kept changing, the strategy kept changing, the tactics were constantly changed, technology kept advancing—and still we are supposed to have lost.

Before the JCS or any successor organization can become effective, we as a nation must have clearly defined goals or else we will continue to fumble around blindly until the next crisis occurs. These goals must be set by the civilian leaders, and not by the military.

Lt. Col. William L. Howard, USAR
Spring Lake Heights, N. J.

Biased and Opinionated?

Who wrote the DARTS article in "The Bulletin Board" section of the March 1984 issue? Undoubtedly the writer was biased and opinionated against the structure of command. The missing points in this article are the facts, such as:

Fact 1. DARTS has not been in existence for two years. DARTS was a one-time manual reporting system designed to capture unique data over a specified six months. It was an effort generated to settle a turf dispute between the data-collection folks in the separations branch at AFMPC and the policymakers at Hq. USAF. Unfortunately, it also was an open admission that our automated data system did not work. Or, worse still, if it did work, then some people did not trust the results.

Fact 2. Only fifty-two percent of NCO drug abusers were separated during the six-month period of the DARTS report. However, if someone chose to look into it, they would find that separations have since exceeded seventy-five percent. And the twenty-five percent or so who have not been separated have not avoided it because of conscious decisions by discharge boards (as an instrument of command) or by commanders. Granted, Hq. USAF has an established policy that "NCOs will normally be separated." However, they normally are.

Fact 3. Commanders make the Air Force operate. They are charged with the responsibility to make decisions. A temporary distrust of urinalysis testing results should not be interpreted as a "reluctance of commanders to respond to proven urinalysis findings." The fact is that numerous test results were not proven, nor were they even accurate. Several hundred correction-of-records actions are now being processed despite the good intentions of our decision-makers.

Drug-abuse reduction efforts in the Air Force are working because of commanders, not because of policies. Drug abuse has always been a people problem that only dedicated commanders can solve. The solutions commanders need from policymakers is to: (1) establish a simple, clear-cut policy and stick to it, and (2) ensure that our technology (urinalysis, automated data systems, and people charged with advising commanders) is at its peak.

Obviously, I'm biased, too, but hopefully these few facts have balanced our news reporting.

Capt. D. M. Aldrich, USAF
Langley AFB, Va.

• *The DARTS article, which was written by the by-lined author, should have emphasized more strongly that it referred only to the six-month period under study. Worth noting, however, is that a blue-ribbon panel of mil-*

itary and civilian experts has reviewed the forensic procedures and operations of the Army/Air Force drug testing laboratories. The overall finding of the blue-ribbon panel was that the laboratories have been accurately identifying drug abuse. No evidence of false positive results was found, although some samples were found to have scientific deficiencies. In those cases, adverse action could not be supported even with positive results.

We agree that policies don't reduce drug use—dedicated commanders carrying out clear-cut policy, based on technically accurate information, will.—THE EDITORS

Instant Ace

John Frisbee, in his "Valor" article "Instant Ace" in the March '84 issue, says of William Shomo's efforts: "No other American pilot scored that many [seven] confirmed victories in a single mission."

Not true. On October 24, 1944, Cmdr. David McCampbell, Commander of Air Group 15 on board the fast carrier USS *Essex*, along with his wingman Lt. (j.g.) Roy Rushing of VF-15, both flying Grumman F6F Hellcats, attacked a formation of forty Japanese fighters. In the ensuing melee, Commander McCampbell shot down nine, while his wingman got six—an event that earned Commander McCampbell the Congressional Medal of Honor. Commander McCampbell finished the war with thirty-four aerial victories, twenty aircraft destroyed on the ground, and the highest number of confirmed victories (nine) in a single mission of any American pilot in any branch of the service.

The records of Commander McCampbell and Major Shomo may both "be credited equally well to the valor of a fighter pilot who didn't stop to count the odds."

Capt. Vincent A. Abruzzese,
USAF
Langley AFB, Va.

The "Instant Ace" article in the March '84 issue was very interesting. However, Mr. Frisbee is in error when he states that no other American pilot scored seven confirmed victories in a single mission.

Col. William L. Leverette, now retired, shot down seven enemy aircraft on a single mission flying a P-38 in the Mediterranean theater in 1943. He was awarded the Distinguished Service Cross for that mission.

Colonel Leverette indicated that Col. Neel Kearby is also thought to have a similar score while operating in the Southwest Pacific. Colonel Kearby was awarded the Congressional Medal of Honor for operations in the area—posthumously.

Lt. Col. R. E. Keyes,
USAF (Ret.)
Houston, Tex.

• *Readers Abruzzese and Keyes are correct.*—THE EDITORS

Military Retirement

Lt. Lance Charnes's letter published in the "Airmail" section of the February '84 AIR FORCE Magazine demonstrated a lack of understanding on a number of points. Rather than address each point, I'd like to focus on one—the military retirement system.

The military retirement system is a force-management tool whose primary objective is to foster readiness of the armed forces. It is *not* a pension system to provide old-age annuities. The retirement system, enacted in its present form in 1948, complements the up-or-out promotion system by allowing those who elect not to or who are unable to serve a full thirty-year career to leave military service at an age that permits them to pursue a second career. However, while in retired status, they remain subject to the Uniform Code of Military Justice and are subject to involuntary recall at any time to active duty—conditions quite unlike those found in the private sector. By providing a means for people to retire over a range of ages, the system stimulates the flow necessary to balance the experience and youth dimensions of the force.

The retirement system is by no means lavish. The average monthly retired pay for an enlisted retiree in 1982 was $781. This works out to be less than the poverty-level income for an urban family of four. Data on retiree second-career incomes indicate that military retirees experience significant and persistent second-career earnings losses compared to their civilian contemporaries. For example, enlisted retirees start second careers at incomes averaging more than $9,000 below the average earnings of an equivalent civilian high school graduate who did not dedicate twenty or more years in the service of this country.

Military life is demanding, and quite often the jobs our people do are neither stimulating nor self-actualizing. Our mission requires that people put in long hours and serve in remote locations, often working outdoors in subfreezing temperatures or desert heat. Frequent remote tours and temporary duty assignments (TDYs) resulting in prolonged family separations are commonplace in many career fields. Family housing is not always as good as we'd like it to be. The list of irritants is long, but, nevertheless, in letters from the field, our members tell us they are willing to endure these conditions because they recognize what they are doing is important. They also recognize that there is a light at the end of the tunnel—after twenty or more years of service they will be able to retire as an alternative to continuing to endure the rigors of military life.

The military retirement system has not been sacrosanct. It has undergone numerous changes in the last few years alone. One of the most significant of these modifications was changing the basis of retired pay from final basic pay to the average of the highest three years of basic pay. This change, which affects all members entering after September 7, 1980, will reduce lifetime retired pay by between eight and twelve percent. In addition, Congress recently imposed a temporary three-year (FY '83–85) cost-of-living adjustment (COLA) cap of fifty percent of the projected CPI for retirees under age sixty-two. The FY '84 DoD Authorization Act also contained several other changes, including rounding down retired checks to the next lowest dollar and eliminating the one-year look-back provision.

The retirement system is, undeniably, under great pressure. Nevertheless, it is important to keep in mind that the system has worked well in the nearly four decades since its enactment. During this period the services have experienced a number of events that have placed great strains on our personnel management system. These include the rapid changes in end strength before and after the Korean and Vietnam conflicts, the swings in active-duty pay from full comparability in 1972 to the significant pay "gaps" in the late 1970s, and the transition from a draft to a volunteer armed force. Through these times, the retirement system has been one of the "constants"—a relatively stable foundation that our careerists could rely on to build a modicum of financial security.

The Fifth Quadrennial Review of Military Compensation has carefully examined a number of alternatives to the retirement system. Their analysis has led them to conclude that further reductions in the value of the present system could damage retention, with collateral impacts on readiness.

In the political fervor over reducing the deficit, further changes to the retirement system are possible. Cost savings, while desirable, are not suffi-

cient grounds for changing a system that has withstood the test of time. The overriding criteria of preserving the readiness of the force and honoring commitments to those who have served faithfully should not be discarded in the name of economy or because of the repetitive drumbeat of the system's critics. Following that course would be an unwise gamble with national security—one no responsible person would make.

Lt. Gen. Kenneth L. Peek, Jr., USAF
DCS/Manpower & Personnel
Washington, D. C.

The Party Line?

Let's turn over the Pentagon to Lt. Lance Charnes *(February '84 "Airmail," p. 9).* Keep the four-stars around as technical advisors and move out the aspiring company men and women. The Air Force would be better if there was more thinking like Lieutenant Charnes's at the top.

It is refreshing to see a young officer take responsible shots at the party line.

As for Vincent Thomas's series on the Grace Commission, an independent thinker has to question his expertise and objectivity. For example, in his February '84 article "Expensive Ways to Save Money," Mr. Thomas gave about eight column-inches to rhetoric about the battleship *New Jersey* and the 1,562 men aboard who had no idea when they were coming home. Sounds really good—if you are a party-liner. I could visualize the four-stars and the service PR hacks screaming "Right on!" as they dreamed of the emotional impact that pap would have on your readers.

The fact is that Naval Reservists have been replacing the original crew for months. Several groups have gone from this frontier town alone. How many more from other parts of the country? It makes no difference whether these actions amounted to permanent replacement of the original crew members or only permitted them to take leave. What is important is that the mental scenario Mr. Thomas attempted to create is totally incorrect.

The point is that Mr. Thomas didn't have his facts straight. Or he did, but chose to ignore them. Considering that, what thinking person can give credence to his opinions?

Shame, shame, that you let an obvious error like that get by during editorial review. But, then again, what he said was the party line.

Lt. Col. John Walmsley, USAF (Ret.)
San Antonio, Tex.

AIRMAIL

• *Author Vincent Thomas comments: "At the time the commentary to which Colonel Walmsley refers (about the crew of the battleship* New Jersey*) was being prepared, there were no firm plans for even* temporarily relieving, *let alone replacing, some crew members with Reservists. Subsequently, a contingent of eighty-seven Reservists was deployed to the Mediterranean in order to make possible Christmas at home for some regular crew members. Since that time, the program of temporarily relieving regular crew members with Reservists has been expanded, and it is now anticipated that a total of 349 Reservists, deploying in six different contingents, will have served temporarily aboard* New Jersey. *Although that is a sizable number, it still is but twenty-two percent of the ship's total crew. Furthermore, according to the Office of the Chief of Naval Reserve, the average period of temporary duty served by those Reservists who do deploy to the Mediterranean is just slightly more than three weeks.*

"Furthermore, at the time the commentary was first written, it simply was not known for sure when the New Jersey *would be coming home. Subsequently, it was decided to expedite the reactivation of her sister ship, the* Iowa, *which now is being readied at the Ingalls Shipyard at Pascagoula, Miss., for fleet duty, so that she could be recommissioned April 30 rather than on the originally planned date of July 4. It is now planned that she will relieve the* New Jersey *in July, which means that the* New Jersey *will have been deployed for at least thirteen months before she returns to her home port. Although the Navy now hopes to make possible one brief leave period in CONUS for all crew members, the time spent on leave will indeed be a small fraction of the total time deployed.*

"Also, when the call for Reserve volunteers first was made, the Navy had no way of knowing just how Reservists would respond to it. It was the wonderfully enthusiastic response that made possible the expansion of the current ongoing program."—THE EDITORS

The Peace Movement

On page 11 of the February '84 issue "Airmail," Alfred J. Bersbach, writing as a "peace marcher," objected to Gen. T. R. Milton's December '83 article "Setup for Nuclear Blackmail" and said that he has "yet to meet anyone who thinks our only choice is between 'Red' and 'dead.' "

I have also sat through a few peace organization meetings, including one memorable day-long symposium (which cost a $10 registration fee) sponsored jointly by the University of California at Davis and the Physicians for Social Responsibility. For hour after hour all sorts of accusations and denunciations were hurled forth, sometimes almost hysterically. One speaker even said that the national economy was in a shambles because all the engineers were either in the military or worked for military suppliers. I have also corresponded with several peace activists. All of these contacts had one thing in common.

The central theme was always the same—antidefense, anti-Administration, emphasis on the horrors of nuclear war and blame for every possible problem on the military-industrial complex. I have never heard any peace activist mention the Soviets in a derogatory manner or offer any alternative to military preparedness other than continued discussion. That, as experience has proven, would only result in further concessions.

While Mr. Bersbach may not consider that approach as "better Red than dead," it is certainly not supportive of any effort to protect our present way of life. The so-called "peace movement" was initiated by the Soviets and continues to be orchestrated by them, finely tuned to whatever theme suits their purpose.

Frank M. Schnekser
Placerville, Calif.

Middies in Air Force Blue

Maj. Gen. Robert A. Rosenberg did a great job in his February '84 article, "The Annapolis Connection," in conveying the understandable pride shared by Naval Academy graduates who have risen to general-officer rank in the Air Force. As was pointed out in the article, former midshipmen continue to make valuable contributions in their roles as deputies to graduates of "other" academies.

Indeed, there are some time-honored military traditions that we should strive hard to preserve far into the future.

William J. Barattino
Albuquerque, N. M.

The Inner Feelings

Having served in the USAAF and USAF from 1943 to 1952, I can only

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say that I regret not staying for my retirement. The opportunity was there. Hopefully, retirement benefits will never be reduced or taken away from those who have served and given so much for this great country of ours.

Time cannot erase the hardships that so many servicemen had to cope with and endure. My heart, thoughts, and prayers went with the aircrews during the Korean and Vietnam conflicts. Only we who have been a part of wars and conflicts from 1941 to the present time can appreciate the inner feelings of all airmen in combat.

Gen. George Kenney used to call us "his kids," but he put his faith in us, just as we must put our faith in the modern-day airman. We of the old breed must never forget that we were scared as hell, too—not only on our first mission but on every one thereafter. But we kept in mind that our sacrifices were all for the defense of our great country and the protection of its freedoms.

God bless you, fellow airman, whatever and wherever your mission may be.

TSgt. Earle R. Harris,
USAF (Ret.)
Naugatuck, Conn.

Takhli F-105s

I need information on three aircraft stationed at Takhli RTAFB, Thailand, during the spring of 1967.

First, I need the ground crew's names on aircraft 638301, an F-105F "Wild Weasel" aircraft piloted by Lt. Col. Leo Thorsness. My picture of Colonel Thorsness's aircraft shows an "A1C" on the aft canopy and a "SSgt." on the pilot's canopy. I can count the letters but can't quite make them out.

Second, I need the same information for aircraft 638354, an F-105F piloted by Maj. Merlyn Dethlefsen. Major Dethlefsen's crew chief was Sergeant Siefert; I need his initial. Further, I need a photo of the tail of this aircraft. I need to know the color of the fin cap and the color of the USAF ID numbers. I have photos of the front of Major Dethlefsen's F-105, which show his name misspelled.

Third, I need the names of the ground crew for aircraft 638349, piloted by Capt. Arnold Dolejsi.

This information will help me make accurate models of these aircraft as requested by the pilots. Please contact me at the address below.

Paul L. Chesley
6804 Bonnie Court NE
Albuquerque, N. M. 87110

Unit History Bibliography

I am working on compiling a bibliography concerning US Army Air Forces and US Air Force unit histories, and would greatly appreciate hearing from unit associations, historians, and collectors with titles concerning units that they are aware of.

Any assistance that readers can provide me with this project will be greatly appreciated. Please write to me at the address below.

James T. Controvich
89 Orpheum Ave.
Springfield, Mass. 01118

AIRMAIL

Parasite Fighters

I am seeking information concerning the design, development, test, and operational use of "parasite fighters" with B-29 and B-36 bombers. Tests of this concept, using the McDonnell XF-85 Goblin and a B-29, were started in 1948; operational use of GRB-36Fs and RF-84Ks began in 1955; and the program was terminated about a year later.

I'd like to hear from pilots, designers, test personnel, maintenance crew, and anyone else involved with the programs who would be willing to share their experiences. Any information, photos, stories, or anecdotes would be very much appreciated.

Please contact me at the address below.

Terry L. Sunday
6655 S. Piney Creek Circle
Aurora, Colo. 80016
Phone: (303) 699-0384

Newsboys Airforce

I am interested in interviewing former members of the Special Leaflet Squadron of the Eighth Air Force who served during World War II. Nicknamed the "Newsboys Airforce," the Special Leaflet Squadron was composed of the 422d Bombardment Squadron (H) of the 305th Group, 1st Air Division (later designated 406th Bomb Squadron), Eighth Air Force. This unit flew leaflet missions out of Chelveston, Cheddington, and Harrington, England, and was commanded by Col. Earl J. Aber, Jr., from November 26, 1943, to March 4, 1945.

If there are any former members of the Special Leaflet Squadron who would be willing to relate their experiences, I would greatly appreciate it if they would please contact me.

Edmund M. Kirk
4545 Pennypack St.
Philadelphia, Pa. 19136

Raids on Saint-Nazaire

I am seeking information relating to a raid carried out on submarine pens at Saint-Nazaire, France, on January 3, 1943, by thirteen B-24s from the 44th Bomb Group and seventy-two B-17s from the 91st, 303d, 305th, and 306th Groups of the Army Air Forces.

A number of these aircraft crash-landed in Pembrokeshire, Wales, on the return flight, including No. 41-23806 of the 44th Bomb Group, 68th Bomb Squadron, which crashed at Milford Haven with its fuel supply exhausted.

I am researching for a book on wartime Milford Haven and would welcome information about this particular aircraft and about its crew. If there are survivors, I would very much like to contact them in order to use their stories in the book.

I would also like to hear from any other veterans whose aircraft crashed at Dale, Talbenny, Templeton, and Haverfordwest airfields in Pembrokeshire that dark night forty-one years ago.

Vernon Scott
"Rowana," Cross Park
Pembroke Dock, Pembrokeshire
Dyfed SA72 6SW
United Kingdom

Ploesti Raid

I am interested in obtaining copies of two B-24 unit histories entitled *The 389th Bombardment Group: A Pictorial Review of Operations in the ETO* and *The Story of the 93d Bomb Group.* In addition, I hope to locate any such pictorial history of the 376th Bomb Group in World War II (if such a book exists). These books would be most useful as research for a book I wish to write about the low-level mission against Ploesti, Romania, on August 1, 1943.

If anyone has any photographs showing close-ups of the inside or outside of the B-24s that flew to Ploesti or any of the books mentioned above, please contact me at the address below. (Photos can be copied and returned or reimbursement will be sent for reproduction of personal photographs.)

Steven D. Nylen
404 Engel Ave.
Henderson, Nev. 89015

46th Fighter Squadron

We have a very important matter that involves members of the 46th Fighter Squadron who were based at New Caledonia during World War II.

A major international resort complex is currently under construction at Tiare in New Caledonia, and we believe that this was the location of the

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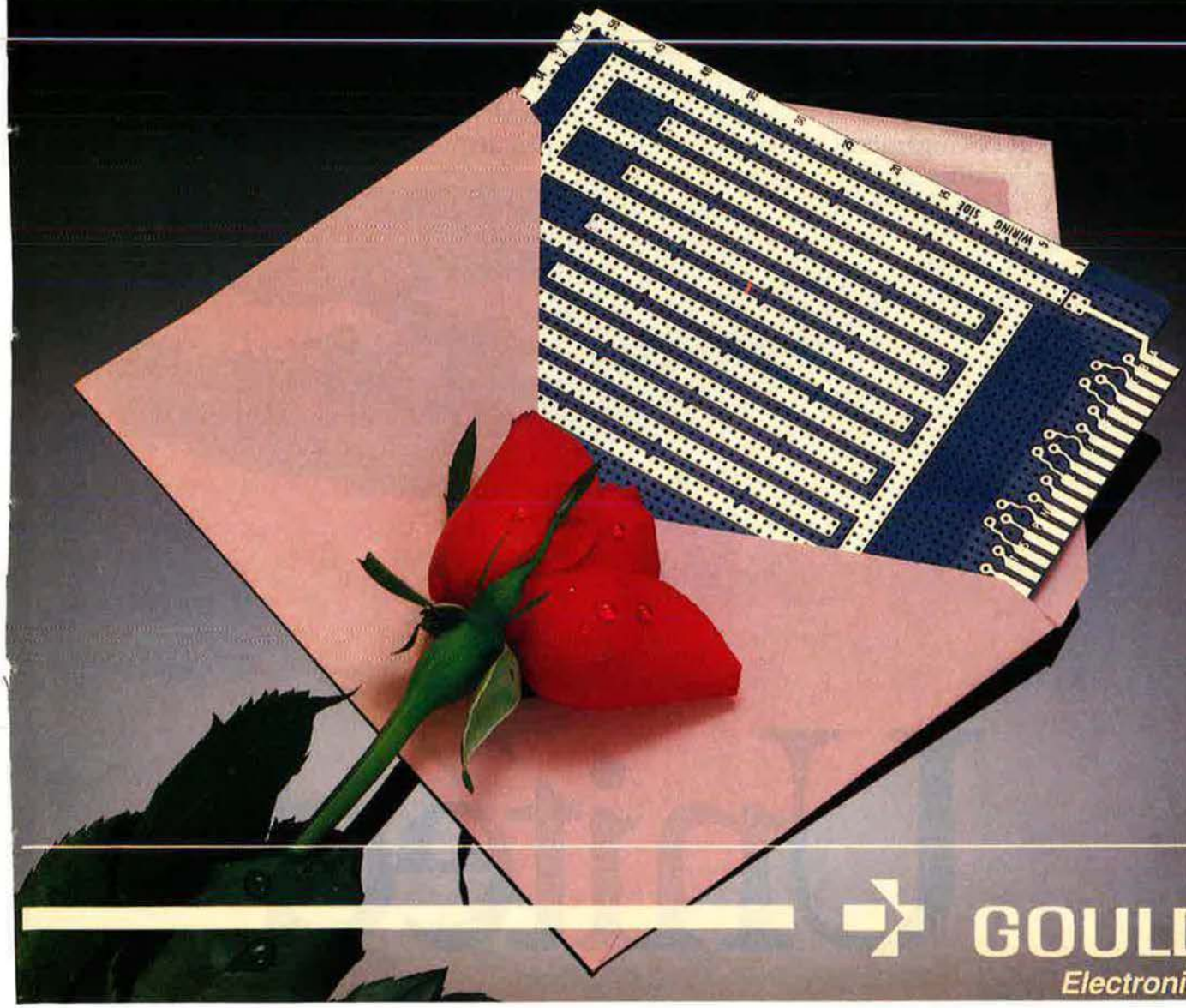

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squadron's base for some period of time during the Second World War.

We are currently compiling a history on Tiare. Its past is quite interesting and worthy of publication. The only period that is missing involves the war years. There are quite a few stories surrounding this period. However, there are no facts to substantiate these tales.

If we could correspond with any personnel who may have been on duty during the period concerned, we would be most grateful. We would also definitely be keen to obtain any photographs possible. With the owners' permission, we would then create a special bar within the development.

Please write us at the address below.

John S. Fuller
6th Floor, Leyland House
332-342 Oxford St.
Woollahra, Sydney 2025
Australia

Crash of ROTC Students

I am seeking information relevant to an air crash of USAF ROTC students from George Washington University in Washington, D. C. I have exhausted every conceivable means in trying to find out about this elusive incident.

I was on that plane that went down in late 1958 or early 1959 somewhere in the foothills of Virginia. I remember clearly that it was winter, as there was two feet of snow on the ground.

On board were about thirty students—approximately twenty males and ten females of Angel Flight. We had been to Eglin Field in Florida and were en route back to Bolling Field near Washington when the crash took place.

Anyone who can furnish any information on this crash is asked to please contact me at the address below.

Gordon M. Callison
430 40th St. N.
St. Petersburg, Fla. 33713

5th Combat Comm Group

The 5th Combat Communications Group will celebrate its twentieth birthday this July 1, 1984. The unit would like to hear from former members and is interested in obtaining any artifacts, photos, clippings, or personal anecdotes.

Former members are asked to contact the address below.

5th CMBTCG/PA
Robins AFB, Ga. 31098
Phone: (912) 926-3384

Vietnamese Air Force

At the present time I am gathering photographs and other material for a book on the Vietnamese Air Force. I would like to establish contact with anyone who has material on this subject.

Contact me at the address below if you might be able to help out.

Jim Mesko
4019 LeCona Rd.
Akron, Ohio 44319

AIRMAIL

Consolidated Catalinas

A former member of the RAF who flew in Consolidated Catalinas (PBYs) during World War II is seeking information about American squadrons equipped with this type of aircraft.

Any anecdotes or other relative accounts will be very gratefully appreciated. Please contact the address below.

Andrew Hendrie
Sandy Ridge, Amberley Rd.
Storrington, West Sussex
England RH20 4JE

BAD 2 Association

During World War II, the Eighth Air Force operated an air depot at Warton in Lancashire, England, modifying and repairing bombers and fighters. At one point in 1944, official records indicate that there were 10,000 Americans stationed at BAD 2 at Warton.

In the past seven years we have located about 500 of those Americans, and they are now members of our BAD 2 Association. We are hoping to locate many more of our former buddies who served in any capacity at BAD 2, including mechanics, test pilots, nurses, doctors, Red Cross girls, inspectors, radio men, etc. We will hold a 1984 reunion in Williamsburg, Va., in September.

For more information about the BAD 2 Association, please contact the address below.

Dick McClune
Membership Chairman
527 Quarterfield Rd.
Newport News, Va. 23602

Class 55-H

On February 7, 1955, pilot training Class 55-H graduated at Laredo AFB, Tex. As a MDAP student, I was among the lucky ones to receive the silver pilot wings.

We had, as was the custom, a classbook printed with the addresses and photographs of all the graduates. I hope to renew the friendships among my classmates and to make a new classbook about us thirty years later. If possible, I would also like to organize a reunion for next year.

All former members of Class 55-H are asked to contact me as soon as possible at the address below.

Gabriel R. Christiaen
Mexicostraat 10
B 8270 Ichtegem
Belgium

Class 44-J

Is there anyone left out there from Class 44-J that was assigned to a P-47 group at Avenger Field in Sweetwater, Tex.? We were the first group to occupy the facility after the WAAFs left.

Names that I remember include George Leeland, Fred Leavitt, Bill Nunnery, William E. Mulcahy, Lt. Drew (brother of Urban Drew), Chink Lewis, Bob McCann (killed), Carroll Higgens, and Lt. Branch (killed), to name a few. It really would be a pleasure to hear from any of the ol' gang and to arrange a reunion.

Also, is there anyone who could tell me where I can purchase a P-47 gunsight with just the ring and pipper (not the computing sight that was brought out later in the war)? I have looked everywhere with no success.

Paul H. Leichty
1914 Barstow Pl.
Sarasota, Fla. 33580

599th Air Engineering Sqdn.

I am looking for ex-servicemen who served in the 599th Air Engineering Squadron, 383d Air Service Group, that activated near San Antonio, Tex., in 1944 and that served in India in 1945 and 1946. We have a roster and would like to add any former members' names, addresses, and telephone numbers. We have photographs of many of the people who served in the 599th/383d and would like to identify more of the unknowns.

I'm also looking for an Air Service Command pin issued to the unit while we were stationed in India. Please contact me at the address below.

Walter Pytlowany
51 Bruce Ave.
Hicksville, N. Y. 11801
Phone: (516) 935-7814

347th/392d OTSs

I am interested in contacting all former members of the 347th and 392d Observation Training Squadrons of Brooks Field, Tex., who flew that "ugly duck" O-52 aircraft during World War II. If there is sufficient response, maybe we could arrange a reunion in the fall of 1984.

Also, I am interested in learning if

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there is an existing O-52 anywhere within the US. Please contact me at the address below.

Lt. Col. Allan F. Beck,
USAF (Ret.)
1204 California St., NE
Albuquerque, N. M. 87110

398th Bomb Group

I am looking for members of Crew No. 181, which flew B-17s with the 398th Bomb Group (601st Bomb Squadron) of the Eighth Air Force in World War II.

Members of this crew include Nigel B. Carter, Jason M. Axson, Jr., Edward Castro, Richard L. Kukuljan, William R. Carr, Robert R. Doll, Donald D. Dorfmeier, Charles A. Hammonds, and Sanford A. Lewis.

The 398th Group is contemplating a reunion in September 1984. Anyone with any information on these men is asked to contact me at the address below.

Harry E. Cowen
149 Meadowbrook Dr.
Bethel Park, Pa. 15102
Phone: (412) 835-0880

35th Tac Fighter Wing

I would like to hear from anyone who worked in the 35th Tactical Fighter Wing intelligence section at George AFB, Calif., from April through June 1972, and from anyone who attended the class designated as #3ABR20430, concerning air intelligence operations, at the Technical Training Center at Lowry AFB, Colo., during February and March 1972, to include my two instructors. This was the last class of its kind ever to be offered.

Please contact me at the address below.

Paul E. M. Collin
FCI #77634-012 Unit-C
P. O. Box 7000
Texarkana, Tex. 75501

Where Are You?

I am looking for anyone who was in the 370th Fighter Group, 401st Fighter Squadron, in 1944. This was a P-38 squadron in Europe. My brother, Lt. William L. Pavlovsky, flew a P-38 with the 401st and was killed on July 14, 1944, over St. Maure, France.

The reason I would like to find anyone from these outfits is because our family has heard two completely different stories of how my brother died after being shot down. The family would like to get it straight, and we feel this would be a good way.

One person we are seeking in particular is Lt. Robert E. Parry. He was on that last flight with Bill and later took a trip into St. Maure to find out what happened to my brother.

Please send any information on my brother to the address below.

Jim Pavlovsky
7238 Calesa Ct.
Citrus Heights, Calif. 95621

For years I have been trying to discover the whereabouts of my former pilot, then-Capt. Frederick M. Olsen, who originally lived in Lombard, Ill. We served together in the 868th Bomb Squadron, Thirteenth Air Force, in World War II. We saw action in the South Pacific theater.

None of my former crew members seem to know where Captain Olsen lives. Last word from his parents during the 1950s was that he had stayed in the service and was then stationed in Japan. Prior to that he had been with USAF at Wright-Patterson AFB, Ohio.

Any assistance that readers may be able to give will be deeply appreciated.

Jack W. Vogel
205 Hershey Rd.
Lititz, Pa. 17543

I'm seeking information concerning Lt. Robert "Butch" Reichelderfer. I would especially like to learn of his service during World War II.

I have a picture that he sent me when I was nine years old. He is standing beside what appears to be a P-47 Thunderbolt. One of my aunts told me that he was killed in action on the day before the Germans surrendered in Italy. I also know that he flew as wingman for his CO, whose last name was Bond. He took basic in Miami Beach, primary training at Coleman Field, Tex., and he was commissioned and received his wings in May 1944 at Foster Field, Victoria, Tex.

Anyone with any information on Lieutenant Reichelderfer is asked to contact me at the address below.

Rev. Robert A. Scheidly
1033 Hartzell St.
New Haven, Ind. 46774
Phone: (219) 493-3230

I am looking for a James Kenneth Lang, born November 15, 1946, in Cumberland, Md. We both lived at Shawnee Acres Orphanage in Dayton, Ohio. I was adopted in 1955. My brother James was adopted in June 1960 by an Air Force family sta-

tioned at Wright-Patterson AFB, Ohio, through the Montgomery County courts in Dayton, Ohio. His adoptive last name is not known, but before his adoption he went by the name of Kenny.

We have been separated now for twenty-seven years. He is my only living next of kin. Anyone with any information on this person is asked to please contact me at the address below.

Donald J. Lewber
99 Partridge Ct.
Selfridge ANGB, Mich. 48045

I am trying to locate Robert E. Horne, who was stationed at MacDill AFB, Fla., during 1950–53. He was an aircraft propeller technician assigned to the 305th Bomb Wing and the 305th AREFS who departed for Guam with his wife Mary and his son in 1954.

Any information that readers may be able to provide would be greatly appreciated.

CMSgt. William B. Camp, USAF (Ret.)
113 Devonshire Rd.
Warner Robins, Ga. 31093

I am searching for an Air Force officer, Fred T. Thessing. We served on Okinawa in 1945. His last known address was at the Air Tactical School at Tyndall AFB, Fla., in 1951.

Anyone with any information on this officer is asked to please contact the address below.

James Gackle
Rte. 1, Box 89
Dickey, N. D. 58431

I am seeking information about a T. A. Cummins. He was a bombardier in the 869th Bomb Squadron, 497th Group, 73d Wing, which was stationed on Saipan during World War II.

Please contact me at the address below.

S. J. Callaway
Rte. 5, Box 375
Waco, Tex. 76705
Phone: (817) 829-1765

I would appreciate learning of the whereabouts of a former cadet—Bob Robinson, Class of 1930, Kelly Field, Tex. He was a classmate of my brother.

Please contact me at the address below with any information concerning this person.

W. Hugh Scott
P. O. Box 574
Cottonwood, Ariz. 86326

I need to hear from any and all personnel of the 314th Composite Wing, Fifth Air Force, based at Johnson Field in Japan during 1945–47.

AIRMAIL

In particular, I am looking for Clinton J. Funkhouser, Lieutenant Krengel, Sergeant Smith, Sergeant Barksdale, Sergeant Dillow, TSgt. Dick Carl, Cpl. Lee Gardine, Dennis Cash, George Shapley, Corporal Halverson, Robert Kibler, Ray Chambo, H. O. Barwhart, and Eugene Taller.

Louis Buddo
Box 35372
Louisville, Ky. 40232

I am looking for the following lieutenants who served during World War II: W. A. Stroud, Charles L. Armstrong, Camille Pelletire, Frank Sneff, and Charles Coleman.

I'd like to hear from them, their relatives, or anyone knowing their present addresses.

Maj. Richard C. Harris, Jr., USAF (Ret.)
4813 Burton SE
Albuquerque, N. M. 87108

Collectors' Corner

I need some help! For some time now I have been trying to find a USAF blazer crest—with no success. I had one, but it finally got so old and frayed that, like me, it is now retired.

I have found crests made of felt, but I don't want those. I want the good quality, braided-gold-thread jobs like the AFA blazer crest (which I wear quite often).

Maj. Samuel T. W. Davidson, USAF (Ret.)
40 Minquil Dr.
Newark, Del. 19713

In 1953, I started a fantastic collection of photographs of aviation history—eight-by-ten glossy photos of aircraft, pilots, and other aviation greats. By the mid-1960s, I had more than 8,000 photos in my collection, many of which could never be replaced.

During my separation for divorce, my ex-wife "lost" my collection, and I never found out what happened to it. I started a new one but need help. I'd like to hear from readers with addresses of aces, famous pilots, aircraft designers, and any other aviation notables. Also, I'd like to receive donations of photos of any USAF aircraft or any aviation subjects for my collection.

Gary Olson
1812 1st Ave. S., #306
Minneapolis, Minn. 55403

I have been collecting Air Force patches for two years and am looking for other collectors to trade with. I have on hand various patches from Langley AFB, Va., to swap for patches from other bases. I am also interested in any Vietnam-era patches, particularly mission and Viet-made patches.

Please contact me at the address below.

Steve Szulczynski
3 Willowood Dr., Apt. 203
Hampton, Va. 23666

I am trying to locate a 16-mm film shown at a 75th Troop Carrier Squadron reunion at Fort Wayne, Ind., in 1973. The film shows the 435th Troop Carrier Group taking off from Tarquinia in Italy with Horsa gliders in tow on the way to southern France. The film was brought by Col. Mike Murphy, who was in charge of the WW II glider pilot training program and who is since deceased.

If you have information on this film, please contact me at the address below.

Robert C. Richards
139 Kiser Dr.
Tipp City, Ohio 45371

I am interested in corresponding with individuals stationed in the Near or Far East for the purpose of gathering photos or hard items of Soviet or Chinese equipment. I am also looking for photos of fire department insignia and equipment, with an emphasis on helmets and helmet plates.

Please contact me at the address below.

A. Burnett
P. O. Box 15022
San Antonio, Tex. 78212

I am looking for patches, photos, insignia, etc., of the 305th Bomb Group and 422d Squadron based in Chelveston, England, during World War II and in Lechfeld, Germany, following the war.

Please contact me at the address below.

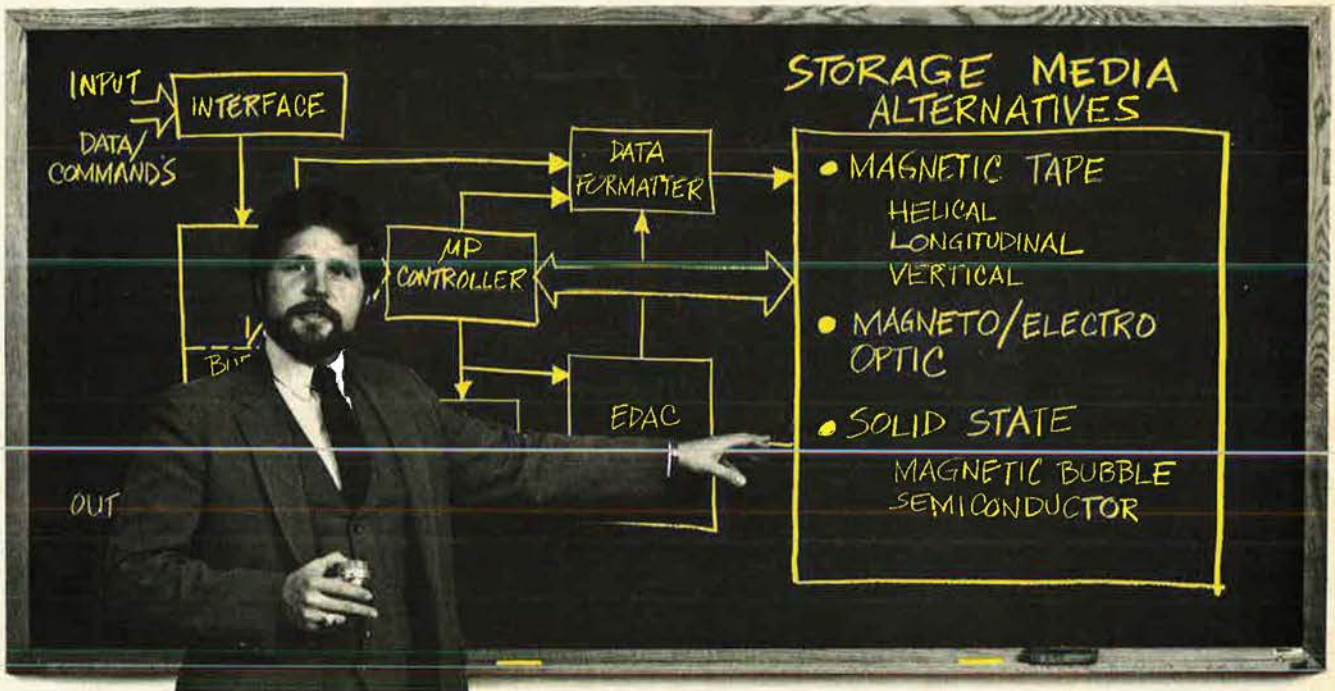
Harry Wolff
336 Central Park West
New York, N. Y. 10025

I am looking for patches from the following units in which I served:

66th APRON/66th TRW, Laon AB, France; 793d RADAR (SAGE) Squadron, Hutchinson AFS, Kan.; 403d MMS, 441st MMS, and 6441st TTW, Yokota AB, Japan; 388th MMS, Korat RTAFB, Thailand; 7234th Ammo Supply Squadron, RAF Welford, UK; 301st MMS/1st TFTW, MacDill AFB, Fla.; and 7206th Air Base Group, Hellenikon AB, Greece.

Information engineering on the move:

Steve Biniewicz on new approaches in data storage technology.



"Military, space and security programs in this country are reaching the point where they require nonvolatile data storage devices ranging from a few megabits of capacity with relatively low data rates to devices with 10^{12} bits of capacity with ultra high input and output data rates.

"In many applications, these devices must be rugged enough to survive missions which include exposure to radiation and EMP and also to severe physical environments such as shock, vibration, and temperature," states Steve Biniewicz, Director of Engineering of Lockheed Electronics' Information Engineering Division.

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AFATL/DLJG
Eglin AFB, Fla. 32542

I have an old watercolor—in pretty fair shape—labeled "Republic P-47 Thunderbolts in New Guinea." It's signed by Sgt. George Porter, New Guinea, 1944.

I would appreciate any information about this picture and would like to find out if it's worth anything.

L. Weil
2113 Pentland Dr.
Birmingham, Ala. 35235

I would like to hear from anyone who served at U-Tapao in Thailand during the mid-1970s. I was stationed there during 1973–74. I am interested in getting slides of the area around Rayong province, including shots of the Thai religious buildings and the Christian Servicemen's Center there. I will accept duplicate slides, will duplicate from your slides, or will buy them.

I also collect patches and would like to get patches for U-Tapao units. I will trade for these.

Please contact me at the address below.

Elmer R. Leonhardt
Rte. 4, Box 258-L
Smyrna, Tenn. 37167

I am looking for any former members of the VII Fighter Command, Iwo Jima, 1945, who escorted B-29s on missions to Japan. I am looking for P-51 and B-29 photographs. All photos will be returned, and I will pay postage.

Please contact me at the address below.

Ron Witt
3220 S. Gavilan Rd.
Las Vegas, Nev. 89122

I am in the process of collecting old aviation goggles, goggle frames, helmets, and oxygen masks covering the period from 1915 through the 1950s.

I would appreciate hearing from anyone having this type of aviation headgear for sale.

Col. William L. Evans,
USAF (Ret.)
4390 N. 125 W.
Ogden, Utah 84404

I am fascinated with hats, especially military caps, berets, and helmets. If you have a hat that I could add to my collection, I would be willing to buy it or to trade an Air Force Academy parade or service cap for it.

Please contact me at the address below if you can help me out.

Chris Davis
P. O. Box 5207
USAFA, Colo. 80841

I am a collector of pictures, magazines, posters, and books on military aircraft of the US Air Force.

I would like to receive from readers any spare photos or other material on the Air Force that they would be willing to send me. I am particularly interested in AIR FORCE Magazines covering the Vietnam conflict (1960–75) and would be willing to buy issues.

Please contact me at the address below.

Bob S. Au
501 Niagara St.
St. Catharines
Ontario L2M 3P4
Canada

I'm an Air Force aviation enthusiast and I'm looking for some Air Force patches to add to my collection.

Any help in obtaining USAF tactical fighter wing and squadron patches would be greatly appreciated.

Please contact me at the address below.

Ferdinand Sy
467 Romero Salas St.
Ermita, Manila 2801
The Philippines

The Hornet Squadron

Attention, ex-commanders and instructor pilots of the 4523d Combat Crew Training Squadron, also known as "The Hornet Squadron":

Is there anyone among you who still has an old patch from this unit and who is willing to sell it?

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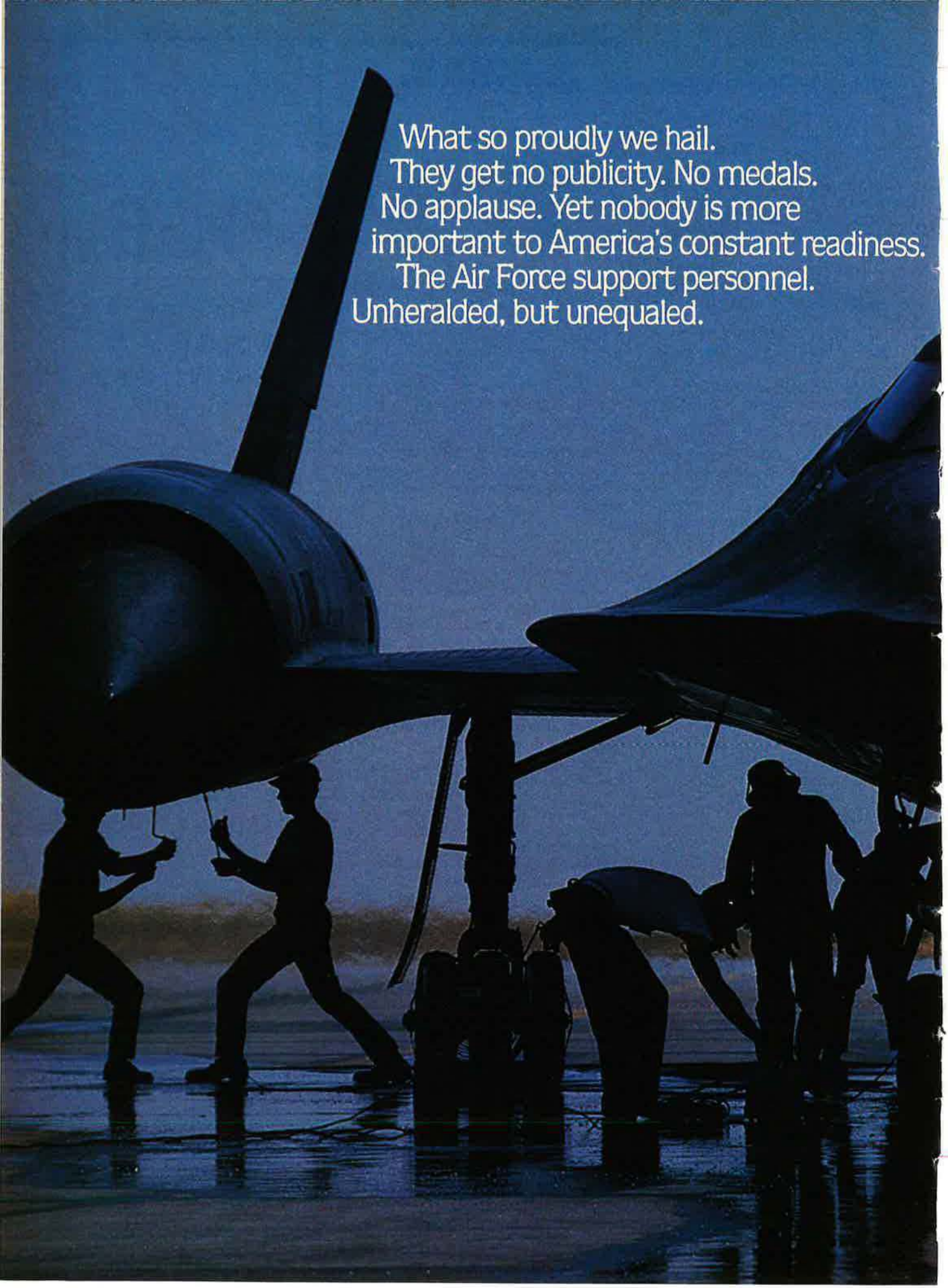
I am also looking for patches of the 4426th CCTS "Cobras," the 4537th FWS, the 4520th CCTG, and a few other Nellis-based F-105 CCTSs that have long been deactivated. Let's hear it from you old Thud jocks!

B. J. Douma
Bonifaciusstraat 7
3768 CR Soest
The Netherlands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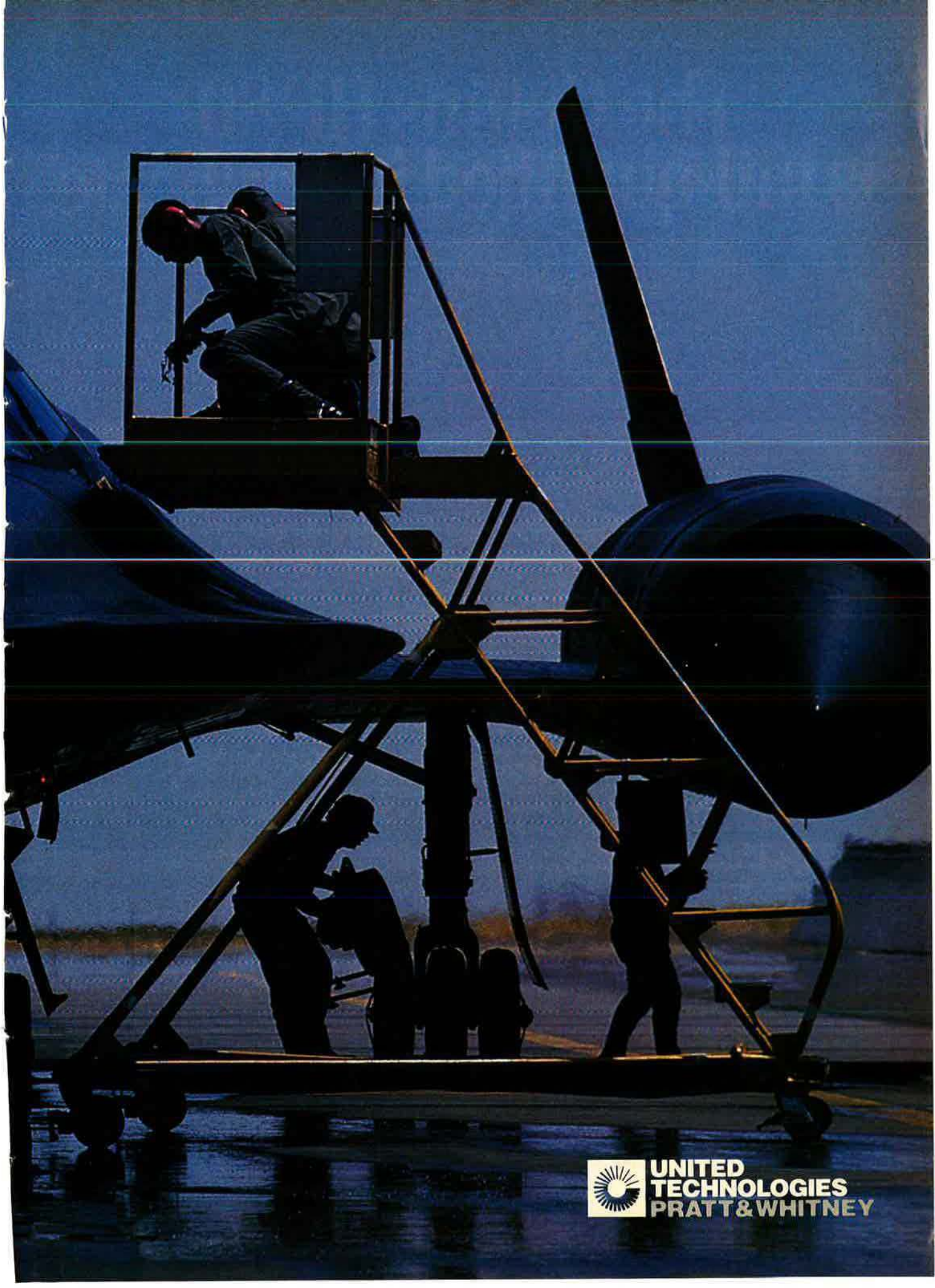
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SDI Settles into Stride

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

Missile defense program gets "strong manager," but development and deployment costs are still incalculable.

Washington, D. C., April 2

Senior Defense Department officials informed Congress that it will take until the early 1990s to acquire the background information needed to decide whether or not a comprehensive strategic defense could be built and to determine what it might look like and cost. Dr. Richard D. DeLauer, Under Secretary of Defense for Research and Engineering, told Congress that attempts to establish an "evidentiary basis for an informed decision" on the Strategic Defense Initiative, referred to by the news media as "Star Wars," will require investments totaling about $26 billion over the next five fiscal years. He added that at this time it is "impossible" to estimate the full costs of developing and deploying a comprehensive strategic defense system.

If eventually such a system proves feasible and is subsequently deployed, its ultimate costs would depend on the technological approaches selected and the size required: "These factors, in turn, would depend in part on Soviet reactions and on the nature of future arms agreements." SDI, he stressed, at this time is a "technical feasibility program, not a decision to deploy." In response to questions by members of Congress, he said he could not envision such a system eliminating the need for offensive strategic weapons to provide deterrence. Dr. Robert S. Cooper, Director of the Defense Advanced Research Projects Agency (DARPA), testified in similar fashion that "there is no combination of gold or platinum bullets" under examination by the SDI program that "would make it possible to do away with our strategic offensive ICBM forces."

Secretary of Defense Caspar W. Weinberger, underscoring the fact that the Administration views SDI as one of its top defense priorities, meanwhile appointed Lt. Gen. James A. Abrahamson, USAF, to the new position of Director of Strategic Defense. For the past two and half years, General Abrahamson served as NASA's Associate Administrator for Space Flight.

In announcing General Abrahamson's assignment as the SDI Program Director, Secretary Weinberger said that building a strategic defense network "will require the cooperation of many different organizations within government and all the military services. To accomplish this, the President recently directed that the program be conducted by a centralized management office, within DoD, under a strong program manager reporting directly to the Secretary of Defense."

The Defense Department's tasks consist of exploring five SDI program elements: surveillance, acquisition, and tracking; directed-energy weapons; kinetic-energy weapons; systems analyses and battle management; and support programs. Funds for the individual program elements, Secretary DeLauer told Congress, "will be held in the Office of the Secretary of Defense and will be provided, at the determination of [General Abrahamson], to the individual services and defense agencies that will execute the individual efforts." Nuclear devices associated with SDI will be developed by the Department of Energy.

The SDI program is looking for ways to engage attacking missiles in all four phases of their trajectory. The first is the boost phase, in which the first- and second-stage rocket engines burn with an intense and readily discernible infrared "signature." In the second phase, the post-boost vehicle, or bus, separates from the main engines, and the multiple warheads, along with perhaps hundreds of penetration aids, such as decoys and chaff, are deployed. In the third, or midcourse, phase, the multiple warheads and penetration aids travel on ballistic trajectories through space, above the atmosphere. In the fourth, terminal phase, the warheads and penetration aids reenter the atmosphere. Obviously, such a multitiered defense presupposes global, full-time surveillance to warn of attack.

The highest payoff, and hence the area deserving the greatest effort, comes from interception during the boost phase, before the individual multiple warheads and penetration aids have been deployed. The key challenge in the midcourse phase is to be able to tell warheads from decoys, and thus engage only the real threats. In the terminal phase, Dr. DeLauer pointed out, "We must be prepared for the attacking warheads to be salvage-fuzed [meaning equipped to go off when approached by an interceptor]; therefore, our terminal defenses must engage them at as high an altitude as possible."

Capping these capabilities must be a survivable battle management system capable of efficient, real-time command and control. The problem of survivability is pronounced in the case of space-based components of the battle management system. Potential threats include direct-ascent antisatellite weapons, laser and other directed-energy weapons on the ground or in the air, orbital antisatellites incorporating conventional or directed-energy weapons, space mines, and fragment clouds. As a result, the space-based components of the SDI's battle management system will probably require a combination of protective measures, including hardening, maneuvering, deception, and active defense.

The SDI program, according to Secretary DeLauer, will also explore technologies for "defense against the shorter-range nuclear ballistic missiles, such as submarine-launched ballistic missiles and theater-range ballistic missiles, which may not have a trajectory high enough to permit

their attack with exoatmospheric systems, and which have short times of flight."

Directed-energy weapons, in the main either lasers or particle-beam devices, are expected to play a major role in any comprehensive strategic defense system. In this context, Dr. George A. Keyworth II, the President's Science Advisor and Director of the White House Office of Science and Technology Policy, told this writer that one of the most promising technological advances affecting the SDI program centers on large, ground-based pulsed lasers of the excimer (rare gases) type whose beams could be "transmitted through the atmosphere and corrected for atmospheric distortion." Such an arrangement, he explained, gains over space-based, directed-energy weapons since ground installations are easier to defend. Also, lasers of this type use a very short pulse, meaning that "you destroy the target by impulse rather than by slow burning." If the total energy product of a laser weapon is brought to bear on a target almost instantaneously—within a period of about one microsecond—hardening against such a lethal impulse becomes extremely difficult, he suggested.

The fact that such pulsed lasers operate in the short wavelength regime provides another important advantage: The shorter the wavelength, the smaller the mirrors associated with such a weapon. Mirror size is especially important in the case of ground-based systems in which the beam is directed against a mirror in space that in turn reflects the laser energy against the ballistic missile it is meant to destroy. Smaller mirrors, he said, "get cheaper" to the point where they might become "almost disposable." These space-based mirrors can be proliferated as well as protected by active and passive means—means including the use of Stealth features since the mirrors could be held to a diameter of no more than ten meters.

Recent advances in the design of deformable, segmented mirrors, also called "rubber mirrors," enhance significantly the prospects for ground-based laser weapons, according to Dr. Keyworth. These designs can be aimed in a manner similar to phased-array radars since the mirrors' segments are electro-optically controlled and thus appear capable of compensating for atmospheric distortion. By measuring what happens to the laser beam as it goes through the atmosphere, such mirrors will seek to change the wave front of each component of the beam at certain distances and thus eliminate the distortion, according to the President's Science Advisor.

Kinetic-energy weapons technology also is being probed by the SDI program. Primary roles for such interceptor missiles and hypervelocity gun systems, Dr. DeLauer told Congress, include midcourse engagement of reentry vehicles not destroyed during the boost and post-boost phases, and terminal defense against warheads that have reentered the atmosphere. These weapons might also be used to defend space platforms against interceptors that are impervious to directed-energy weapons, to intercept short-range SLBMs in their boost phase, and to conduct ballistic missile intercepts from space, Dr. DeLauer said.

The SDI effort includes program elements that are being carried out by the Department of Energy, in the main work on nuclear-driven X-ray lasers and on neutral particle-beam devices that can operate from space.

NATO's Conventional Force Levels Too Low

NATO's current conventional posture does not provide "our nations with adequate deterrence, and it leaves the nuclear threshold at a disturbingly low level," Gen. Bernard W. Rogers, Supreme Allied Commander Europe, told the House Armed Services Committee recently.

Warning that "we have mortgaged NATO's defense to the nuclear response," he said that the Warsaw Pact knows that NATO's escalation to nuclear weapons invites at least as much devastation on the West as it would visit on the Soviet bloc. Thus, NATO could be coerced into concessions by threats of a conventional attack that "both sides would know could only be stopped by our first use of nuclear weapons."

He told Congress that NATO can afford an adequate conventional capability since there is "no alternative: There is no panacea in abandoning forward defense—as properly defined—or adopting radically new battlefield tactics. Technology will boost our efforts, but it can't relieve the West of the significant financial sacrifice required for credible deterrence."

The call for improved conventional forces, General Rogers told Congress, is not at all predicated on the notion that "NATO should change its strategy of 'flexible response.' The inadequacy in NATO's deterrence is not the fault of its strategy. Flexible response can provide credible deterrence if it's supported by adequate forces." He explained that the flexible response strategy can accommodate a raising of the nuclear threshold because the flexible response strategy does not prescribe an exact threshold level nor does it specify the precise conventional capability required. Nevertheless, it is possible to gauge maximal and minimal allowable levels of reliance on conventional forces to deter a major nonnuclear attack.

As a minimum, General Rogers pointed out, NATO's conventional posture needs to provide "more than a tripwire" for a nuclear response, meaning sufficient strength to make "direct defense a feasible initial response against a major nonnuclear attack." At the other end of the spectrum, the doctrine of flexible response militates against NATO committing to a "no first use" of nuclear weapons. This doctrine also rejects the hypothesis of a conventional posture so strong that it would eliminate the need for the threat of escalation to nuclear weapons.

This logic creates another imperative: "Our nonnuclear forces must at least be strong enough to give us high confidence that we can preserve the integrity of ACE's [Allied Command Europe] conventional defense long enough [for] NATO to make an orderly and deliberate consideration of escalatory response to try to convince the aggressor to cease his attack."

Further, he suggested, ACE's conventional forces need to be able to protect NATO's nuclear delivery means and the associated command and control structure against conventional attack. But even in combination, these traits probably can't be built up to a level where they could guarantee "success against any type of nuclear attack." A key reason here is that the Warsaw Pact, "in addition to possessing formidable forces, also has the advantage of being able to choose the time, location, and nature of an attack."

The US, he emphasized to Congress, must recognize that the "grave internal threat facing its European allies is the loss of political will—a weariness of heavy defense spending that may not seem to bring adequate security. Cuts in US spending and troop commitments to NATO play into the hands of those Europeans who prom-

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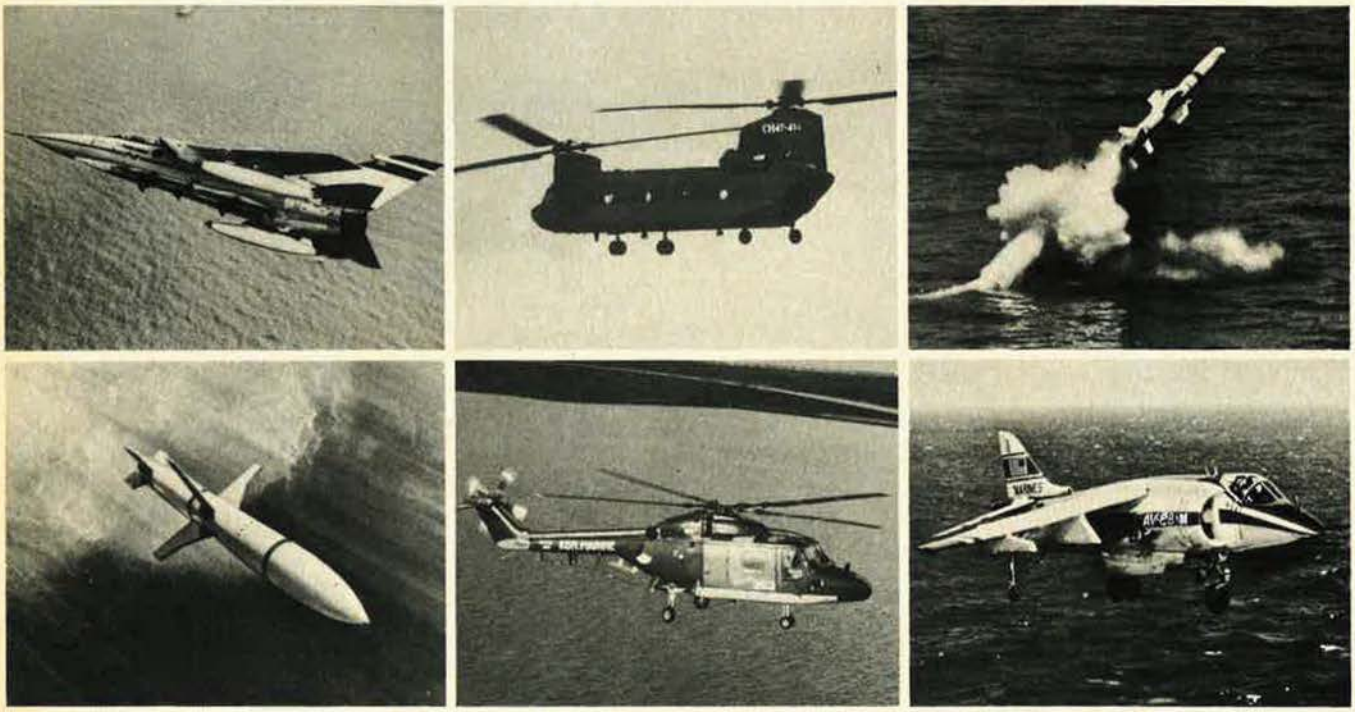

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ise a formula for peace that somehow does not require military strength." Significant decreases in the American commitment to Europe, he suggested, "would prompt some European leaders to consider seeking compensation through greater accommodation with the Soviet Union."

Tactical Fighter Roadmap

The Air Force has developed an all-encompassing "Tactical Fighter Roadmap" that sets forth the direction and schedule of tactical airpower modernization and expansion into the next decade. This comprehensive guide analyzes the types, numbers, and mix of aircraft—and associated performance upgrades—needed to accomplish the tactical airpower mission over the next ten years.

As part of the Roadmap, the Air Force formed a Tactical Modernization Office, headed by Brig. Gen. Jimmie V. Adams, under the Deputy Chief of Staff for Research, Development and Acquisition to monitor all relevant programs, maintain liaison with industrial contractors, and help in the formulation of force structure planning. The new office also will oversee improvements of the F-15 and F-16 and coordinate the Dual-Role Fighter and Advanced Tactical Fighter programs.

The overriding concerns of the new Roadmap are acquisition planning with an eye on the number of fighters required to flesh out, modernize, and sustain a force of forty wings of tactical fighters, as well as an adequate air defense force; the mix of fighters that can perform specialized and multirole missions with the greatest flexibility and effectiveness; and quality improvements for fighters in step with the growing threat. The current force structure serves as the Roadmap's point of departure.

The initial conclusion is that the tactical air forces lack sufficient aircraft to meet the long-standing, central goal of maintaining a force structure of forty fighter wings, each comprised of seventy-two combat-ready aircraft. Such a force structure, combined with what is needed for continental air defense, can be attained and sustained only if the Air Force can acquire between 260 and 280 new aircraft each year, according to the Roadmap.

But these acquisitions must also allow for the right mix of air-to-air and air-to-ground fighters to cover the wide range of missions in both regimes. Around-the-clock, all-weather capabilities along with long-range, air-to-ground requirements received major attention in the Roadmap, whose specific findings and recommendations remain classified for security reasons. The document also deals with improvements of existing weapon systems to handle demanding air-to-air missions until the Advanced Tactical Fighter is fielded in the mid-1990s.

The F-16XL cranked-arrow-wing aircraft that originally had been considered for the dual-role fighter mission and that was designated in the FY '85 Defense Budget request for eventual development is included in the Roadmap. Current, as yet tentative plans call for the acquisition of four of these aircraft in FY '89 and about 370 by FY '93.

The "Unreadiness" Media Blitz

Internal service readiness ratings reflecting recently tightened reporting standards caused a media brouhaha and erroneous charges that, in spite of increased defense budgets, the readiness of the armed forces had gone down. Gen. John V. Vessey, Jr., the Chairman of the Joint Chiefs of Staff, countered these media myths at a special Pentagon press conference in which he asserted that "we've got a very ready force out there that's well manned with capable people with good equipment, and they are ready to do what the taxpayers would like to have them ready to do."

All services are more capable now than they were three years ago because of massive infusions of badly needed new equipment and improved training. Flying hours for the tactical pilots in the Air Force went up by twenty percent and in the Navy by six percent. In addition, flight training is "more realistic" and logistics support has been improved. Over the past three years, "sustainability funding is up by about twenty-five percent, spares funding has doubled, ammunition funding has trebled"—with the result that both readiness and sustainability are improved markedly. Air-to-air munitions are up by thirty-two percent and the equipment prepositioned in Europe is up by about 100,000 short tons.

The reason why various internal service readiness measures gave rise to media claims about drops in readiness, General Vessey explained, is that units slated to receive such new equipment as M1 tanks or F-15 aircraft that have not yet transitioned to the new weapons are now rated as not fully ready. These units, however, may well be fully ready in terms of the equipment available to them at this time, such as F-4s or M60 tanks, he pointed out.

Explaining that the services' readiness rates are in a constant state of flux and are meant only to serve as a management tool for those familiar with these intricate statistics, he said they were never meant to "describe the readiness of the force to the taxpayer."

Alarming Soviet Developments

The Soviets are placing renewed emphasis on sheltering strategic nuclear weapons in tunnels in order to increase their survivability. Large, deep subterranean tunnels with submerged entrances are being developed to protect their SSBN fleet from US ICBMs. These tunnels are buried deep inside rock formations to withstand even direct hits by large nuclear warheads and are spacious enough to allow even the large Typhoon-class SSBNs to turn around and undergo maintenance inside of these "caves."

At the same time, there is evidence that two new Soviet ICBMs, the SS-X-24 and SS-X-25, will be deployed in both silos and mobile fashion. Hardened railroad tunnels are apparently being readied to shelter these rail-mobile missiles. The SS-X-25, congressional experts believe, is capable of carrying three warheads. Originally, US intelligence assumed that this new ICBM carried only a single warhead. Heavy encryption of all SS-X-25 test-flight data is apparently meant to mask the fact that the missile is MIRVed.

US analysts also see evidence that the Soviets are developing a large, Mach 2.6-class, long-range cruise missile that apparently can be launched from submerged submarines as well as from aircraft.

Washington Observation

★ NASA is working on concepts for a spaceplane that can be dropped out of the orbiting Shuttle and fly back to earth. Such an experimental design is being examined primarily in terms of structures and critical component technologies. This project is meant to serve as a stepping-stone to advanced spaceplanes with national security applications. NASA also is working on a Mach 5-class penetrator using methane or other unconventional fuels. DARPA is funding NASA's work on this high-performance vehicle. The Air Force reportedly is interested in this project. ■

CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., Mar. 23

AMRAAM Problems

Increased costs and schedule delay of the Air Force's priority air-to-air missile have raised questions in Congress about its affordability as the DoD budget is squeezed. The Advanced Medium-Range Air-to-Air Missile (AMRAAM), replacement for the Sparrow AIM-7 missile, is about halfway through full-scale development, but has experienced some difficulty meeting production milestones.

Air Force Assistant Secretary for Research, Development and Logistics Thomas Cooper told a congressional panel that AMRAAM is about six months behind schedule. Production of the first 174 missiles is expected to begin in 1985 to meet an Initial Operational Capability (IOC) of 1986. But some members of Congress think the production decision is premature. The Air Force, however, is reluctant to slip production further because of resulting cost escalation. The price tag is about $200,000 per missile. The original estimate was about $75,000 a copy; last year USAF figured the cost at $122,000.

The Air Force is not happy with the AMRAAM, according to Secretary Cooper. He admitted that the Air Force considered scrapping the program, but no other system can provide equal capability for the same cost. There is an urgent operational need for the missile, especially on F-16s in Europe. Initially it will be integrated on F-16s, which do not now have a radar missile capability. The advanced, all-weather, beyond-visual-range missile will provide a wider envelope, increased velocity, better maneuverability, improved terminal guidance with its own radar, and a multiple kill capability.

NATO Conventional Needs

The nuclear threshold is dangerously low in Europe because of shortcomings in NATO's conventional forces, according to Gen. Bernard Rogers, Supreme Allied Commander Europe. Although NATO strengthens its conventional base each year, the gap continues to widen between NATO and Warsaw Pact forces. General Rogers asked Congress to increase conventional forces for NATO to raise the nuclear threshold. His primary concern is the level of sustainability—about forty-three days of ammunition on the ground.

General Rogers estimated that annual real increases in defense spending "somewhat higher" than the three percent commitment by NATO countries are essential to achieve an adequate conventional deterrent by the end of the decade. A strengthened conventional capability, in his view, would alleviate many Europeans' concern that any conflict with the Warsaw Pact would escalate immediately to nuclear weapons.

The NATO Commander asked Congress not to repeat last year's freeze on the level of US troops stationed in Europe. He fears wavering by the US in its commitment to NATO would prompt some European leaders to seek "compensation through greater accommodation with the Soviets."

Superior US Technology

The US leads the Soviets in most of the twenty basic technologies thought to have the greatest potential for increasing defense capabilities over the next twenty years. In a report to Congress justifying a $142 billion research, development, and acquisition request, DoD said the Soviets, now spending about twice the US expenditures on R&D, are eroding the lead in about half of the fifteen technologies where the US has the advantage. The Soviets are making strides in the areas of optics, propulsion, microelectronic materials and integrated circuits, and guidance and navigation, among others.

The US also has the qualitative edge in most deployed systems, although the Soviets' ability to deploy new weapons at high production rates soon after comparable US systems reach their IOCs is diminishing the US lead in many areas. The US and USSR are about equal technologically in most deployed land-force systems, except chemical weapons, where the Soviets maintain an advantage. The US has the edge in strategic systems other than ICBMs.

Readiness on the Rise

Today's forces are far more ready than they were in 1980, according to JCS Chairman Gen. John Vessey. The military has more and better personnel, more realistic training, better support, and equipment that is more reliable and easier to maintain.

Recent news accounts alleged that some combat readiness rates, so-called C-ratings, declined from the disastrous levels of 1980 despite substantially increased defense budgets over the last three years. Such C-ratings are low on paper only, however. Since 1980, combat readiness standards were raised; more stringent requirements must be met for a unit to be rated combat-ready. Further, C-ratings do not reflect the numerous force conversions and modernization that have occurred since 1980. As General Vessey pointed out, a fully combat-ready F-4 unit authorized for conversion to F-16s is measured against F-16 standards and hence would not be rated fully ready.

Defense Spending

Congress is expected to approve only five percent real growth at the most for FY '85 because of the emphasis on deficit reduction.

House Democrats propose only 3.5 percent defense growth, which would require significantly greater cuts in FY '85 than the 5.1 percent growth preferred by the Administration and congressional Republicans. The GOP proposal is in line with last year's budget resolution and would require cuts of about $14 billion.

DoD expects to submit a budget amendment with program changes to coincide with the GOP compromise. Pentagon sources think the required savings will come from small cuts in O&M, personnel changes, cancellation of some new starts, military construction cuts, entitlement adjustments, as well as some program stretchouts. Major program terminations are not expected to be proposed by the Administration. ■

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The Aircrew Training team is built on experience. CAE Electronics, known throughout the world for the quality of its flight simulators, was the first to build the highly sophisticated Phase III simulator, and has many years' working experience with United. Seville Training Systems is an established leader in total training system analysis and design.

Aircrew Training also draws on United Airlines' many years of widebody training experience. United flies the largest widebody fleet in the world. Its total commitment to Cockpit Resource Management and Line Oriented Flight Training, uniquely combined in United's current aircrew training program, is critical to the quality of aircrew performance. And the people who made it happen at United will make it happen in the C5 aircrew training system... and beyond.

es Aircrew Training, Inc.
5. And beyond.

United has a long historic relationship with MAC, dating back to the Alaskan and Pacific Operations of World War II. United understands the difference between military and commercial operations, and will involve MAC in all phases of the training system. United knows that the quality of aircrew performance rides directly on the quality of training.

Combined—CAE, Seville, and United Airlines—the Aircrew Training team represents a new force in aircrew training. A new force which is ready to work on the C5 aircrew training system... and beyond.

UNITED AIRLINES AIRCREW TRAINING, INC.

The new force in aircrew training.

cae Electronics, Ltd.

Seville Training Systems

UNITED AIRLINES

Meet the new force in aircrew training.

UNITED AIRLINES

• The largest airline in the Free World, flying more people than any other—with 322 jets—over 1 million miles every day. • A long productive relationship with the U.S. Air Force through the CRAF Program. • Understands exactly how aircrew training fits into the big picture of operating an airlift system. • A successful survivor of airline deregulation, and will be around to back up its commitments for the life of the C5... and beyond.

UNITED AIRLINES AIRCREW TRAINING, INC.

• Wholly owned subsidiary of United Airlines, created specifically to develop, implement and manage state-of-the-art aircrew training systems under contract. • C5 expertise is resident in the staff, a staff who, from the top down, have been responsible for the success of aircrew training at United Airlines and for the U.S. Air Force. • Will have access to the total resources of United Airlines and the United Airlines Training Center to help accomplish any aircrew training system under contract.

CAE

• 30 years experience building military and commercial simulators. • Integrated engineering and manufacturing facility with 1500 employees, over 600 engineers, scientists and technicians. • 72 commercial simulators built for 32 customers in 21 countries. • 90 military simulators supplied to 16 countries for tactical, helicopter and transport aircraft, including recent deliveries of C-130, P-3C, E-3A, CP-140, CF-18 and Tornado. • A five-year working relationship with United Airlines which includes the supply of five Phase II and III simulators.

Seville Training Systems

• Successful track record of analyzing, designing and developing aircrew training within the Instruction Systems Development (ISD) framework. • Experience and production capacity appropriate for large aviation ISD projects. • Long association with United Airlines and the U.S. military.

UNITED AIRLINES TRAINING CENTER

• United's training and maintenance operations are the largest. Trained pilots for most of the world's major airlines and a leader in safety and flight innovations. • Proven over and over again that it can field effective aircrew training systems in a timely and low-risk manner. • Has aircrew training, human resources and material in quantity and in depth. Any show-stoppers possible in a system contracted to Aircrew Training? Highly unlikely with this experience resource base backing them up.

VIEWPOINT

Rediscovering the Pacific

By Gen. T. R. Milton, USAF (Ret.), CONTRIBUTING EDITOR

Europeans may resent US concern with Asia as a distraction from NATO, but we have vital interests in the Far East.

Twenty years or so ago, there was, to my certain and daily knowledge, a brass telescope in the office of the Commander in Chief Pacific—then, as now, an admiral. CINCPAC's telescope remained fixed on Pearl Harbor, perhaps as a symbol of Pacific maritime strategy. As a lunchtime tennis player, it was my misfortune to have the courts in the telescope's line of vision. The admiral thought reading messages, not tennis, a proper noontime diversion. On occasion, he reminded me of our different priorities via a Marine runner.

Anyway, those were the days of our unquestioned supremacy in the Pacific. SEATO, a pale version of NATO, was still carrying out the charade of contingency plans and solemn alliance meetings because the United States wanted it that way and the United States held most of the cards. Red China was the agreed-upon threat, and Japan scarcely entered the calculations. Vietnam was just beginning to attract our attention. It would be years before that venture would destroy the illusion of American dominance and invincibility in the Pacific.

After the Vietnam pullout, the United States turned back to its NATO obligations with an audible sigh of relief. NATO had been neglected during the Vietnam years; the Pacific could now be neglected. President Carter scheduled a cutback in Korea and was only dissuaded by the military facts of life, Taiwan became a diplomatic outcast, and Mr. Carter's State Department seemed unaware of the value of our Philippine bases. As if to emphasize the declining importance of the Pacific basin, the post of Commander in Chief, Pacific Air Forces, was reduced from four to three stars, a mistake only recently corrected.

Meanwhile, the Soviets were on the move. Cam Ranh Bay and Da Nang became Soviet bases, thus giving the USSR unprecedented leverage in the South China Sea. Indonesia and the strategic Strait of Malacca lie to the south and the Philippines to the east, within easy reach. It is worth remembering that an early World War II British naval disaster, the sinking off the Malay coast of the *Prince of Wales* and the *Repulse,* was inflicted by Japanese airplanes based in Saigon.

Land-based air remains a decisive factor in that part of the world, and the Soviets now have a distinct advantage. Not only do they have our former Vietnamese strongholds, but Vietnam itself has the most formidable air force in Southeast Asia, complete with a fine base structure, radar sites, and a generous inheritance of American equipment together with people the US trained to use it.

Our old friends the Thais are worried about their aggressive neighbor, as well they should be. The Pentagon has promised additional aid, to include a few more F-5Es, an air defense system, and various other items, but Thailand's principal asset is the base structure we created. Any serious move by Vietnam against Thailand would require US help; deploying air to Thailand would be easy and quick.

Until now, Japan has avoided any serious defense outlay, thanks to Article 9 of its US-devised constitution. There is mounting pressure on Japan to interpret Article 9—which limits Japanese armament to that needed for self-defense—more liberally. Self-defense in this era might include such things as defending the oil routes on which Japan is wholly dependent, but it will not be easy to overcome a deep-seated Japanese aversion to increased military activity. For this reason, the Self-Defense Forces, so called because of Article 9, have been inconspicuous on the Japanese scene since their creation in the 1950s. The mission continues to be self-defense in its narrowest definition, despite an air force—sorry, an Air Self-Defense Force—with more than 300 aircraft, including F-4s and F-15s. As matters now stand, the United States is obliged to defend Japan, but Japan has no obligation, or even the right, to aid the United States in other areas.

Then there is Taiwan, our almost forgotten ally and onetime bastion when we worried about Red China. United States policy at present appears to be one of gradual withdrawal, in the hope, presumably, that time will take care of things. The fact remains that Taiwan, by whatever name, is essential to any coherent western Pacific strategy. If it were only an island inhabited by backward natives, it would be essential, but because it is one of the most successful small nations, with a population of 20,000,000 industrious and literate people, Taiwan becomes doubly important. How to reconcile the absolute strategic essentiality of Taiwan with the problem of closer ties to Peking is a puzzlement. But as an incentive to do the puzzling, imagine a Taiwan turned, in exasperation, toward the USSR.

The vast area we call the Pacific is becoming increasingly important to America's trade and is, one way or another, the source of new additions to United States citizenry. Along with Central America, the Pacific is beginning to contest Europe for Uncle Sam's attention. It is a worry to Europeans, this United States distraction with matters other than NATO.

The Grenada expedition, for instance, put a severe strain on our ties with Britain and gained no applause from our European allies, despite the clear justification for the action. In Britain's case, the pique—fury seems a more exact word to describe Mrs. Thatcher's emotional state—may be ascribed to a lack of consultation. However, for the other European allies, Grenada was worrisome evidence that the United States has other things on its mind besides European defense. ■

AEROSPACE WORLD
News, Views & Comments

USAF has chosen the Sherpa, above, as its European Distribution System Aircraft. Short Brothers Ltd. of Belfast builds the light transport.

Washington, D. C., March 21

★ The Air Force has selected the Sherpa, manufactured by Short Brothers Ltd. of Belfast, Northern Ireland, as its European Distribution System Aircraft.

A $54,590,082 firm fixed-price contract was awarded to Short Brothers for the manufacture and delivery of eighteen of the aircraft to Military Airlift Command's 10th Military Airlift Squadron at Zweibrücken AB, West Germany.

The 10th MAS was reactivated in January, and the initial cadre of squadron members is scheduled to arrive this summer.

Short Brothers was also awarded a contract for the logistics support of the aircraft over a ten-year period. The eventual estimated value of this contract is $96,225,492.

The twin-engine turboprop light transport will have a 2,800-pound payload range of 789 nautical miles and a 4,200-pound payload range of 406 nautical miles. It will fly at 157 knots true airspeed, land on 1,500-foot runways, and fly at night and in bad weather. The first aircraft is scheduled for delivery this fall.

"The aircraft will provide a dedicated cargo transport system to get the appropriate spare part to the right place at the right time—preferably overnight," an Air Force spokesman said.

★ In a move that is expected to improve the warfighting readiness of the Air Force's tactical fighter force, the Air Force has announced a split award between General Electric and Pratt & Whitney for a new fighter engine. General Electric will receive seventy-five percent of the new fighter engine award for the first year and Pratt & Whitney will receive twenty-five percent.

For more than ten years, the Air Force has been procuring engines for two fighter programs from one source. The split award to two major suppliers will, according to officials, "ensure that the benefits of competition which have already been produced will continue in future procurements."

"The larger share of the award to General Electric reflects its responsiveness to the Air Force's requirements for dual sourcing and cost-effective warranty protection," said one Air Force official.

The contracts are firm fixed-price awards for a single year. In the first year, General Electric's F110-GE-100 will be installed in new production F-16s. The Pratt & Whitney F100-PW-220 will be installed in new production F-15s.

In referring to the competition, Secretary of the Air Force Verne Orr said, "This culminates perhaps the most significant Air Force acquisition initiative in the past decade. The advantages of competition were fully demonstrated. We set the mark very high, and we met our mark.

"Acquiring both new engines will result in a reduction of $2.5 billion to $3 billion in overall costs of ownership," Secretary Orr said.

A key element of this competition was the Air Force's request for extensive warranty provisions that will shift responsibility for the cost of material failure to the contractor and will warrant retention of engine thrust and fuel consumption characteristics.

"The warrranties are a form of insurance against receiving a faulty product from the contractor," said Secretary Orr.

The General Electric F110 is a derivative of the F101 engine being used in the B-1B. It will retain the core of the F101, which is itself similar to that in the CFM56/F108 engine family. The improved Pratt & Whitney F100 incorporates major changes to the existing design by introducing Digital Electronic Engine Control, a new gear-type fuel pump, and the Increased Life Core. The Increased Life Core offers a 4,000-cycle inspection interval for the high-cost core components and has just completed its first 4,000-cycle durability test. This is more than twice the current F100 capability.

★ An improved 2,000-pound bomb that will replace the Mk 84 bomb is being developed by the Munitions Division of the Air Force Armament Laboratory (AFATL), Eglin AFB, Fla.

The new bomb is being flight-tested with the GBU-15, GBU-10, and GBU-24 guidance kits. According to

AFATL officials, six of the improved bombs went through tests last year designed to verify structural integrity.

"The objective of the program is to develop an improved bomb for use in guided and unguided weapon applications and to provide a system capable of defeating hard targets built of earth, concrete, rock, and rubble materials," AFATL officials said.

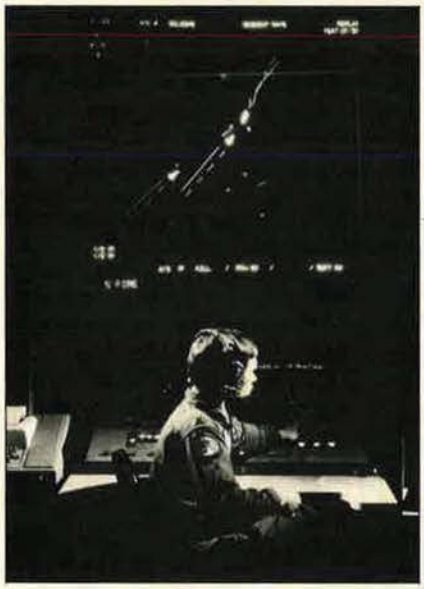
AFATL officials intend to have the improved 2,000-pound bomb design ready for production in sufficient time to influence FY '85 and FY '86 buys and to replace the Mk 84 for buys beginning in FY '87.

★ The US Army/Hughes Helicopters, Inc., AH-64 Apache antiarmor helicopter team has been awarded the 1983 Robert J. Collier Trophy, the aerospace industry's most coveted award.

The Collier Trophy is awarded annually by the National Aeronautic Association for "the greatest achievement in aeronautics and astronautics in America, with respect to improving the performance, efficiency, or safety of air and space vehicles."

The jet turbine-powered Apache is the most advanced antiarmor helicopter weapon system in the free world. The first AH-64 was delivered to the Army in January, a month ahead of schedule.

The Collier announcement came as Hughes Helicopters and Army officials signed the third annual Apache production contract totaling $848.1 million for 112 helicopters. A total of 171 Apaches is now funded for production.



The Royal Thai Air Force will use Cubic Corp.'s unique ACMI computerized training system, at work above, to sharpen pilots' combat skills.

"The Apache is one of the revolutionary changes in warfare that we have seen in recent times," said Brig. Gen. Ellis Parker, former Army Aviation officer. "Used with the best tactical concepts, it may prove to be even more revolutionary than the Germans' use of tanks and dive bombers in the blitzkrieg warfare of World War II," he added.

Presentation of the trophy will be made at the annual Collier Trophy Dinner, to be held in Washington, D. C., on May 11, 1984.

★ The Air Force has decided to shift all Military Airlift Command (MAC) commercial charter passenger flights from McGuire AFB, N. J., to Philadelphia International Airport starting in October 1984.

Department of Defense dollar savings are anticipated to be minimal. "The shift of operations is aimed at simplifying travel arrangements. Since many travelers use commercial flights to connect with the military charters, shifting the charter operations to civilian airports eliminates the lost time and added expense traveling to a military terminal often more than forty miles away," said an Air Force official.

More than 144,000 passengers, military and their dependents, are now expected to use the Philadelphia gateway annually.

The Air Force will continue to use McGuire AFB as a readiness terminal to handle military flights. The readiness terminal concept allows the Air Force to use commercial gateways while still meeting the armed forces' need for secure marshaling and processing areas for passengers during contingencies and wartime.

The shift in commercial charter passenger flights to Philadelphia is part of an overall shift of DoD charter passenger traffic from military air bases to civil airports. Traffic already has been shifted from Norton AFB, Calif., to Los Angeles International Airport; from Travis AFB, Calif., to Oakland International Airport; and a mid-United States civil gateway has been established at St. Louis, Mo. In the spring of 1982, the Charleston, S. C., civil airport was designated as the Southeastern civil gateway.

★ Work has begun on a new microprocessor-controlled air combat training system for the Republic of Thailand under an $18 million-plus contract with Cubic Corp.

Site preparation, under way at Korat RTAF base near the provincial capital of Nakhon Ratchasima, about 150 miles northeast of Bangkok, is expected to be completed by mid-June 1985. Engineers from Cubic Corp., based in San Diego, Calif., will also operate and maintain all facets of the training system under a separate contract to be awarded later this year.

The unique Air Combat Manuevering Instrumentation (ACMI) system enables fighter pilots to experience actual supersonic air-to-air battles without expending live ordnance. The RTAF system will be able to track up to twenty tactical fighter aircraft and is capable of processing real-time weapon simulations for eight of these simultaneously.

Each training mission can be replayed on multicolor large-screen displays for in-depth analysis when the pilot returns to base. The system also will include a no-drop bomb-scoring capability, permitting air-to-ground mission analysis.

The ACMI in Thailand is one of twelve that Cubic has built and installed or currently has under contract to provide throughout the world, primarily for the US Navy and Air Force.

★ The Air Force and Sperry Corp. announced that the Air Force's new, advanced Phase IV computer system—the largest single commercial computer order in the industry's history—has successfully passed the first operational testing phase of the program for worldwide implementation.

Over the past year, more than 2,500,000 lines of Air Force computer programming code were converted to new large-scale Sperry systems. In addition, thousands of rigorous tests were performed at the Langley AFB, Va., data-processing facility to be prepared for cutover and operation at the base level with minimal Air Force-wide retraining time or expense.

Based on the Phase IV program's outstanding success at Langley, the Air Force has authorized worldwide implementation of the system. During the next one and a half years, individual Air Force base computer operations will be converted and integrated into Phase IV at 118 Air Force installations.

A Sperry official said the Air Force deserves to be congratulated for "their expert project management" and for keeping a program of such magnitude and complexity on a demanding schedule.

The contract, awarded to Sperry in January 1983, calls for replacement of 287 older, obsolete computers with 153 Sperry 1100/60 large-scale systems with more than 20,000 communications terminals. The new Sperry systems will support Air Force re-

quirements for handling aircraft parts inventories and maintenance operations worldwide. In addition, the new Sperry computers will perform a diverse array of base personnel, financial, civil engineering, and administrative functions.

AEROSPACE WORLD

★ Flycatcher, an all-weather, low-level air defense system developed by Hollandse Signaalapparaten Co. of the Netherlands, has been purchased by the Air Force for use by the 3246th Test Wing, Eglin AFB, Fla. The system will be used for development test and evaluation of Air Force electronic countermeasures equipment.

"The Flycatcher is an impressive system," said Col. Thomas A. Stover, Deputy for Range Systems, Armament Division, AFSC. "It's flexible, accurate, and simple to operate," he said.

Flycatcher was designed for the detection and tracking of low-flying aircraft under all-weather and electronic countermeasures conditions. It uses state-of-the-art computer technology and is able to control a combination of three guns and/or missiles simultaneously for an optimal short-range air defense.

"One operator can run the system, from detection of an enemy aircraft to firing of the three weapons," said Colonel Stover.

The system can be transported as a trailer, or as a container by truck, aircraft, or helicopter. "Due to the special construction of the undercarriage, a high level of mobility, both cross-country and on the road, is assured," Colonel Stover said.

"Flycatcher's capabilities as an all-weather, low-level air defense fire-control radar make it an outstanding candidate for additional test and evaluation," Colonel Stover added.

★ MAC C-5Bs will receive state-of-the-art crew seats, designed for crew comfort and efficiency, according to MAC Plans officials.

Because of the C-5's in-flight refueling system and virtually unlimited range, crew discomfort becomes a potential hazard on long missions, officials noted.

The new crew seats are designed to provide improved comfort for the occupant as a result of medical research conducted at the Institute of Aviation Medicine at Farnborough, England, and a seat development program carried out by the manufacturer.

The pilot and copilot seats are com-

From the Boneyard to the Skies: Two DC-130s Get a Second Chance

Maj. Michael Frueh, a pilot in Aeronautical Systems Division's 4950th Test Wing, came up with the idea to retrieve two mothballed DC-130s from the Air Force's Military Aircraft Storage and Disposition Center near Tucson, Ariz., and to use them as test-bed aircraft. That move, according to ASD officials, has saved the Air Force about $28 million, the basic price of two new C-130s.

Major Frueh's idea will continue to save the Air Force money as long as there are new airborne electronic components to be tested. It costs the 4950th about $2,750 per hour to fly the DC-130As, compared to about $4,700 for the C-135 or C-141.

Major Frueh flew the DC-130 Drone Launchers during the Vietnam conflict. He was one of the pilots who delivered the planes to the storage facility, commonly called the "Boneyard," in 1979 after they had outlived their usefulness as primary mission aircraft.

When rising costs forced the test wing to seek more cost-effective ways to test electronic components for use in future Air Force aircraft, the major recalled the drone ships in the Arizona desert. He proposed they be acquired by the wing and converted to test-beds.

DC-130s have two pylons fitted under each wing with associated wiring and cables already installed. Each pylon can carry about 4,500 pounds, and the cargo area is of sufficient size to handle multiple sets of test apparatus so that competing pods can be test flown simultaneously.

Once he gained approval, Major Frueh and another wing pilot, Maj. John K. Morris, flew to Davis-Monthan AFB to retrieve the two planes. They were joined by two other wing aircrew members, SMSgt. Donald R. Turner and SSgt. John H. Armstrong, and a team of 4950th Test Wing maintenance experts headed by TSgt. Charles Ridgeway, crew chief. The group worked closely with maintenance personnel of the Military Aircraft Storage and Disposition Center in getting the two craft, both "A" models of 1956 and 1957 vintage, flyable.

"I was surprised when after years in storage, all engines started on the first try," said Major Frueh.

Both planes were flown first to the Hayes Aircraft Co. in Birmingham, Ala., for maintenance updating and a paint job, then to Wright-Patterson to be modified as test-bed aircraft. Modifications included installation of four standard pallet stations, an AC/DC power distribution system, interphones, oxygen outlets, and observer seats.

Using standard test pallet stations, tests can be set up on pallets in a laboratory, taken to the aircraft intact, and simply locked into place.

—GENE HOLLINGSWORTH
AERONAUTICAL SYSTEMS DIVISION
OFFICE OF PUBLIC AFFAIRS

ABOVE: This rehabilitated DC-130 is used to test electronic components destined for future USAF aircraft. BELOW: DC-130 Drone Launcher in storage at Davis-Monthan AFB, Ariz.

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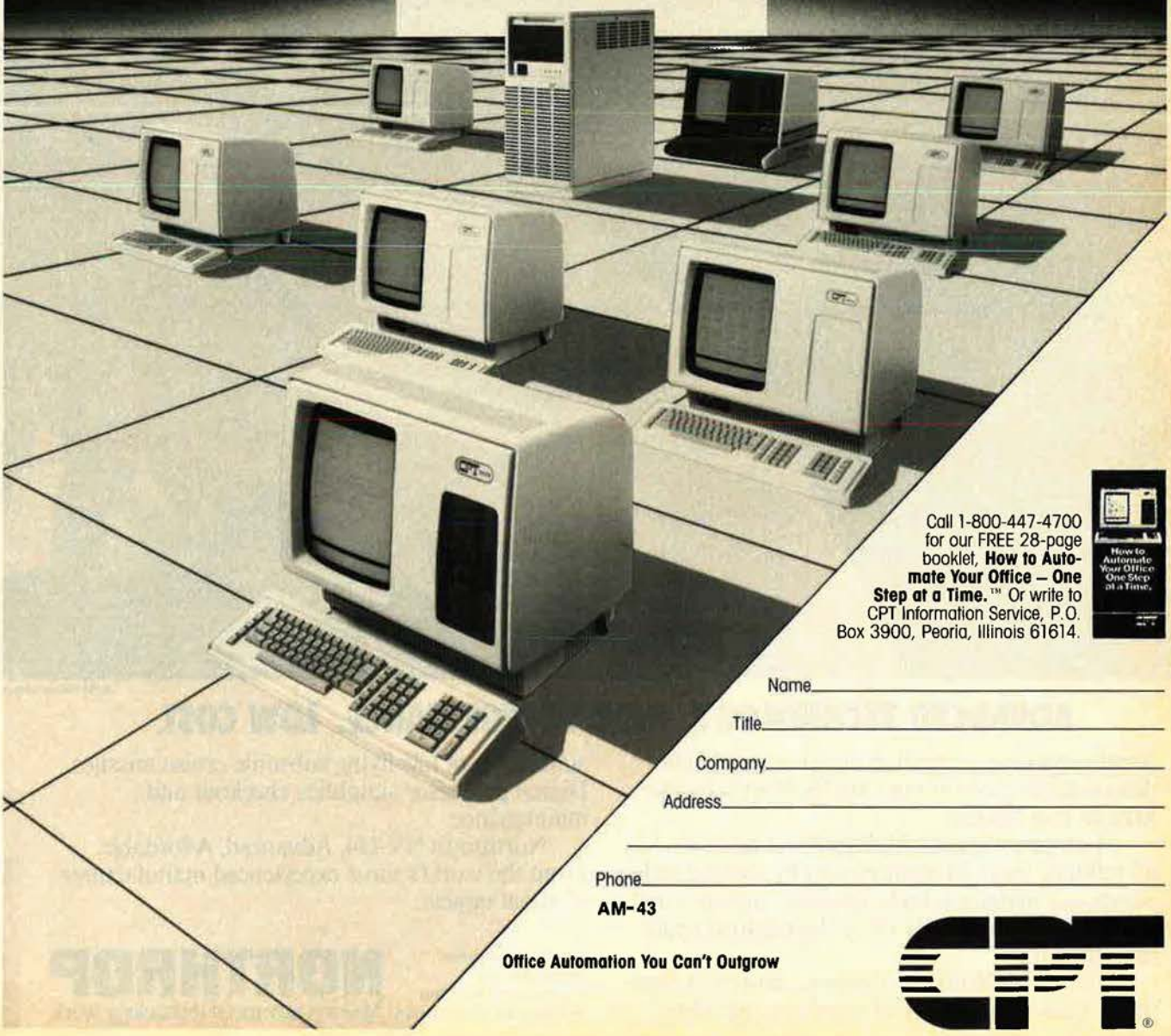

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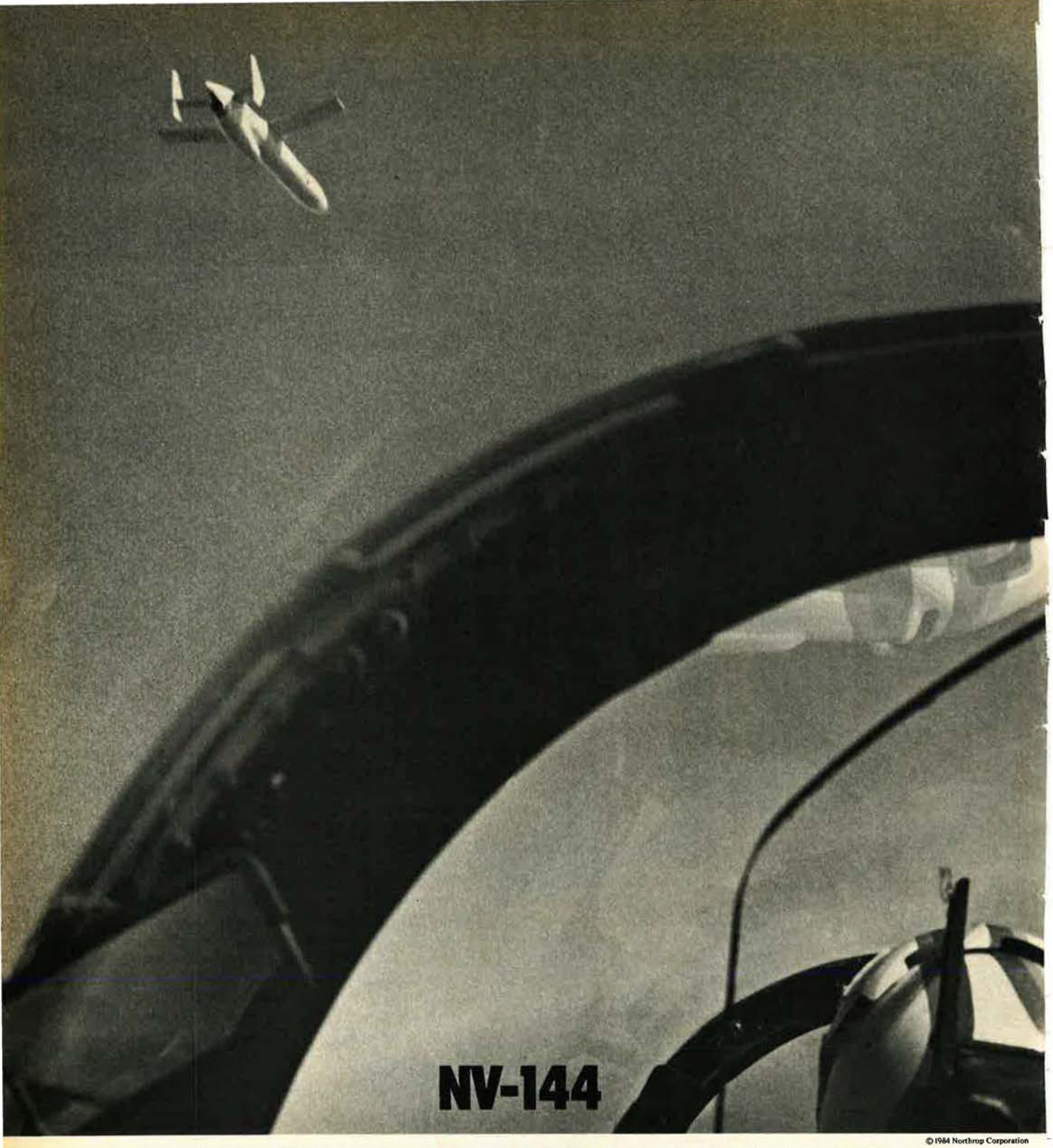

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pletely flexible and capable of moving laterally, forward, and aft with the aid of a track.

A similar seat design is currently being installed in the C-130 Hercules.

Ipeco Europe Ltd., of Essex, England, has been contracted by Lockheed-Georgia to manufacture the new seats. The first set of seats is expected in March 1985, with the first C-5B scheduled for delivery later that year.

★ Some scientists believe the cloud-shrouded atmosphere of Jupiter, the largest planet in the solar system, is a sample of the original material from which stars are formed.

The key that could unlock those secrets of the origin and development of the solar system is the Galileo Probe. The probe is scheduled to make a twenty-seven-month trip to the giant planet later this decade where it will make direct measurements of the chemical composition and physical state of Jupiter's clouds and atmosphere. The probe will be carried to the planet by its supporting spacecraft, the Galileo Orbiter.

NASA's Ames Research Center has accepted the planetary explorer from Hughes's Space and Communications Group, which designed and built the probe. Ames manages the probe portion of Project Galileo. Overall management is handled by NASA's Jet Propulsion Laboratory, which is also building the orbiter and has responsibility for the mission design and mission operations.

Project Galileo will be the first interplanetary vehicle launched on the Space Shuttle. After a trip of approximately 750,000,000 miles, the probe is expected to encounter Jupiter in August 1988. The probe will enter Jupiter's brightly colored clouds at 107,000 miles per hour, fast enough to get an earthbound traveler from Los Angeles to Las Vegas in nine seconds.

The probe and parachute combination is expected to descend into the atmosphere for fifty minutes, while being exposed to continuously increasing pressures up to ten times that of earth's at sea level. After that, weakening radio signals, limited battery capacity, and ever-increasing temperatures are expected to end the probe's mission.

The probe will transmit to the orbiter the information it receives during its descent for relay to tracking stations on earth. After the probe completes its mission, the orbiter will spend twenty months circling Jupiter. The orbiter is expected to return about 50,000 high-resolution pictures of Jupiter and its moons.

AEROSPACE WORLD

★ A Lockheed P-3A Orion originally designed to search for enemy submarines will seek drug smugglers for the US Customs Service beginning next year.

Lockheed-California Co. recently received a $5 million contract to modify one P-3A with an infrared detection system and APG-63 radar to track aircraft and ships suspected of transporting illegal drugs. Although the Naval Air Systems Command awarded the contract, the Customs Service will operate the aircraft.

Eventually, the Customs Service may order up to five more P-3As for surveillance duty under the federal government's drug interdiction program, according to Lockheed-California officials.

When its modifications and testing are completed, the Customs Service P-3A will fly out of New Orleans to patrol the Gulf of Mexico and the Caribbean. Besides the APG-63 radar, the P-3A will house a multipurpose radio for communications with the Coast Guard and the Customs Service's ground control.

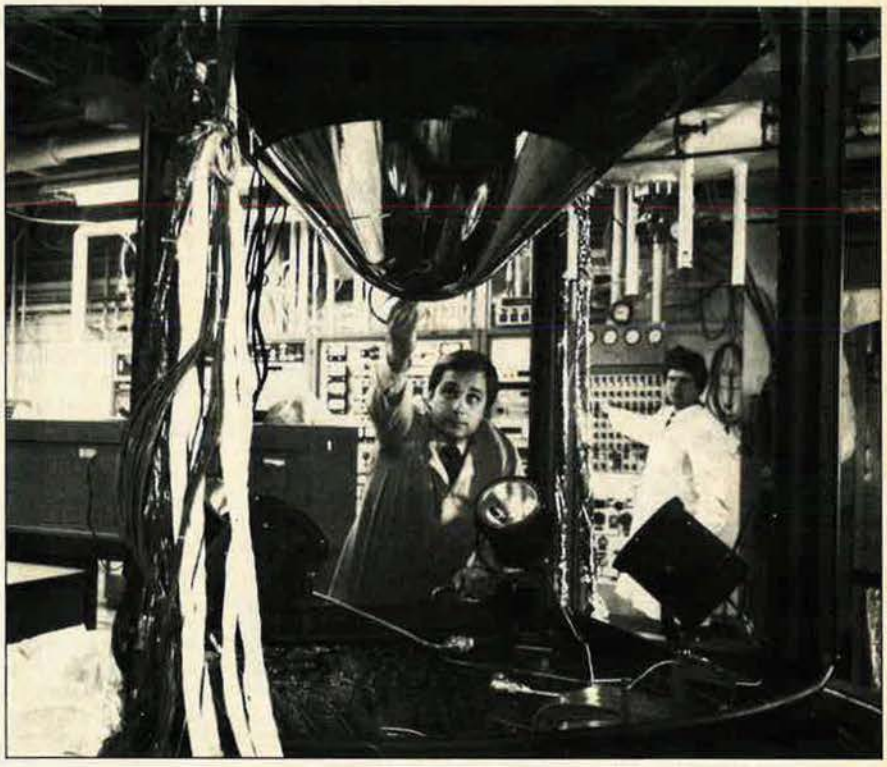
In the past, Navy P-3s have undertaken drug surveillance assignments on an as-needed basis, but the modified P-3A will be the first Orion devoted to such work full time.

★ The ESD Combat Air Surveillance Correlation and Display Equipment system (CASCADE) program office recently won praise from AFSC Commander Gen. Robert T. Marsh for taking CASCADE from program direction to turnover in just eleven months.

CASCADE was developed by ESD's Deputate for Electronic Countermeasures under the Quick Reaction Capability program for fielding high-priority electronic combat programs in the shortest possible time. Electronic combat requirements are unique, according to Air Force officials, because they are driven by enemy capabilities that can change rapidly.

In a message to ESD Commander Lt. Gen. James W. Stansberry, General Marsh said, "It is a pleasure to add my congratulations for ESD's successful management of CASCADE. Bringing a program in on schedule and within cost is our mission, and CASCADE is a super example of what can be accomplished."

Not only the program office won



The Galileo Probe, the key that could unlock the secrets of the solar system when it visits Jupiter in August 1988, is checked by spacecraft manager William Butterworth before the probe enters a thermal-vacuum chamber for testing. See accompanying item.

praise for the eleven-month effort. E-Systems Inc.'s General Reconnaissance Program Office of Greenville, Tex., received ESD's Exceptional Achievement Award from General Stansberry.

★ Global Weather Dynamics, Inc. (GWDI) is placing an airline-quality weather service at the fingertips of general aviation. Called "WeatherCard," the new system permits business and private pilots as well as fixed-base operators to access a menu-driven Global Weather database and actually charge the service directly to their Visa or MasterCard.

Although WeatherCard will first be made available to the general aviation world, the system is highly relevant to several other markets, such as agriculture, TV stations, public utilities, and trucking concerns. It can be received by anyone who owns a microcomputer or terminal capable of being connected to a telephone.

To use the service, the pilot dials a toll-free number that connects him to the GWDI computer in Monterey, Calif. The computer then asks for details on the user's credit card and runs a standard validation check. First-time users receive a statement of costs, terms and conditions of service, and operating instructions for the system. The user then can elect to exit the system or start using the service.

The WeatherCard system initially provides a menu of available services, including the same aviation weather database used by the major domestic and international airlines. The pilot can access this database to receive the weather information he requires in an easy-to-understand format. He can retrieve terminal and area forecasts, upper wind and temperature forecasts, radar reports and NOTAMs, and a variety of other information.

Another option allows the pilot to run a flight plan by answering a series of questions regarding his flight.

AEROSPACE WORLD

★ Strategic Air Command will expand its conventional support of Navy operations by equipping two squadrons of B-52Gs with Harpoon antiship missiles.

According to Majs. David L. Lay and David P. Knowles, Hq. SAC collateral mission officers, Harpoon-equipped B-52s will be based at Loring AFB, Me., and Andersen AFB, Guam. Three modified B-52Gs are already at Loring, and the Air Force expects to complete deployment of both squadrons by mid-1985.

SAC is already providing mine-laying, antisubmarine, and sea-surveillance support to the Navy. A Memorandum of Agreement signed by the two services in late January adds antiship support to the collateral mission.

The Majors stressed that while the Air Force is increasing its naval support, the Navy maintains the primary responsibility for sea defense. They added that the B-52's range and endurance expand the tactical use of the Harpoon and give the Navy more flexibility in its defense of the sea.

The Harpoon is an all-weather, sea-skimming cruise missile with a range

On the Road Again With the Air Force Message

For thirty-nine years the Air Force's Orientation Group has used exhibitions to show advances in airpower as well as the significance of the Air Force to the security of the United States.

This year is no exception as AFOG's six theater and two specialty vans travel to more than 300 high schools throughout the southern states and to locations along the east and west coasts.

The six refurbished tractor-trailer rigs expand into forty-seat carpeted theaters, each featuring a fifteen-projector multi-image program called "Flightlines." For eleven minutes, using more than a thousand slides, the Flightlines show helps students trace the progress of aviation through the personal accomplishments of six aviation pioneers. It also gives them a look at some Air Force people on the job.

Flightlines, a fast paced multi-image show depicting historical moments in US aviation, is the featured attraction inside the forty-five-seat Air Force theater van. The van travels from the Air Force Orientation Group, headquartered in Dayton, Ohio. (USAF photo)

In support of the Air Force's growth in high technology, AFOG also uses two specialty vans to attract university and college students to the officer ranks. Each van carries an eight-minute show entitled "Shaping the Future" that highlights the Air Force's advancements in high technology. This program uses eight projectors, more than 400 slides, and a stereo sound system in describing the Air Force's involvement in such programs as computer simulation, aircraft design and structural improvements, and the latest techniques being used to improve communications and weapons delivery systems.

"The specialty vans also house a recruiting office at one end to give local recruiters the opportunity to talk with prospective applicants, while on campus, about Air Force opportunities," said an AFOG official.

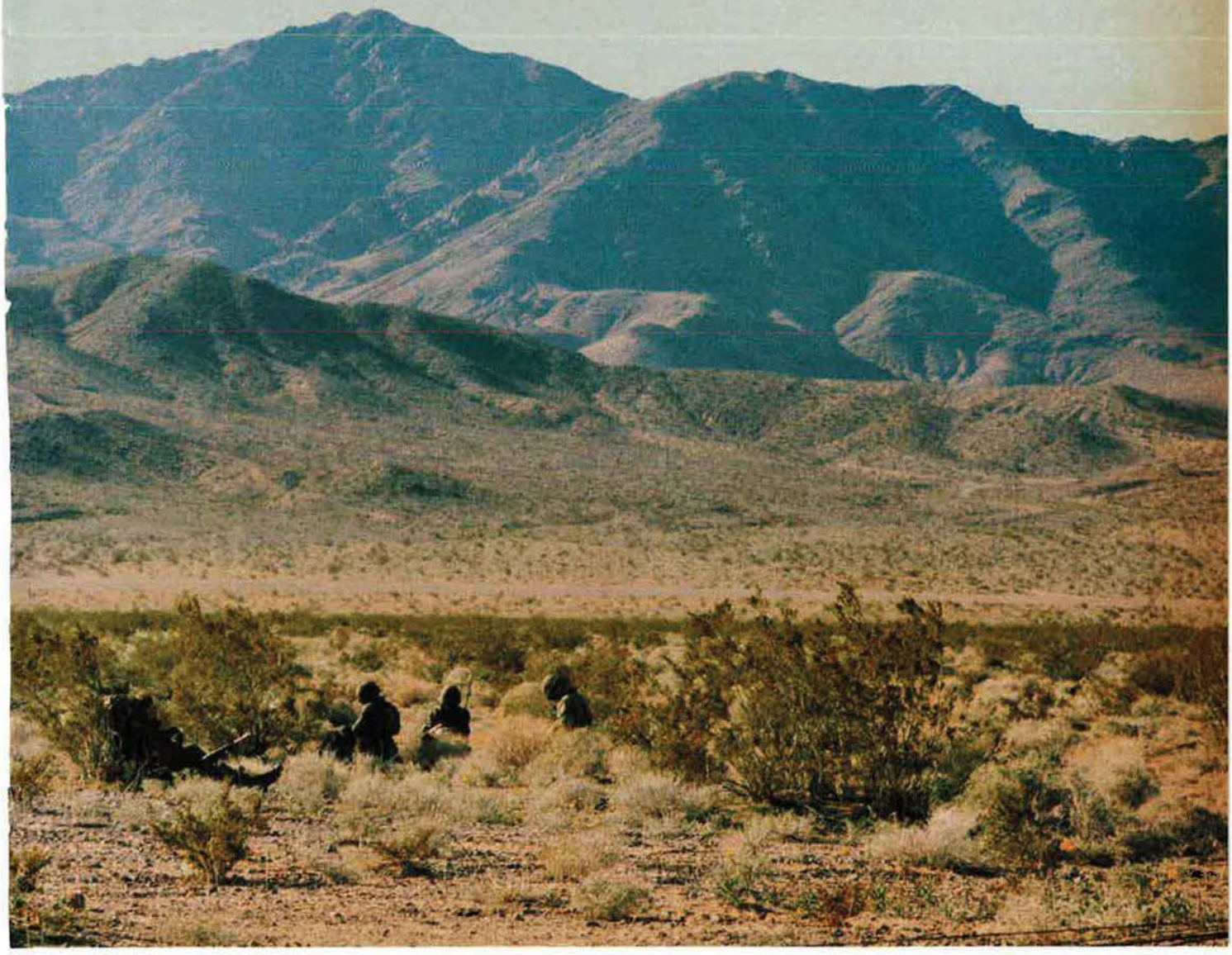
By the end of this spring, the two minitheaters will have traveled to more than sixty colleges and universities from coast to coast.

From its facilities at Gentile AFS in Dayton, Ohio, AFOG is tasked with creating and displaying exhibits that inform the American public about Air Force people, equipment, and contributions to the nation. To accomplish this job, AFOG has 170 officer, enlisted, and civilian members.

In 1983, for example, exhibits like the high school and college vans helped Air Force recruiters reach almost 300,000 students at nearly 800 high schools and at more than 200 colleges and universities. Through the use of these exhibits and other types of displays, AFOG had direct contact in 1983 with almost 7,000,000 people at more than 1,000 display sites.

"As an awareness unit, AFOG has continuously proven to be one of the most important resources to directly support recruiting objectives and the Air Force's public affairs program," said an Air Force official.

AREA:	**CLASSIFIED.**
SITUATION:	**ALLY HAS REQUESTED U.S. ASSISTANCE**
COMBAT SUPPORT NEEDED:	**300,000 TONS** **- WHEELED AND TRACKED COMBAT VEHICLES** **- LARGE AND SMALL TRUCKS** **- TROOPS** **- AMMUNITION AND RESUPPLY**
PROBLEM:	**USAF MUST MAINTAIN ROUTINE FLIGHTS INTO SMALL AIRFIELD TO SUSTAIN NEARBY TROOP DEPLOYMENT. AND DO IT NOW.**



SOLUTION: THE C-17.

The C-17 will airlift troops and cargo from the U.S. directly into forward areas where only short runways and limited ramp space are available. It will bypass major airfields and ports where cargo frequently stacks up waiting for forward shipment to the combat zone. This direct delivery will give the theater commander far more flexibility to counter the threat.

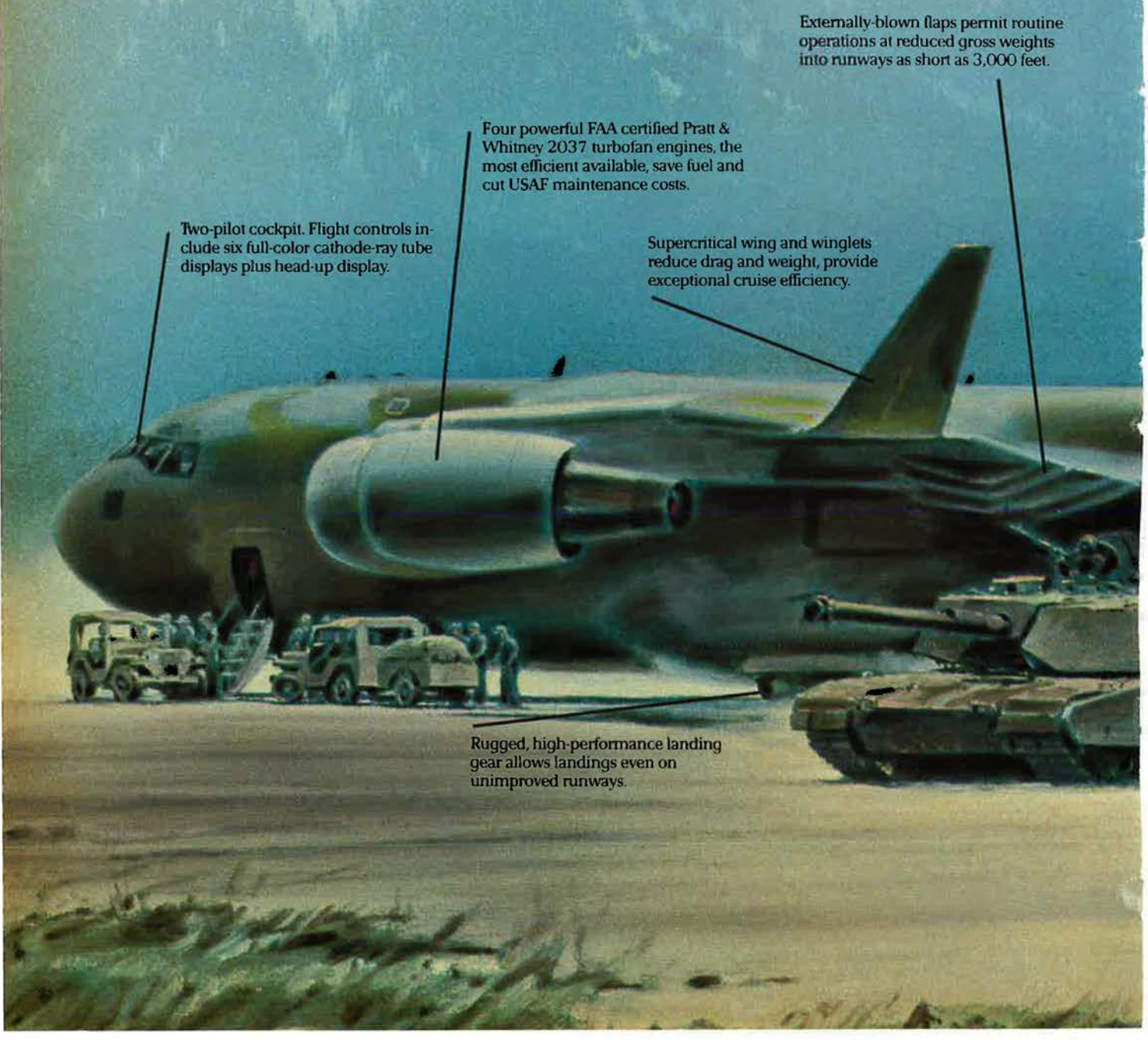
The C-17's supercritical wing design and propulsive lift system make direct delivery possible. Engine exhaust blows on the wing flaps to increase wing lift. The result is a much steeper angle of approach to the airfield, a lower landing speed, and routine operations to 3,000-ft. runways.

The C-17 is specifically designed to meet current and future air mobility needs. It will carry all U. S. Army and Marine Corps combat equipment. And it's the only airlifter which can air-drop outsize equipment.

There's more to an airlift mission than payload and speed.

C-17 on-the-ground maneuverability is superior. For instance, the C-17 can be turned completely around in just 90 feet. It can back up. It can offload pallets while taxiing and be fully unloaded with engines running without risk of injury to personnel or blowing debris damaging the plane or

THE AIRLIFTER THAT BRINGS THE



other aircraft parked nearby. C-17s can be parked in tight clusters where space is limited.

The bottom line: The sustained, routine movement of the cargo we need, to exactly where it's needed, in less time than ever before possible.

MISSION DOWN TO EARTH.

MCDONNELL DOUGLAS

We Have a Reputation For Coming Out First !

It started in 1959 on top of Thor-Able, followed by the Titan, Atlas and Minuteman ICBM's. Now, it continues with the PEACEKEEPER REENTRY SYSTEM.

The Reentry System consists of deployment structure, reentry vehicles, electronic package and aerodynamic shroud. The system is currently in full-scale engineering development at Avco under contract with the U.S. Air Force Ballistic Missile Office.

Peacekeeper is shown during cold gas ejection from its launch cannister at Vandenberg Air Force Base.

Peacekeeper Reentry System

AVCO SYSTEMS DIVISION

201 LOWELL STREET, WILMINGTON, MA 01887

of more than fifty nautical miles. It carries a conventional warhead and is similar to the Exocet missile used by the Argentines to destroy the British warship HMS *Sheffield* during the Falklands War.

A modified B-52G can carry twelve Harpoons mounted in clusters of three under the wings.

★ According to Air Force Logistics Command officials, AFLC saved US taxpayers $40 million in the last three years by utilizing Numerical Control (NC) equipment.

The NC program directs the movement of metal-cutting machines by converting numeric codes into electrical commands, which then permits manufacturing of a finished product or repair of an existing one.

AFLC has invested $18.7 million and currently owns seventy-eight NC machines at its five air logistics centers.

"NC equipment has helped us to significantly reduce the cost of producing low-volume parts for aircraft," said Larry Head, industrial engineer at Headquarters AFLC, Wright-Patterson AFB, Ohio.

The NC systems are an example of Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM).

"CAD/CAM systems are expected to demonstrate a four-to-one productivity improvement," Mr. Head said.

CAD/CAM systems are being used throughout AFLC, increasing productivity in the areas of numerical control parts programming, tooling/fixture design, printed circuit-board manufacturing, and development of interface test adapters for automatic test equipment. Other uses include plant layouts, office layouts, electrical schematics, civil engineering drawings, and office-related graphics.

"We are striving to increase our productivity and manufacturing capability through the use of CAD/CAM. This will enable AFLC to provide those parts and services necessary to keep our major weapon systems operating," said Mr. Head.

AEROSPACE WORLD

★ **NEWS NOTES**—The **122d Tactical Fighter Squadron of the Louisiana Air National Guard** will be the first Guard unit to modernize its fleet with Air Force **F-15 Eagles.** The squadron will get the first of its twenty-four Eagles in the summer of 1985. The 122d TFS currently flies F-4C Phantom II fighters.

The Air Force has signed contracts with **Beech Aircraft Corp. and Gates Learjet Corp.** for the lease of aircraft to fulfill that portion of the operational support aircraft mission presently being accomplished by the aging CT-39 fleet. The leased aircraft will consist of forty turboprop Beech Super King Airs, which have been designated **C-12Fs,** and eighty turbofan Gates Learjets, designated **C-21As.**

Solar Challenger, the solar-powered aircraft that made aviation history on July 7, 1980, with a celebrated flight across the English Channel, has been donated to the **Smithsonian Institution** by the Du Pont Co.

The Space Shuttle *Enterprise,* NASA's prototype pioneer Orbiter, will be on display at the **1984 World's Fair in New Orleans** this month. The *Enterprise* will be stationed on a reinforced dock near the United States Pavilion. ■

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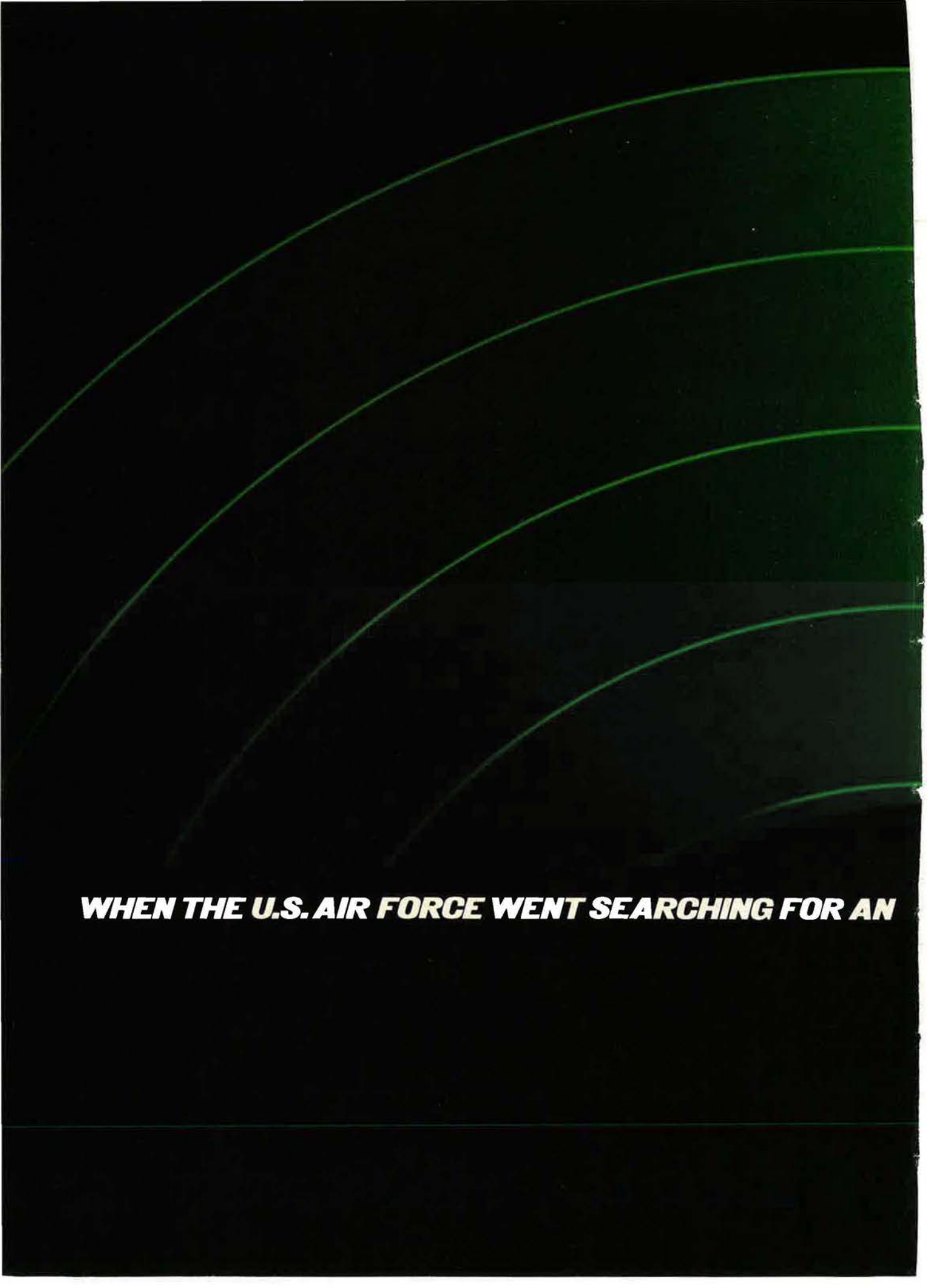
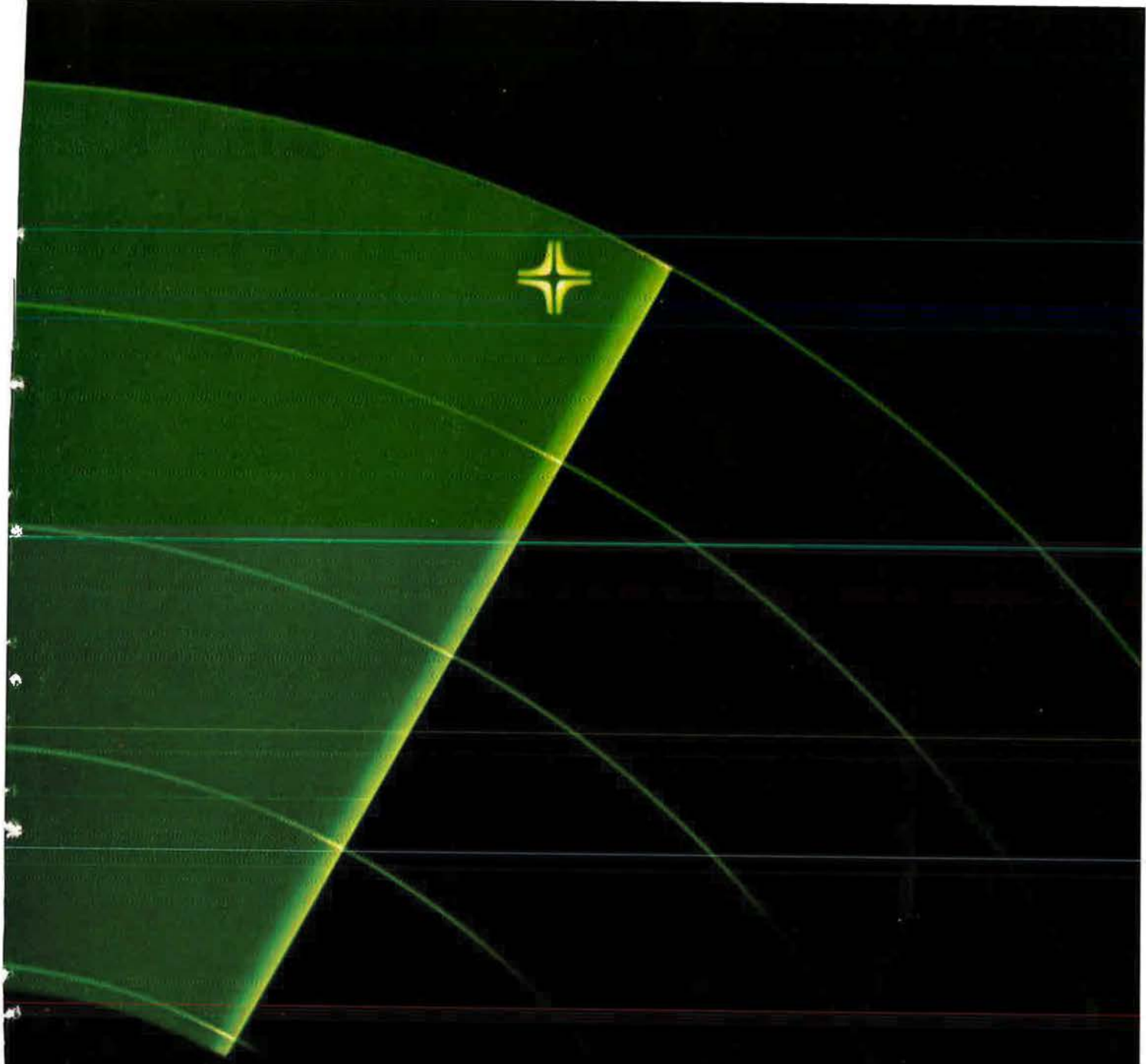

WHEN THE U.S. AIR FORCE WENT SEARCHING FOR AN



ADVANCED TACTICAL RADAR, IT LOCKED IN ON SPERRY.

The new U.S. Air Force Advanced Tactical Radar (ATR) will be the first ever using a cylindrical antenna configuration.

It is a C-Band, electronic scanning system, capable of multi-target tracking at any azimuth or elevation. Highly resistant to jamming and anti-radiation missiles, it is rapidly deployable and ground-mobile as well.

Sperry's radar capabilities sweep along the entire RF spectrum, from baseband to millimeter wave.

Under a joint award by the Departments of Commerce, Defense and Transportation, Sperry is developing NEXRAD, the next-generation weather radar system.

ATR and NEXRAD are the most recent in a continuing series of definition and development contracts won by Sperry to further the use of radar and related technologies for all services.

Sperry Corporation, Electronic Systems, Great Neck, NY 11020.

SPERRY

WE UNDERSTAND HOW IMPORTANT IT IS TO LISTEN.

An Alliance Of Intention

By and large, the problems are the same ones that NATO has always faced.

BY GEN. T. R. MILTON, USAF (RET.)
CONTRIBUTING EDITOR

EARLY in the First World War, Marshal Ferdinand Foch was asked by a somewhat unctuous Englishman what France needed from Britain. His answer was one British infantryman who would then be promptly killed in action. Thereafter, it went without saying, Great Britain would be committed.

There is an element of the Foch concept embedded in NATO's strategy of flexible response, just as there was—even more openly—in the preceding trip-wire strategy. Four and a half American divisions, along with a sizable tactical air force of five combat wings, are well in excess of Marshal Foch's British hostage requirement, but they tend to serve, in part, the same purpose. So long as the United States remains in the front line of Europe's defense, the United States will be thoroughly engaged against any Soviet aggression in Europe.

This NATO strategy is singleminded and does not allow for extrapolation. If the Soviets threaten somewhere else, say in the Persian Gulf, the United States is on its own. Following the Berlin Blockade of 1948, an obvious test of American resolve, the Soviets have taken the NATO strategy at its face value. Stripped of semantics, that strategy says Soviet aggression in Europe means war with the United States.

Over the years, NATO has become a part of European life. A generation of Europeans has reached middle age undisturbed by war. Except for those who live within sight of the death strip, the Soviet presence is unremarked by the average citizen. Even the hideous Berlin Wall has become part of the scenery, largely ignored by West Berliners.

Europe, in short, accommodated itself both to the Soviet menace and the permanent residence of troops from the other superpower. The occasional peace marches and anti-NATO demonstrations were simply fringe movements. For the vast majority of Europeans, NATO was nothing to get excited about. Everyone knew, if he thought about it at all, that there were nuclear weapons in NATO; there had always been nuclear weapons in NATO. And since even the NATO hierarchy maintained a certain woolliness about how and when these nukes might be used, the matter stayed out of the spotlight.

The Decision to Modernize

During the Carter years, the European allies began to worry about America's seriousness of purpose in regard to European defense. United States dithering over the neutron weapon had been a severe embarrassment to certain European politicians, Germany's Helmut Schmidt chief among them. Perhaps because he saw a need for a reaffirmation of the NATO strategy, Schmidt led NATO's highest councils into a decision aimed at modernizing NATO's nuclear-weapon inventory. In retrospect, since the warheads involved were United States property, it might have been less controversial if the United States had simply replaced old weapons with new ones.

However, this modernization was a NATO decision, and it was essential to play it that way. The Federal Republic agreed to take 108 Pershing IIs along with three squadrons of cruise missiles providing Germany was not alone as a northern European host for these missiles. Accordingly, the Netherlands and Belgium agreed to accept forty-eight cruise missiles each. Their agreement, however, was not exactly wholehearted, and both these countries are having trouble facing up to the actual introduction of the GLCMs. Across the Channel, the United Kingdom is going ahead with the GLCM deployment, although not without problems. Italy finessed the antimissile opposition by selecting a site in far-off and economically depressed Sicily.

In Germany itself, the arrival of Pershing IIs has focused attention on NATO to a surprising degree. Among other things, the Pershings and the soon-to-arrive GLCMs have raised new questions about a strategy that contemplates the use of nuclear weapons. Germans have always been sensitive to the fact that a war in northern Europe would make Germany—East and West—a battleground. Because there are close familial ties that run back and forth across the arbitrary boundary of the two Germanys, nuclear weaponry can only be viewed dispassionately so long as there is no talk of German nuclear targets.

The Soviets made a heavy-handed try at influencing the German elections last year on the issue of the Pershing II and GLCM deployments. They failed, and the Christian Democrats came to power, but a sizable opposition to this nuclear modernization remains. The Social Democrats oppose the missiles, and the Greens, a splinter left-wing party, managed twenty-seven seats in the Bundestag on an antinuclear platform.

There are signs, it is pleasant to note, that the Greens are having internal trouble. Gert Bastian, a retired Bundeswehr major general with extensive NATO experience, was a principal ornament of the Green Party's election campaign. Early this year, Bastian addressed a letter to the Green Party objecting to the one-sided stand of the Greens in which only the United States bears guilt for nuclear arms. He has threatened to resign from the party, a move that would be cheered by his former military colleagues and would undoubtedly distress Petra Kelly, a Green Party leader and Bastian's steady companion.

Lingering Opposition

Nevertheless, there continues to be considerable opposition to the new missiles. Some of this opposition is

noisy and demonstrative, and some of it is simply that of uneasy citizens. In time, the Pershing IIs and the GLCMs will doubtless be accepted as people come to realize what is going on across the border in terms of nuclear modernization. In any case, public-opinion polls show that the vast majority of West Germans are strong supporters of NATO and of the United States.

Generalizations tend to be misleading, however, and so is this one. While public-opinion polls and, indeed, visible man-in-the-street attitudes are favorable toward the United States and recognize the essentiality of the US contribution to Europe's defense, there are indications of dissatisfaction with the long-term American presence in Germany. Helmut Schmidt, in an ill-advised lecture at a January conference in Brussels, recited a list of European grievances against the United States, at least as he perceives them.

Although Herr Schmidt no longer speaks for anyone but himself, there can be no doubt his views reflect a certain unofficial constituency. His attack on the United States' All-Volunteer Force was justified ostensibly on economic grounds: If less were spent on personnel, the US could do more in the way of combat forces. But there was also an indirect slap at the quality of American forces, and thus an unpleasant reminder that our long stay in Europe has not been without a certain amount of friction.

Schmidt's speech drew a prompt reply from former Secretary of Defense James Schlesinger, who pointed out the declining German defense expenditure in real terms—the result of which has been serious shortages in spares, munitions, and other items associated with staying power. The Federal Republic, by Schlesinger's reckoning, is in no position to criticize the United States on defense matters.

Helmut Schmidt, a brilliant and articulate man, has occasionally made this sort of outburst in the past. He made no secret of his contempt for Mr. Carter's vacillating foreign policy, and evidently he has no admiration for the firmness of Mr. Reagan's. Mr. Schmidt is out of office and, indeed, out of power in his own Social Democratic Party, which has swung farther left than he wishes to go.

Kohl's Troubles

The present Chancellor, Christian Democrat Helmut Kohl, is solidly behind the missile deployments and the US contribution to NATO. The problem, if there is one, lies in the possible weakening of the Kohl coalition government because of internal political misfortunes. Count Otto von Lambsdorff, the economics minister, is accused of taking bribes. Manfred Wörner, the defense minister, got himself into a jam by summarily relieving General Günter Kiessling, one of two figurehead Allied Command Europe deputies, on grounds of security.

General Kiessling, a bachelor, was accused of frequenting homosexual bars and by inference of homosexual activities. He denied the charges and hired an expensive defense lawyer, instead of accepting retirement. Because the evidence appeared to be largely circumstantial (at least as of this writing), Mr. Wörner himself ended up on the defensive. General Kiessling, not incidentally, is a registered Social Democrat.

NATO deployment has begun for the US Army's Pershing II missile, left, and USAF's ground-launched cruise missile, above. Their presence and continued deployment are still being questioned on both sides of the Atlantic, however, and the long-term US military presence in West Germany is being debated there.

This mishandled affair has ended in the reinstatement of General Kiessling, who can look forward to an honorable scheduled retirement later in the spring. Chancellor Kohl rejected Minister Wörner's resignation, but there is no doubt harm was done to NATO, as well as to the Kohl government, by this unfortunate business. There are better and more discreet ways of easing out unwanted generals.

These distractions aside, Pershing II deployments to the Federal Republic are going ahead on schedule. Demonstrations against the missiles did not live up to advance notices, and while there will undoubtedly be further protests and occasional violence, Pershing IIs are now a fact of German life. Whether their mobility is also a fact of life remains to be seen.

Don't Bet the Rent Money

It also remains to be seen whether Belgium and the Netherlands will honor their agreement to accept cruise missiles. Each of these neighbors is supposed to receive forty-eight GLCMs, and the time is drawing near for a decision if construction is to be on track. The Netherlands finally has a government with the resolve to go ahead with the missiles. The difficulty is with the Dutch peace movement, which in the past decade has gained a virtual veto on defense matters. NATO betting is on the side of the Dutch government, possibly after a few concessions. Belgium, nearly bankrupt and disrupted more than ever by its Flemish-Walloon language controversy, is also a slight odds-on favorite to take its GLCMs. Neither the Dutch nor the Belgian decision is anything a prudent individual would bet the rent money on.

Incidentally, money is a key factor in these decisions. No country is prepared to spend enough on conventional forces to obviate the need for these missiles. Deep Strike, SACEUR's new strategy visualizing nonnuclear exploitation of new, accurate standoff weapon systems, is not yet sufficiently understood or accepted. There are those who feel any use of missiles will be interpreted by the enemy as a nuclear attack and that air forces must thus perform the Deep Strike mission of hitting the enemy in his vulnerable rear. *(For more on this new NATO strategy, see "Restoring NATO's Flexible Response" and "Strategy for Victory or Defeat?" in the April '83 issue.)*

The Situation in Britain

Across the Channel, the British are going ahead with GLCMs at Greenham Common, the celebrated location of one of the more persistent—certainly the most squalid—of the protest movements. This all-female camp-in is a continuing annoyance to base authorities and British security police. It is an unpleasant public nuisance to the long-suffering villagers. The women are a problem, and the danger of an ugly incident is always present. Protesters notwithstanding, Greenham Common will get its ninety-six missiles. The interesting test will come when they are moved out the gate to operating locations, an exercise that will have to be performed sooner or later. The grubby ladies outside the fence will then have to be dealt with more sternly.

Molesworth, a World War II B-17 base and wartime home of the 303d Bomb Group, is the other deployment site. It is scheduled for forty-eight GLCMs, but that is not until 1988, and is not, as a guess, a sure thing. The next few years will be tough ones for British defense. They will not be made any easier by the Labor Party's increasingly leftward antidefense stand.

Perhaps the most troublesome British problem will develop from the decision to maintain an independent nuclear deterrent. With the retirement of the RAF bomber force, this nuclear capability now rests entirely

Map shows GLCM ranges. A total of 464 GLCMs are to be deployed in the UK, Sicily, Belgium, the Netherlands, and West Germany. In addition, 108 Pershing II missiles will be based in the southern part of West Germany.

on missile-firing submarines. Because the *Polaris* subs are nearing the end of their operational life, the British government decided some years ago on *Trident*. So far, the *Trident* learning curve has been on the low end, and *Trident* has not severely dented the budget. But the next few years will see the four *Tridents* use up about £8 billion, or $11 billion.

With the Falklands another heavy drain on British defense resources, something will probably have to give, either *Trident* or the conventional forces. As matters look now, it will be the conventional forces, and they are already beginning to feel the pinch. All of this makes one at least wonder if it might not make more sense to turn over some US nuclear weapons—the GLCMs, for instance—to the UK and let them spend their money on conventional forces.

As to the Falklands, the new and apparently more conciliatory Argentine government may allow for a graceful British cutback in military commitments there, but that is yet to be seen.

In any case, the outlook for the Royal Air Force is a circumscribed one. Still a splendid professional organization, the RAF is cutting back to a force geared to insular defense and NATO commitments. Well, mostly. There is an interesting new air refueling capability coming along that would allow easy deployments to such places as, say, the Persian Gulf. British officials discourage that sort of speculation, but the fact remains that two squadrons of Victor K Mk 2 bombers converted to tankers, along with two squadrons of converted VC10 and Lockheed TriStars, will give the RAF legs it never had before.

Possibly the British even share the view of many Americans that NATO, by resolutely staring straight ahead, avoids seeing danger in the Mideast. It is easy to get that impression during London discussions, although it is certainly not the official view. The British, like the other European allies, express worry about American preoccupation with other areas. The Rapid Deployment Force, in particular, with its demands on European-based units, is a frequently voiced concern.

Where You Hang Your Hats . . .

An interesting comparison can be made between the dissimilar approaches of the US Navy and the US Air Force to a similar organizational problem.

Allied Forces Southern Europe, with headquarters in Naples, is the fiefdom of a US Navy admiral. Like most NATO positions, the duties are mainly planning, with a heavy agenda of protocol and just plain diplomatic politicking, if the Commander in Chief so desires. The Commander in Chief, Southern Command, has traditionally put emphasis on protocol, diplomacy, and public relations in its many guises. The results have been impressive in terms of press coverage and in high diplomatic regard for the importance of CINCSOUTH.

The admiral commanding SOUTHCOM last year acquired the additional function of Commander in Chief, US Naval Forces Europe. Headquarters for CINCUSNAVEUR is on Grosvenor Square in London. CINCSOUTH makes occasional forays to London to catch up on parochial naval matters, but his residence and daily place of business is in Naples.

The US Air Force has a similar two-hatted fellow in the Commander in Chief, US Air Forces Europe, and the Commander in Chief, Allied Air Forces Central Europe. Admittedly, while USAFE is on a level with NAVEUR, AAFCE is one notch down from SOUTHCOM, but never mind. There are aspirations to raise AAFCE to the next level.

The point of this little essay lies in the different philosophies of the two services. In the case of the Air Force, the USAFE responsibilities take most of the two-hatted general's time. His NATO function, even though just next door, is largely delegated to his German deputy.

Without any question, the running of USAFE is a demanding job, made even more so since so many of the responsibilities, large and small, were centralized in USAFE Headquarters with the move from Wiesbaden to Ramstein.

Whether the Navy or the Air Force approach is the correct one is not for me to say. It is enough to point out the differences, along with the observation that the Navy philosophy of having a senior admiral wearing the NATO hat most of the time does have its advantages within the political forums.

There is a certain irony in all this, for the Air Force is more directly and wholeheartedly involved in NATO's everyday functions than the Navy.

Smoothing the Facade

By and large, however, the problems facing NATO are the same ones that have always been around—they are only superficially different. And since NATO is primarily an alliance of intention rather than a mobilized force, the important thing is the bureaucratic structure, the facade. Over the years, that facade has stayed pretty much in place.

When Charles de Gaulle gave NATO an eviction notice, there were fears this might be the end. Instead, NATO headquarters moved smoothly from Paris to Brussels into temporary lodgings that shortly became its permanent home. SACEUR, meanwhile, shifted his headquarters to Casteau near the gloomy Belgian city of Mons, and SHAPE went on as before—minus, of course, the French.

There was one casualty in the bureaucratic structure, that of Allied Air Forces Central Europe. Before the move to Belgium, the Central Europe Command, the largest of the major NATO subordinate commands, was in Fontainebleau, along with Allied Air Forces, Land Forces, and Naval Forces Central Europe. When CINCENT moved to Brunssum, it was without his service components. Not insignificantly, Allied Air Forces Central Europe had been, in Fontainebleau, traditionally commanded by an RAF Air Chief Marshal.

In the early 1970s, there was a new initiative to create an air command in Central Europe. The United States Air Force, with the support of the German Air Force, was the prime proponent of this new command. The Royal Air Force, along with the Belgians and Dutch, opposed the idea. There then began a protracted power struggle.

Basically, the British resisted the creation of an Allied Air Forces Central Europe because they suspected USAF motives. The RAF, despite greatly diminished resources on the Continent, had a prestige command in 2d Allied Tactical Air Force. The Commander, 2ATAF, was the organizational equal of Commander, 4ATAF. The problem lay in the fact that Commander, 4ATAF, also commanded US Air Forces Europe, vastly larger than RAF Germany. The proposal for an Allied Air Forces Central Europe—or AAFCE—called for the Commander, USAFE, to become Commander, AAFCE.

The British were prepared to swallow that, but the American concept also eliminated the two allied tactical air forces and with it any remaining RAF identification with allied air forces.

It soon became apparent the ATAFs would have to remain if the AAFCE proposal were ever to gain agreement in the Military Committee. Having decided to retain the ATAFs, there was then an argument, often acrimonious, over location. The USAF wanted AAFCE at Ramstein, collocated with USAFE. The British held out for placing AAFCE at Brunssum in the Netherlands, the site of Headquarters, Central European Command.

Not to make too long a story, the Dutch constructed a building at Brunssum in anticipation of AAFCE's arrival. It now houses the operating staff for the airborne warning and control aircraft—the AWACS. Allied Air Forces Central Europe is at Ramstein, exactly where the persistent US Air Force sponsors of the scheme willed it to be.

Mechanism in Place

Almost ten years have passed since AAFCE was created, complete with the compromised decision to retain the two ATAFs. The British continue to command 2ATAF in northern Germany, while a Luftwaffe general now commands 4ATAF in central Germany. Another German Air Force general acts as Deputy, AAFCE, at Ramstein. The question is whether this addition to NATO's facade was worth the acrimony and labor that went into its creation. Not an easy question to answer.

In theory, the answer is yes. Before the creation of AAFCE, 2ATAF and 4ATAF went their separate ways with no common doctrine or procedures, not even common tactical frequencies. Ten years of AAFCE have seen a few improvements in these areas, but progress has been, to put it kindly, measured. The two allied tactical air forces still retain their separate identities and confusingly, while subordinate to AAFCE, are nonetheless on the same organizational level—all three subordinate to the Commander, Central Europe, at Brunssum. For one reason or another, there appears to be little day-to-day liaison between the Commander, AAFCE, and the Commander in Chief, Allied Forces Central Europe.

So far as the British are concerned, this was all predictable. Any suspicion that they might have lent a hand to the partial derailment of this allied air command is without proof, although senior RAF officers will cheerfully argue that the demise of AAFCE in favor of an air staff at AFCENT would be a better solution.

The other major participant in AAFCE, the Luftwaffe, continues to support the original concept but is disappointed in the results thus far. German disappointment is eased by the ownership of two key posts—Commander, 4ATAF, and Deputy Commander, AAFCE.

Meanwhile, various schemes make their slow rounds through NATO's labyrinths. One would elevate AAFCE to a major subordinate command. Ramstein would then equal Brunssum. Another, headed in a different direction, would place the air function at SHAPE under a SACEUR deputy who would, naturally, be British. The chances are that nothing will happen. AAFCE will remain where it is, both organizationally and geographically, and there will yet be a little more progress.

By and large, the Alliance is better off for having this air command, however ineffectual it has been thus far. At least the mechanism is in place, and some day, maybe, it will begin to function as originally designed. Meanwhile, identification remains a problem still to be solved.

The New NATO Overseer

NATO is not a place for impatient achievers. Bruised feelings and offended national egos can undo the most sensible proposals. NATO is not, in short, so much an efficient military organization as it is a consortium of independent partners, each with an equal say as to how Europe will be defended—a sometimes frustrating arrangement but an essential one.

A new overseer of this democratic alliance will report for duty this June. He is Peter Carrington, former British Minister of Defense, former Foreign Minister who resigned as a point of honor over the Falklands miscalculation, one-time Grenadier Guardsman who won a Military Cross in World War II, Sandhurst graduate, and the sixth Baron Carrington. Lord Carrington will doubtless be a different Secretary General than his predecessor, if only because of their different upbringing. Joseph Luns, who has presided with aplomb over NATO these past thirteen years, came to the job as a career diplomat. Carrington, the archetypal British aristocrat and an urbane and witty man, is inclined more to the direct approach. It will be interesting to see how he adjusts to the interminable diplomatic persiflage of the North Atlantic Council.

One of his early orders of business will be the resolution of Spain's membership. The Spanish have joined NATO, but they have yet to come in all the way. A referendum on NATO membership is still scheduled for the Spanish electorate, and its outcome could be unfavorable, although the new Spanish service chiefs appear to favor unrestricted membership.

One lingering problem, and one Lord Carrington knows very well, concerns Gibraltar. Spain considers this British enclave on the Iberian peninsula an affront to Spanish territorial integrity. The Gibraltarians, on the other hand, desire overwhelmingly to remain British, and the United Kingdom has given the Spanish no reason to hope for an early return of the Rock.

Like all NATO problems, this one will take time. Like the Iceland-British fishing dispute, the Turkish-Greek Aegean quarrel, and other squabbles, it will, without doubt, be featured in occasional communiqués. But if the past thirty-odd years are any indication, NATO will continue to bumble along, posing, in spite of all its shortcomings, too much of a risk to Soviet aggression for those cautious old men in the Kremlin. ■

Gen. T. R. Milton's by-line is one familiar to AIR FORCE *Magazine readers through his regular "Viewpoint" column and his periodic feature articles. His forty-year military career included combat service with Eighth Air Force in World War II, participation in the Berlin Airlift, command of Thirteenth Air Force, service as Air Force Inspector General and as USAF Comptroller, and duty as the US Representative to the NATO Military Committee. He retired from active duty in 1974. This article is based on General Milton's recent trip through Europe.*

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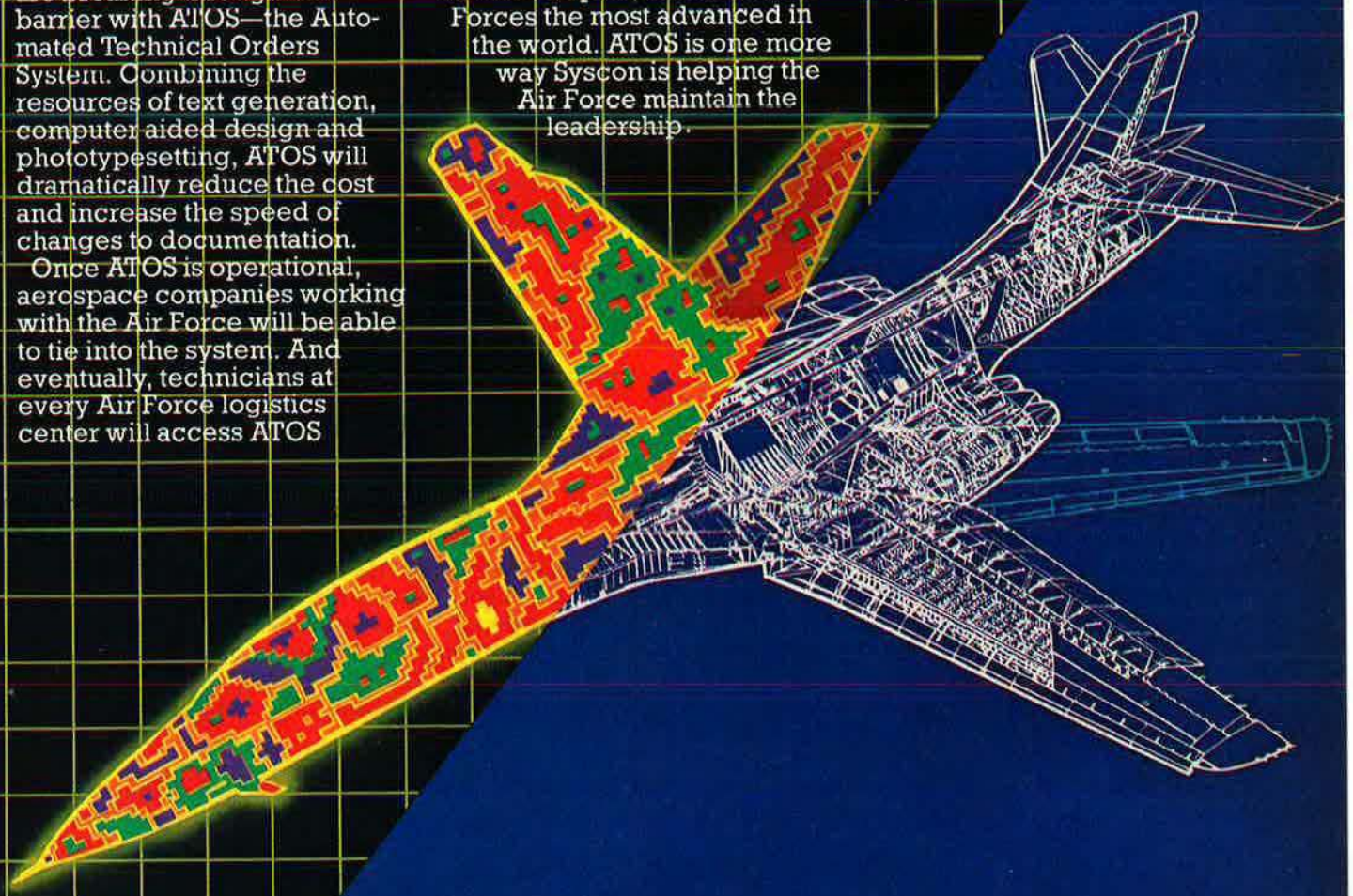

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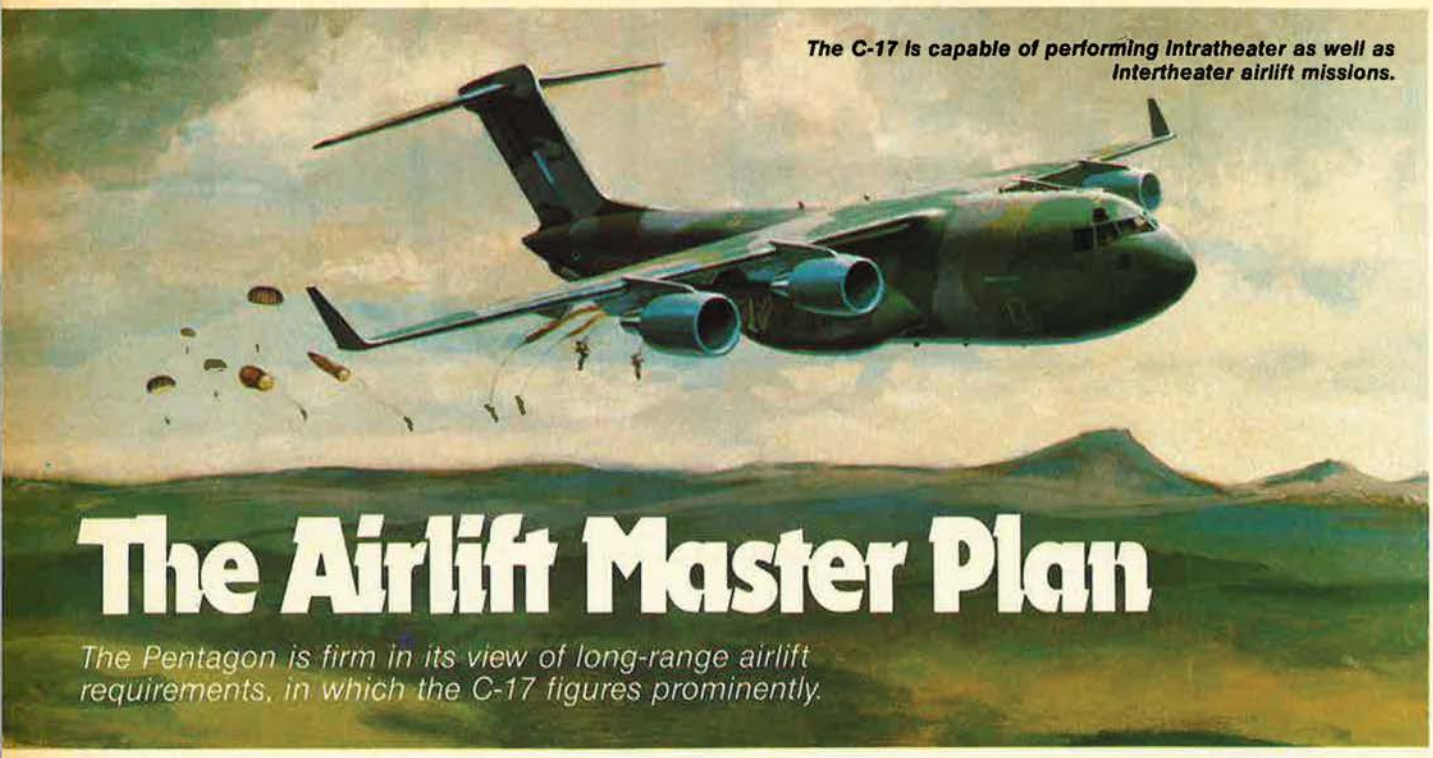


The C-17 is capable of performing intratheater as well as intertheater airlift missions.

The Airlift Master Plan

The Pentagon is firm in its view of long-range airlift requirements, in which the C-17 figures prominently.

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

THE growing Soviet capability to project military power globally—and to apply that power in several places at once—puts vast new stresses on US mobility. Airlift is obviously the pivotal component for timely initial responses to this global threat. As Lt. Gen. Robert D. Russ, USAF's Deputy Chief of Staff for Research, Development and Acquisition, put it, "Airlift is the element of force projection that provides the capability to respond rapidly virtually anywhere in the world and with the force that can make the difference between keeping a conflict at a low level or escalation of hostilities to a dangerously high level." This argument can be extended to reason that airlift can make the difference between victory and defeat.

Yet both forms of airlift, intertheater as well as intratheater, are deficient in capacity and in need of modernization. USAF's new Airlift Master Plan, a cohesive roadmap for correcting existing shortfalls and meeting future mobility requirements, is the distillation and capstone of seventeen major mobility studies conducted over the past decade, all of which concluded that airlift requirements far exceed capabilities.

Formulated in close coordination with the other services, the unified and specified commands, the Joint Chiefs of Staff, and the Secretary of Defense, the Airlift Master Plan is anchored primarily in two documents—the long-term Defense Guidance and the Congressionally Mandated Mobility Study (CMMS) of April 1981. As such, it is balanced in relation to the other components of mobility—sealift and prepositioning of materiel—and allows for the fact that airlift, although fast and flexible, inherently has a limited capacity and depends on the availability of airfields.

Conversely, the plan allows for the fact that sealift has a large capacity and some flexibility but is slow and seaport-dependent. Prepositioning is dependent on linkups of equipment and personnel to reduce long-range lift requirements and is burdened by the expense of duplicate sets, limited flexibility, and vulnerability. While the individual components of mobility can't function efficiently by themselves, in combination they are complementary, even synergistic. With the plan's envisioned ability to deploy rapidly and to sustain fighting units, US forces would be able to meet the central criterion of the Defense Guidance, which is to "contain and reverse the geographic expansion of Soviet control and military presence throughout the world, and increase the costs of Soviet support for and use of proxy, subversive, and terrorist forces." Possibly even more important, such a force-projection capability would go a long way toward deterring Soviet military adventurism and the accompanying challenge to vital US security interests.

The Airlift Challenge

The present airlift system blends the Military Airlift Command active-duty Air Force, Air Force Reserve, Air National Guard, and Civil Reserve Air Fleet (CRAF) personnel, aircraft, and equipment into a national airlift force. This force at present has the capacity to deliver 32,400,000 ton-miles of cargo per day over "intertheater" distances. The Defense Authorization Act of 1981 initiated the Congressionally Mandated Mobility Study, a total, long-term look at US mobility requirements. The CMMS gauged the national airlift requirements in relation to a variety of scenarios and time frames, with 1986 serving as the baseline force structure. While it produced a host of findings and hypotheses, CMMS yielded one central conclusion: A combined intertheater airlift capacity of 66,000,000 ton-miles per day (MTM/D) is a "minimum goal." "Minimum" in this context was defined as constrained by fiscal pressures, thus falling short of the full requirements ensuing from the individual scenarios that served

as benchmarks. An ancillary conclusion of the study was that a significant portion of the recommended airlift capacity should be capable of accommodating outsize cargo.

While the Master Plan is governed by the Congressionally Mandated Mobility Study's minimum goal of sixty-six MTM/D in intertheater lift capacity, the requirements in intratheater mobility could not be pinpointed with the same precision. The Plan is predicated on evidence from a series of preceding studies that the present force of 512 Primary Aircraft Authorized (PAA) C-130s, with a capacity of about 9,200 ton-miles per day, is inadequate to support intratheater logistical deployment, employment, and resupply requirements. Moreover, the C-130 is intrinsically an intratheater airlifter. Cargo brought into a theater by such intertheater aircraft as the C-5, C-141, or KC-10, therefore, has to be transferred to intratheater aircraft, which causes airfield saturation at the main operating bases and slows down the cargo flow to the users.

The Airlift Master Plan provides for continuing, detailed assessments of mid- and long-term intratheater lift requirements. Until these analyses can be incorporated into the Plan, the present intratheater lift capacity will serve as a temporary baseline even though the Defense Department reported formally to Congress in February 1984 that "we cannot transport heavy, outsize Army equipment to a vast majority of small austere airfields which comprise most of the free world's runways. Additionally, the productivity of the C-130 is seriously reduced [when] carrying cargo over the long intratheater distances found in Southwest Asia, Africa, and other areas of the Third World."

This report to Congress—which was endorsed specifically by the Secretaries of the Air Force and Army, the Chiefs of Staff of these two services, the Commandant of the Marine Corps, as well as the Secretary of Defense and the Chairman of the Joint Chiefs of Staff—points out that as scheduled improvements in intertheater airlift, sealift, and prepositioning increase the amount of cargo delivered to a given theater, "these enhancements, in turn, will require more intratheater movement" to distribute this material.

The Defense Guidance covering the five-year period to FY '89, therefore, instructs the Air Force to increase intratheater lift capacity by fifty percent. Eventually, the plan is to attain a capacity of about 16,000 ton-miles per day. Other details of intratheater airlift modernization will probably be spelled out in the Defense Department's pending Worldwide Intratheater Mobility Study.

The Aging Factor

Because it is oriented toward the long term, the Airlift Master Plan allows for attrition and aging of the force and the concomitant requirements of replacement and modernization. By 1990, the Air Force told Congress, the average age of the C-141B fleet will be more than twenty years, and the early C-130 aircraft will be thirty-three years old. Aircraft structural fatigue, coupled with obsolescent technology in avionics, design, and support, can be expected to drive up the operational costs of these aircraft to exorbitant levels over the next twenty years.

The older C-130s already require major modification, including centerwing rehabilitation and new outer wing boxes. In the case of the C-141 fleet, phaseout will probably have to begin in the mid-1990s and be completed shortly after the year 2000 unless major rehabilitation programs are started soon. But even with extensive modification, the useful service life of the 272 C-141s now in the inventory probably can't be extended beyond 2015, in the view of Air Force experts.

Based on elaborate, painstaking analytical and tradeoff studies, the Master Plan provides two specific sets of force structure recommendations—one geared to the year 1998 and the other keyed to the next century.

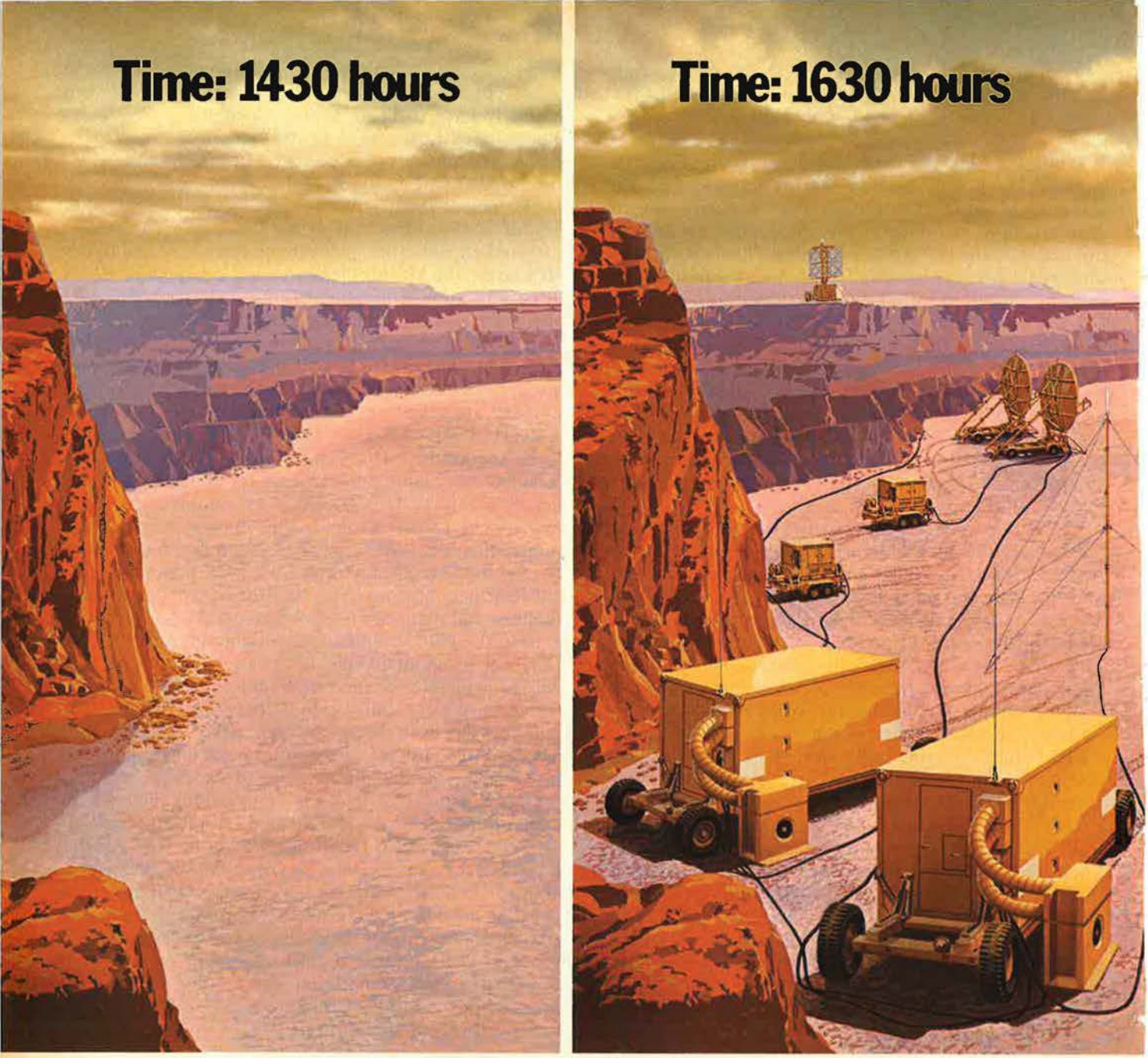
In the first instance, the Plan recommends that 180 older PAA C-130s be retired between 1991 and 1998, along with fifty-four PAA C-141Bs. The remaining C-141Bs are to be transferred to the Air Reserve Forces. A total of 180 PAA C-17s (210 total authorized aircraft) is to be acquired by 1998 while 114 PAA C-5s are to be retained and manned by active-duty and ARF personnel. SAC's sixty KC-10s are to be retained, but their assignment to the airlift or air-refueling mission will remain flexible. While forecasts about CRAF capacities beyond the year 2000—when the service life of the present fleet becomes marginal and for which the airlines' replacement plans are not yet formulated—are tenuous at best, the Plan assumes that a minimum of 11.3 MTM/D as well as about 145,000,000 passenger-miles per day will be available for the foreseeable future. The intratheater airlift capability is to be boosted to 16,000 ton-miles per day even though the associated manpower is to increase by only 245 spaces (0.2 percent), mainly because of the greater productivity of the C-17.

Over the longer term, the Plan envisions the replacement of the 180 PAA C-141Bs by the addition of at least forty PAA C-17s, to be operated by either the Air Reserve Forces or the active-duty/Reserve Associate program. In order to maintain the CRAF contribution at a constant level, it "may be necessary for the military and civilian sector to jointly develop a new-technology Advanced Civil/Military Aircraft (ACMA)," according to the Master Plan. In addition, there could develop the need to buy additional quantities of C-17s or a new, advanced technology aircraft.

The C-17 Solution

On the basis of a multitude of tradeoff analyses, the Air Force and the Defense Department concluded that the C-17 is essential to modernize and expand both intra- and intertheater airlift in the most effective and economical way. Compared to a force mix involving additional C-5Bs and C-130s, USAF's recommended force structure revolving around the C-17 costs $17.9 billion less, requires 16,500 fewer personnel, and provides "more intratheater capability and military utility."

Gen. Thomas M. Ryan, Jr., Commander in Chief of the Military Airlift Command, told AIR FORCE Magazine that the C-17 "is a highly survivable solution to a wide range of airlift requirements—including direct delivery of the full range of military equipment over long ranges, to wherever the combatant commanders need it." He added that the aircraft's "low operating costs, ease of maintainability, and sharply reduced manpower requirements make it far and away the lowest life-cycle cost solution to the airlift force structure called for in the



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USAF Airlift Master Plan to meet our national objectives."

Air Force Chief of Staff Gen. Charles A. Gabriel summed up the key qualities of the C-17 in a memorandum to his US Army counterpart in which he said its primary mission is to "help satisfy the wartime inter- and intratheater airlift needs of this nation." The new aircraft, he pointed out, "will reduce our intratheater airlift shortfall through its capability to operate into small, austere airfields on direct-delivery missions from the CONUS to forward operating areas."

In an intratheater role, he explained, "the C-17 can deliver people, equipment, and supplies to the brigade level and even further forward, if required. Its design will allow delivery of all sizes of cargo into forward operating locations; its maneuverability, speed, climb rates, and redundant systems make it more survivable than any current airlift aircraft." The C-17's large payload and small crew size allow "effective risk management by exposing fewer people and aircraft to forward area threats," according to General Gabriel.

Genesis of an Airlifter

The C-17 program dates back to October 1980 when the Air Force issued a request for proposals (RFP) for what was then called the CX program. Boeing, McDonnell Douglas, and Lockheed responded, with the latter submitting two proposals, one for a new aircraft and the other for an updated C-5. The Air Force subsequently informed relevant elements of Congress that the C-5 would not meet the CX program's operational requirements. In August 1981, the Air Force selected McDonnell Douglas the winner of the CX competition without entering into a production commitment at that time. In November of that year, the Chiefs of Staff of the Army and the Air Force, along with the Marine Corps Commandant, informed Congress that they were in accord on the selection of the C-17, and in January 1982 recommended acquisition of forty-four KC-10s and 164 C-17s.

Also in January 1982, the Air Force and the Defense Department, in response to an unsolicited proposal by Lockheed centering on the acquisition of an additional fifty C-5s on a fixed-price basis, announced that the C-5 would go back into production. The reason for this decision was that the C-5 would be ready sooner. After protracted congressional wrangling over whether additional Boeing 747s rather than C-5s should be authorized, the Senate-House Authorization Conference agreed to acquire the additional C-5s, along with three 747s, and to speed up the C-17 program.

Initial development of the C-17 got under way in June 1982. The C-17 program is phased to follow directly behind the C-5B acquisitions, the last of which is scheduled to be delivered in February 1989; the first C-17 is to enter the inventory in December of that year. The FY '85 Defense budget request earmarks $129 million to begin full-scale engineering development of the C-17. R&D funding of the program in prior years totals about $120 million. The overall cost of the program—R&D as well as acquisition of 210 aircraft—is expected to amount to about $37.5 billion, expressed in then-year dollars.

The rationale undergirding USAF's airlift acquisition strategy, according to General Russ, is "to meet pressing near-term capability shortfalls and provide a long-range solution to correct quantitative and qualitative deficiencies in the total airlift system. The procurement of KC-10, C-5B, and additional CRAF aircraft was the best approach to building intertheater capability quickly, while the C-17 offers us the best approach to meet long-range goals."

The acquisition of the C-5 and the C-17 was not an "either/or decision," he stressed, adding that "each provides a specific capability and, by complementing each other, helps us meet national force-projection goals better." While the C-5 will remain "our most efficient carrier of large, heavy payloads over intercontinental distances" with a payload capacity of about 260,000 pounds, the C-17 not only helps to redress quantitative and qualitative airlift deficiencies but "provides desperately needed force modernization. It adds to our total airlift capability at the lowest life-cycle cost of other alternatives examined to meet the overall shortfall. The C-17 will have significantly lower manpower and operating costs."

Unique Performance Features

The generic performance requirements for the C-17 were spelled out in the original CX RFP and—according to a report by Secretary Caspar Weinberger to Congress, entitled "Validation of the Requirement, Concepts, and Design for the C-17 Airlift Aircraft," submitted two months ago—"remain valid today and for the foreseeable future." These characteristics pivot on intercontinental and in-theater delivery of the full range of Army and Marine Corps equipment; the ability to operate from 3,000-foot runways; ground maneuverability sufficient to permit routine operations through small, austere airfields; the capability to airdrop troops and equipment; enhanced survivability; excellent reliability, maintainability, and availability; and low life-cycle costs.

Secretary Weinberger's detailed validation report pointed out that the C-17, because of its inherent flexibility to perform both the inter- and intratheater missions, "would produce significantly reduced life-cycle cost, particularly in manpower, over any multiaircraft solution examined. In addition, any delay in procurement of additional aircraft past the mid-1990s will result in a loss of capability due to the necessary retirement of part of our C-141 and C-130 forces. Such a delay could push the solution to the nation's airlift shortfall into the twenty-first century. The C-17 provides a timely single aircraft solution to the needs of our airlift system."

The central performance feature of the C-17 is its ability to carry a maximum payload of eighty-six tons a distance of 2,940 nautical miles and deliver it directly to forward operating locations. The C-5, by way of a benchmark, can carry a payload of 130 tons up to 1,650 nautical miles, while the C-141B is capable of delivering forty-five tons of cargo over 1,970 nautical miles. These aircraft, however, can't match the C-17's "airfield compatibility," meaning runway length and width standards as well as performance with regard to taxiways, ramp space, obstructions, and weight-bearing capacity.

The Runway Rule

As a rule of thumb, each thousand-foot reduction in runway length required by a given aircraft type doubles

the number of airfields at which it can land. It would obviously be desirable to reduce the required length of the runway as much as possible without giving up other essential performance characteristics, such as range and payload. Detailed analyses by the Air Force show that the ability to operate from runways between 3,000 and 4,000 feet in length provides significant operational flexibility and doesn't tax unduly other performance requirements and the technology available at this time. Airfields with relatively short runways are usually constrained also in terms of width—on the average, runways in the range of 3,000 to 4,000 feet in length are about ninety feet wide—and are hampered by a limited number of narrow taxiways and cramped parking areas.

For example, in West Germany the typical small, austere airfield has a runway 3,000 to 4,000 feet long and ninety-eight feet wide, taxiways between forty and fifty feet in width, and no more than 50,000 square feet of parking space. In Saudi Arabia, the runways of austere fields range between 3,000 and 5,000 feet in length, are either unpaved or semiprepared, and have neither taxiways nor defined parking areas, according to Secretary Weinberger's report to Congress. In Korea, many of the paved runways are between 2,500 and 5,000 feet long, lack parallel taxiways or turnaround areas, and are limited to about 110,000 square feet in parking area.

Aircraft operating in these theaters must have the ability to accommodate such constraints. The number of airfields in the free world—excluding those in the US—with runways longer than 5,000 feet and wider than 150 feet is 1,576, while the number of fields with runways

The Airlift Master Plan calls for the acquisition of forty-four KC-10s (upper) and fifty C-5Bs (lower) to provide the nation with strategic mobility quickly and economically.

more than 3,000 feet in length and ninety feet in width is 9,887, according to the Defense Department's report to Congress. Even in the NATO nations, there are few airfields that can handle a heavy flow of the large transports currently in MAC's inventory, mainly because the airfields are too small to accommodate those aircraft's limited ground maneuverability. Also, runway interdiction and the need to bed down reinforcing fighter and combat support units would exacerbate the problem.

In certain areas of the world, such as the Middle East, Africa, and South America, the limited number of major airfields stretches out the time required to deliver a force into combat, especially if airlift flow into these few fields must be restricted or if a long overland march is required from the offload base to the area of combat. By way of an example, the Saudi Arabian airfield system consists of ninety-nine airfields with hard-surface runways. Only ninteen of these fields can be considered adequate for C-5 and C-141 operations; almost all of these airfields can accommodate the C-17.

The ability to deliver cargo directly to or near the combat zone is a function of airfield availability and compatibility as well as of a suitable command and control system. Aircraft traits that enhance direct delivery include not only the ability to operate into austere, short-runway fields with minimal ramp space but also the ability to offload without sophisticated ground equipment and to perform with high reliability. The C-17 is optimized for direct delivery by combining intercontinental range, outsize cargo capacity, and the ability to use the same type of airfields as the C-130, according to Secretary Weinberger's report to Congress. Because of its direct-delivery capability, the C-17 could reduce unit closure time by between seven and fifteen percent when assigned to deployment missions in Southwest Asia. Also, because it reduces transshipment requirements at main operating bases, the C-17 reduces congestion at these vital nodes, lowers the demand for intratheater movement, and, hence, cuts the requirement for support personnel and equipment.

Direct Delivery

There is an additional plus that accrues with the C-17, according to the Defense Department: "The C-17 will comfortably operate in the intratheater role traditionally reserved for the C-130. Although the C-17 has a much greater capacity, it will not replace the C-130 for the sortie-intensive, relatively low-tonnage resupply mission [but will] ease the pressure on the C-130 fleet by augmenting it when the situation justifies the larger capacity, such as for bulk ammunition or fuel supply, or the longer range intratheater missions typical in areas such as Southwest Asia."

The C-17's ability to haul large payloads over long distances while retaining the short takeoff and landing (STOL) capabilities and ground maneuverability essential for direct delivery is the result of unique configuration and design features. The advanced technology wing design of the aircraft decreases aerodynamic drag and reduces structural weight, thereby reducing fuel consumption. Also, the greater thickness of the advanced technology airfoil provides a larger internal fuel volume. The use of winglets, proven on commercial aircraft, reduces drag and lowers fuel consumption by approximately four percent. Further, the Pratt & Whitney PW2037 engine chosen for use on the C-17 is the most fuel-efficient engine available. In addition, the aircraft is equipped with a full-time, computer-controlled, energy-performance management system that boosts fuel efficiency. As a result, the C-17's payload capabilities are optimized in the critical range from 2,400 to 3,200 nautical miles where it approaches those of the larger and heavier C-5B.

The C-17's STOL features, proven in 800 flight-test hours on the YC-15 prototype aircraft, stem in part from

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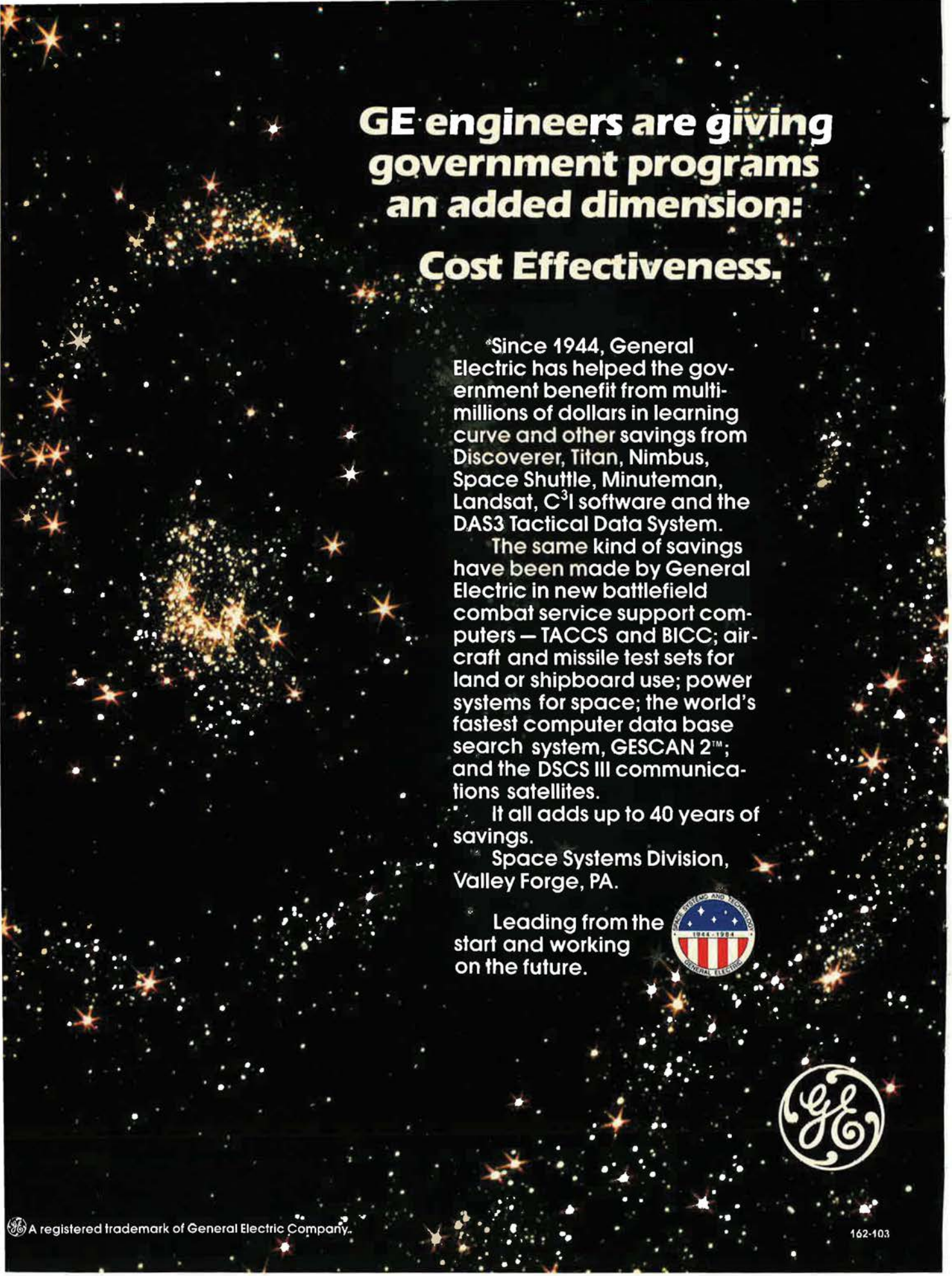
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externally blown flaps. The engine exhaust flows over and through the flaps to generate additional lift. The high, forward position of the engines increases and spreads the exhaust flow over the flap and, at the same time, increases ground clearances. This feature also helps in obstacle avoidance and reduces the risk of foreign object damage. The C-17 uses direct-lift control spoilers, mounted on the upper wing surfaces, to improve low-speed handling. This combination of externally blown flaps and direct-lift control spoilers permits approach speeds as low as 115 knots with a maximum payload and sufficient fuel for a 500 nautical mile return flight.

The C-17 incorporates a head-up display and a high-impact landing gear that, along with its high low-speed maneuverability, enable the pilot to touch down with high precision. The C-17's design is also tailored for efficient ground operations at small, austere airfields, with the physical dimensions of the aircraft—165-foot wingspan and 175.2-foot length—permitting simultaneous operation of two C-17s on a 250-foot by 300-foot ramp or single aircraft operations on ramps as small as 135 feet by 125 feet. Further, the aircraft's thrust-reversing system facilitates backup during ground operations and enables the C-17 to turn around on a ninety-foot-wide runway. While the Air Force expects to operate the C-17 mainly from paved runways, the aircraft can operate with a full payload from unpaved, semiprepared, compacted surfaces, such as sandy clay or gravel. The engine exhaust flow, when reversed, is deflected upward to cut down on dust and debris that might interfere with ground personnel and equipment.

The C-17's cargo compartment accommodates outsize cargo and makes possible side-by-side double-row loading of the oversize pieces that make up the bulk of the Army equipment. Two five-ton trucks, for instance, can be carried side by side to make efficient use of the cargo space. A large cargo ramp and door allow straight-in loading of all equipment.

High Survivability

Survivability is obviously a cardinal requirement for an airlift aircraft meant to operate as close as tactically practical to the forward edge of the battle area. The C-17 is optimized for high survivability by sets of features that reduce exposure, provide self-protection, and broadly boost survivability. Exposure to threats is reduced intrinsically by its high maneuverability and the flexibility of being able to choose from a large number of airfields. Also, the C-17 can use in-flight thrust reversal for rapid, straight-in descent or small-radius, spiral approaches to avoid enemy weapons in the vicinity of airfields. Conversely, the ability to accelerate rapidly and climb out with powered lift in small-diameter spirals reduces exposure on takeoff. Rapid onload and offload on the ground or LAPES (low-altitude parachute extraction system) airdrops also help reduce the time the aircraft needs to spend in combat areas. Lastly, the C-17's low noise and smoke levels make it difficult for ground-based threats to detect the aircraft.

In terms of self-protection features, the C-17 incorporates provisions for radar warning systems, electronic countermeasures pods, cockpit electronic countermeasure control, and infrared missile protection. The design also stresses redundancy and separation of subsystem components, shielding, and fail-safe critical components to cut the C-17's vulnerability.

The C-17's crew is protected by armor and provided with a redundant oxygen supply. The aircraft can sustain flight with two of its four widely separated engines out of commission. The engine cases are designed for blade containment. The aircraft's electrical system is both redundant and shielded. These and other design features, the Air Force reported to Congress, make the C-17 a highly survivable airlifter in the Army's Airland Battle environment.

The C-17 takes advantage of technologies pioneered and proven in modern commercial aircraft to simplify maintenance, streamline logistics support, bolster reliability, and allow for high utilization rates. The aircraft's avionics incorporate the latest advances in digital computer hardware and software, such as the systems in use on the DC-9-80, Boeing 757, and Boeing 767 commercial airliners. Before its first flight on the C-17, the Pratt & Whitney PW2037 engine will be proven in more than three and a half million hours of commercial service on the Boeing 757.

Unique Warranty Provisions

The C-17 contract contains unique warranty provisions concerning reliability, availability, and maintainability, all of which are better than the performance levels of the three airlift aircraft now in MAC's inventory. Should the C-17 fail to meet any of the warranted performance levels, the contractor must provide corrective action at no increase in contract price. At the same time, the contract provides for incentive payments to the contractor if the aircraft exceeds the specified goals. The contract further requires the contractor to correct any structural defects that come to light during 45,000 hours of durability testing. The airframe is warranted for ten years or 10,000 hours and the landing gear components for twice that time.

The reduced, warranted maintenance requirements, in turn, will result in reduced maintenance manning, just as the C-17's three-member aircrew size will reduce aircrew manning requirements compared to present MAC aircraft. The C-17's cockpit design holds the flight deck crew to two pilots, similar to modern commercial airliners. The cargo compartment has been designed for operation by a single loadmaster. As a result, the C-17—in spite of higher wartime utilization and higher crew ratios per aircraft—will have the lowest aircrew requirement of any large military airlift aircraft.

The unit flyaway cost of the C-17 expressed in FY '84 dollars, the Air Force reported to Congress, is pegged at $85 million, compared to $141 million for the C-5. The procurement cost (which includes support equipment, simulators, and tech data) is estimated at $94 million for the C-17, compared to $150 million for the C-5.

The importance of the C-17 as a pivotal element of the Airlift Master Plan was summed up recently by the heads of the Army, Air Force, and Marine Corps to the Secretary of Defense and Congress in this statement: "The design characteristics and performance capabilities incorporated in the C-17 make it the best solution to satisfy overall airlift requirements and meet long-range objectives." ■

FLYING WITH THE

TURKISH AIR FORCE

Kemal Ataturk said it: The future is in the skies.

BY MAJ. THOMAS O. FLEMING, JR., USAF

THE four F-4Es swept low over fields of golden wheat. In the distance, snow-capped mountains towered above crystal waters, shimmering in the clean air. Below, the farmer harvested his wheat much as his ancestors have done for more than 3,000 years. As he looked up at the aircraft overhead, you could almost imagine the pride in his face, for this was his air force—the *Turk Hava Kuvvetleri,* or Turkish Air Force (TAF).

I was extremely fortunate to have the opportunity to fly with the TAF—if only as a "weekend warrior." During my two years as a staff officer at the Joint US Military Mission for Aid to Turkey—JUSMMAT—I flew F-4Es on a monthly basis with the 111th Filo (Fighter Squadron) at Eskisehir Air Base. Although two USAF officers are currently serving as exchange officers in the TAF supply and training directorates, there is no flying officer exchange program.

The Turkish Air Force was formed in 1911, and its first pilots were trained in France. The fledgling service fought in the Balkan Wars, World War I, and the Turkish War of Independence (1919–22).

It's impossible to appreciate modern Turkey or its Air Force fully without some knowledge of Mustafa Kemal Ataturk, founder of the Turkish Republic. His status in the eyes of the people transcends comparison with any American political or military hero. He first attained prominence as a young division commander in the Sultan's Army in the successful defense of the Gallipoli peninsula during World War I.

In the aftermath of this disastrous conflict, the Turkish people found themselves saddled with a corrupt and ineffectual government and faced with occupying troops on Turkey's shores for the first time since the Crusades. Ataturk found the situation intolerable. Like many of his countrymen, he was unwilling to accept the humiliating concessions to which Turkey submitted at the end of World War I.

Consequently, he organized disparate groups of patriots, soldiers, and bandits into an effective fighting force, mustered the support of the Anatolian people, and launched a seemingly futile struggle for Turkish independence. Not only was the fight against the government and the forces of the Ottoman Sultan but also against the occupying troops of the victorious allies: Britain, France, Italy, Greece, and Russia. Although Russia had withdrawn from the war in the wake of its 1917 revolution, it still entered the postwar scramble to dismember the Ottoman Empire.

Ataturk successfully fought first the Sultan's forces and then a large invading Greek army. After a bloody three-year conflict, the Greek forces were expelled in 1922 in a climactic battle that resulted in the razing of one of the world's most ancient cities—Smyrna (later rebuilt and renamed Izmir). The results of this victory reached all the way to London, where it precipitated the fall of the Lloyd George government, which had supported Greece in the conflict.

With the war won, Ataturk turned to reconstructing his country. A social democrat at heart, he found the task of developing democracy in a nation used to a thousand years of empire to be more difficult than the war. Ataturk's "experiment in democracy" experienced periodic contractions (observers would say that recent events in Turkey are simply a continuation of those original democratic "birth pangs"). Though many Westerners viewed his regime as a dictatorship, it was a far cry from the oppressive rule of the Sultans.

Political, Social Transformation

Ataturk not only transformed the political life of Turkey, he directly attacked the social fabric itself. A great admirer of Western Europe and the United States, he was deter-

A Turkish Air Force (TAF) F-4E goes off on a training sortie, left, and another is prepared for flight, right. Fighter-oriented TAF also flies F-5s, F-100s, and F-104s.

mined to drag Turkey into the twentieth century. His social reforms not only redistributed the land and wealth of the Sultanate, they also introduced Western dress, labor unions, experimental agriculture, equality for women, and, perhaps most difficult of all, a new alphabet and "purified" language. Ataturk was not known for his patience. When his principal educational advisor told him his planned introduction of a Western alphabet would take five years, Ataturk said, "I'll give you three months."

Ataturk was a visionary in many ways. He was ahead of his time in recognizing the future importance of airpower. One of his often-quoted dicta reflects his attitude in this regard: "The future is in the skies." Today, it's virtually impossible to visit a Turkish Air Force base without seeing these words.

What strikes the American observer first about a TAF fighter squadron is not the difference between it and its USAF counterpart, but rather the similarity. As in any organization, the dominant impression is made not by facilities or equipment, but by people. In the 111th Squadron, the faces and attitudes are not unlike those in a USAF squadron: young, dedicated, and professional. Between missions, the light banter, often punctuated by flight-related gestures, produces quick smiles. But, beneath this veneer, in every Turkish soldier, sailor, or airman is an abiding commitment to his country and a heartfelt sense of pride.

In all he does, a Turk is nothing if not proud. Jokes are plentiful, but never at someone else's expense. Complaints are few. In two years, the only complaints I ever heard in the 111th were about not enough flying (as with USAF pilots, it's never enough!)—never a word about long hours, unsympathetic commanders, or the mysterious "they" several echelons above whom we seem to blame for everything.

Most TAF officers—and all pilots—are commissioned through the Air Force Academy in Istanbul, founded in 1951. Graduates receive bachelor of science degrees and fifteen-year service obligations along with their commissions. The Academy's four-year curriculum is not very different from that of the USAF Academy—with heavy emphasis on mathematics and science and a fifteen-sortie T-41 pilot screening program. Though officer production varies with the requirements of the Turkish Air Force, the Academy currently has a total enrollment of approximately 900 and graduates 175 to 225 new lieutenants each year.

The Turkish officer enters a career path generally similar to that of his US counterpart. A "full career" is guaranteed, with retirement possible after twenty years of service. Turkish officer ranks are identical to US ranks with the exception of third lieutenants—a grade bestowed on reserve officers, who are non-academy, university graduates discharging their eighteen-month military obligations.

The TAF Academy graduate (along with a selected few third lieutenants each year) is commissioned a second lieutenant. After three years in grade, he's promoted to first lieutenant, a rank he'll have for six years. Promotions to field-grade ranks are competitive, but normally require six years each to major and lieutenant colonel, and three years to colonel. General officers are selected by a panel of four-star generals from all three services.

"Fast Track" for Promotions

Turkish officer progression is similar to that of many European nations in that service school attendance may accelerate it dramatically. Officers are selected for the TAF War College based on a competitive general examination, with about thirty-five captains selected for this triservice school each year. Upon successfully completing the two-year curriculum, they enter a "fast track" for subsequent promotions, and their assignments are closely monitored. The distinctive red flashes worn by graduates on uniform lapels give rise to the term "red necks." Some of these graduates are also selected for follow-on attendance at US and other allied service schools.

About ninety percent of the new lieutenants enter undergraduate pilot training (UPT) at Cigli (pronounced CHEE-lee) Air Base near

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A 1969 graduate of the Air Force Academy, Maj. Thomas O. Fleming, Jr., is currently serving as an F-4E pilot and Chief of the Ready Team with the 86th Tactical Fighter Wing at Ramstein AB, Germany. Major Fleming has earned both a bachelor's degree in aeronautical engineering and a master's in business management. A Senior Pilot with 2,600 flying hours, he logged more than 200 missions as a forward air controller in Southeast Asia.

Izmir. About half enter right after graduation, while the rest begin about six months later, after additional English language training. Like the Academy's curriculum, the UPT syllabus parallels that of the USAF, emphasizing transition, instrument flying, and basic formation maneuvers. After a further screening and indoctrination program in T-41s and T-34s, students log approximately 110 hours in T-37s, followed by another 113 hours in T-38s or T-33s. Upon graduation, the new pilots are subdivided into two groups: transport and fighter pilots. Transport selectees go to Erkilet AB, near Kayseri, for transition into the C-47, C-130E, or C-160 (a Franco-German twin-turboprop similar to the C-130).

Since the TAF is composed predominantly of fighter-type aircraft, a majority of pilots will fly fighters (F-5s, F-104s, F-100s, and F-4Es). Before aircraft assignment, prospective fighter pilots must complete a six- to nine-month, ninety-hour course in basic fighter maneuvers, weapons delivery, and tactical formation. Patterned after the USAF T-38 Fighter Lead-In Training (FLIT) program at Holloman AFB, N. M., the TAF program is conducted in F-100C and F aircraft at Konya AB (Konya is the traditional home of Turkey's renowned Mevlana Sect—the "whirling dervishes"). Performance during FLIT is highly competitive. The top three graduates are allowed their assignment of choice, with others assigned through a lottery process. Transition into mission aircraft is conducted by provisional training squadrons throughout the TAF (F-4E transition is at Eskisehir AB and takes about six months), with final training to combat-ready status undertaken at the unit level.

From entry into the TAF Academy through combat-ready certification, the sequence and content of all training programs closely resemble those of the USAF. Modifications to the various USAF syllabi are scrutinized by TAF leaders and staffs, and most are eventually included in TAF curricula.

Even though there's no formal flying exchange program between USAF and TAF, it's not surprising that TAF officers perceive a close kinship between our organizations. With the exception of the Franco-German C-160s, virtually the entire inventory of TAF aircraft and weapons is US-produced. Training is patterned on the USAF model, and most TAF pilots and officers view the USAF approach to tactics, training, and maintenance as the "approved solution."

Unfortunately, these close relations and unabashed admiration were somewhat dimmed by the 1974 Greek-Turkish conflict in Cyprus and the subsequent arms embargo imposed by the US Congress. The results of this embargo were especially painful to the highly technical, US-equipped Air Force, which was almost grounded by the subsequent interruption of parts, munitions, and training.

One consequence of the embargo is the current relatively low proficiency in English within TAF. Even among pilots, for whom English is the "official" NATO language of airborne communications, only a handful speak English. Today this situation is improving. English instruction, cut off in the wake of the Cyprus embargo, is returning to the curricula of high schools and the TAF Academy. Nevertheless, almost half a generation of TAF officers is painfully unfamiliar with the English language.

I came to appreciate the ramifications of this problem firsthand, as I was frequently the lone English-speaker among eight F-4 crew members. My halting "Tarzan-Turkish" was the source of considerable humor and consternation, and I was normally assigned a backseater who knew at least some English. Even then, problems abounded.

For instance, there was the single-ship, low-level mission when my backseater kept saying "lower, lower." As I descended, and the rocks and trees became alarmingly large, I could hear the tension in his voice. He was on the verge of hyperventilation, but still he said, now in a directive tone of voice, "We must go lower!" By then, my personal minimums had been reached, and I threw in the towel, climbing back to a more comfortable altitude. Little was said for the duration of the mission until we climbed into the truck for the ride back to the squadron. It was only then, with the assistance of my pocket dictionary, that we discovered he'd reversed the meanings of "higher" and "lower."

Life in the Squadron

Life in a Turkish fighter squadron is surprisingly similar to that in its US counterpart. The hours are long and frequently boring, but the friendly, relaxed attitude characteristic of so many Turks makes the time pass quickly. The "dead time" is filled by such games as chess or backgammon, study, or just friendly conversation, interspersed with innumerable glasses of piping hot tea—or "chai," as it's known locally.

The typical day of a TAF pilot begins at 0730 when the "blue bird" buses arrive at the squadron. After reaching the squadron, the pilots have forty-five minutes to change into flight suits (all TAF officers wear class-A uniforms year-round), have a glass of chai, and prepare for the morning's activities. The squadron daily briefing begins at 0815 and lasts fifteen to twenty minutes. Weather, NOTAMs, and daily tactical call signs are briefed by junior officers. Then the Training Officer briefs the day's duty schedule, including flights, simulator missions, and such rotating duties as runway monitor and range control officer. His discussion goes beyond simply identifying aircraft, crews, and general mission profile. Normally, he'll specify for each mission what the objectives are and often precisely how the flight is to be conducted.

Following the Training Officer's presentation, the Flying Safety and Standardization Officers usually lead a discussion on some relevant emergency, weather problem, or recent aircraft accident or incident. Finally, the Squadron Commander or Operations Officer normally takes a minute or so to make some pertinent point about the weather, training objectives, or upcoming exercise.

Typically, there are two periods of flying each day, with night flying added about twice weekly. Briefings are more abbreviated than those in US organizations and "standard-

ized" missions are the norm. Since debriefings are also quite brief, the total time from briefing start to debriefing conclusion rarely exceeds three hours.

Turkish squadrons specialize in air superiority or ground attack much as US units do. While there's some overlap, more than four-fifths of the unit's sorties are normally in the primary mission area. Since most of the TAF's fighter bases have at least one squadron dedicated to air superiority and one to ground attack, tactical balance and flexibility are maintained.

Unrestricted Flying

Flying in Turkey, at least for TAF units, is about as unrestricted by airspace limitations as anywhere in the free world. The normally good weather (especially by European standards) and proximity of gunnery ranges enables TAF crews to maximize training benefits on each mission. At some bases, the gunnery range is so close that it's possible to mistake aircraft in the bombing pattern for those in the landing pattern.

The Turkish countryside offers an amazing diversity of scenery. A peninsula bounded by three seas, Turkey is crisscrossed with mountains. In a single one-hour flight, it's possible to fly over two different coastlines, snow-capped peaks, large cities, totally barren deserts, and endless pine forests. Despite Turkey's large size (three times that of West Germany), one is never far from a potentially hostile foreign country. From Russia and its Warsaw Pact ally Bulgaria in the north, to Iran in the east, and Syria and Iraq in the southeast, potential sources of conflict abound.

Turkey's historically strategic position along the "silk routes," the Aegean coastline, and the northern end of the "fertile crescent" is no less important with today's emphasis on the Persian Gulf's oil and the turbulent Middle East. Though its relations with the Soviet Union are proper and relatively harmonious, Turkey's membership in NATO is testimony to the wariness with which it views Soviet intentions. In the course of its history as both the Ottoman Empire and as a young republic, Turkey has fought numerous wars with Russia, most to stem Czarist expansionism. Today, Turkey controls access of the Soviet Black Sea Fleet to the open sea through the strategic Bosporus and Dardanelles straits. Consequently, Turkey is the target of potential Soviet aspirations in both the west (the straits) and the east (access to Persian Gulf oil fields).

Turkey's 500,000-man army (the largest standing army in NATO besides our own), along with the renowned discipline and tenacity of the Turkish soldier, constitutes the primary deterrent to ground attack from any quarter. Nevertheless, the ability of modern airpower to paralyze a nation's fighting capacity has led to increased prominence for the Turkish Air Force, whose primary obligation is to defend Turkey from hostile air attack. The TAF also represents the nation's primary means of power projection, a fact the Soviet Union has recognized by locating several thousand aircraft and SAMs along the Turkish border and Black Sea coast. In the absence of a perceived threat from Turkey, many of these assets could be relocated to NATO's Central Region.

It's in recognition of Turkey's strategic importance, as well as its economic need, that the US allocated $400 million in foreign military sales credits and grant aid in 1982, making Turkey the third largest recipient of US military assistance (after Israel and Egypt). At present, the TAF receives more than half of this assistance, most of which goes to keep its aging force operational and to increase its effectiveness through better munitions and increased readiness.

The Turkish government evaluated several aircraft recently to select a replacement for its F-104s and F-5s. A decision to purchase the F-16 was announced in early September 1983. A key consideration is a coproduction arrangement under which Turkey will itself build a significant portion of the new aircraft. Though this program enjoys undisputed priority among Turkish defense programs and has the support of the US government, the estimated price tag of several billion dollars is staggering for an economy with limited foreign currency reserves and an already excessive debt burden.

Turks have traditionally demonstrated their willingness to "pay any price" in wartime. Now, they must demonstrate this same determination to modernize their air force and thus reduce the threat of war. Having flown with them and known them, I'm confident they'll meet this challenge. ■

Turkey has decided to buy and coproduce the General Dynamics F-16, as shown in this artist's sketch with TAF markings, to replace its F-5s and F-104s.

Japan Wrestles With Its Defense Options

A larger security role seems inevitable, but political and cultural factors make the nature of it uncertain.

BY JACQUELYN K. DAVIS

SINCE World War II, Japanese perspectives on security issues have tended to be parochial, centered around the defense of the Japanese islands, and been based upon the protection afforded Japan by the extended deterrent of the United States and as spelled out in the US-Japan Security Treaty signed in September 1951. Under the terms of the US-Japan Security Treaty, the United States is obligated to come to the defense of Japan in the event of an attack against that nation. While the Treaty is not reciprocal in nature, Japanese forces are obliged to aid the United States in the event that US forces or facilities in Japan are subject to enemy attack. The United States may use American military forces stationed in Japan in contingencies in which Japan is not a direct participant, such as those relating to the Korean peninsula.

Today, thirty-two years after the ratification of the Security Treaty, there is growing pressure in both the United States and Japan for a reassessment of the Japanese contribution to the defense of Japan and the Western Pacific based on the changes that have taken place in the global security environment.

Growing Doubts

To Japan, the 1979 invasion of Afghanistan by the Soviet Union demonstrated vividly the importance of military power to the Soviets as an instrument of foreign policy. This Soviet emphasis—together with the attainment by the Soviet Union of (at least) strategic nuclear parity with the United States and the quantitative as well as qualitative increase in Soviet nuclear and nonnuclear military forces assigned to the Far East theater—has raised doubts among increasing numbers of Japanese about the credibility of the existing assumptions underlying Japan's defense posture, especially those assumptions concerning American reinforcement in a future conflict.

The expansion of US security commitments to Southwest Asia and in Central America, in particular, is rightly perceived by many in Japan as placing additional burdens on US defensive capabilities, with the inevitable result of force draw-downs in other regions, especially the Pacific theater. While Japanese defense analysts acknowledge the need to protect US and Western interests in regions beyond Northeast Asia, they, nevertheless, view with increasing concern the gaping East-West force imbalance in the region.

It is the view of a growing number of Japanese that Japan must broaden her security options and assume a greater regional security role. The Japanese are especially concerned with the buildup of Soviet military power close to Japan's shores and particularly on the southern Kurile Islands—territory that, Japan claims, the Soviet Union seized illegally at the end of World War II.

Forces Against Change

While, in theory, Japan has available several security options—ranging from disarmed neutrality to armed neutrality, in addition to the preservation of a security relationship with the United States or a closer association with other states in the region, notably China—formidable political, military-strategic, and economic constraints argue against any dramatic change in Japan's

security posture. Strong political and emotional sentiments in Japan militate against Japanese rearmament, especially with regard to the development of nuclear weapons.

Japan's so-called "nuclear allergy" supports a security policy based on the protection afforded Japan by the US nuclear umbrella (extended deterrence) and that adheres to the three nonnuclear principles of no manufacture, possession, or deployment of nuclear weapons on Japanese territory. Given the depth of pacifist sentiment among the Japanese and the concerns of Japan's Asian neighbors over the potential for a resurgence of Japanese militarism, it is unlikely that the option of nuclear-armed neutrality will be considered seriously in Japan except among a tiny minority of younger Japanese who have no memory of Japan's wartime experience.

Fear of Involvement

There are those, too, in Japan who oppose the granting of US access to Japanese bases and facilities out of fear that Japan will be "dragged" into a US conflict.

However, such sentiments must be balanced against the consequences of abrogating the security relationship with the United States. For most Japanese this would necessitate the adoption of an unarmed neutralist policy that would find Japan virtually isolated in Asia and dependent on the vagaries of the international environment for its security.

The lack of any satisfactory alternative, together with Japan's links to the West, especially the United States, reinforces a broad-based Japanese consensus that any realistic appraisal of Japan's future security options must center on the relationship with the United States. Most Japanese support the US-Japan Security Treaty, although some in Japan seek modifications to its provisions to provide for a more equitable partnership between allies.

Defining the Regional Role

If the future orientation of Japan's security policy is clear, its role as a regional partner of the United States needs to be defined. Sensitivity to US concerns with regard to alliance burden-sharing has prompted the Japanese government to reassess Japan's role in the security of the Western Pacific. Whereas, for reasons of Japanese domestic politics, including constitutional restrictions, it is unlikely that Japan can ever evolve with the United States a reciprocal "Alliance" relationship comparable to the Atlantic Alliance, the augmentation of Japan's role in the security posture of the Western Pacific region is inevitable.

Increasingly, and on a broad scale, Japan's ability to provide for its own defense is equated to national self-esteem and Japan's role in the international arena. Consistent with this view, the Japanese government has indicated a willingness to assume the mission, in a conflict with the Soviet Union, of blockading the strategically important straits of Soya (to the north), Tsugaru (between the islands of Honshu and Hokkaido), and Tsushima (to the south, facing the Korean peninsula). This willingness comes even though some Japanese analysts readily concede that the political importance of a blockade may exceed its military significance because of the Soviet emphasis on "sanctuaries" to protect its long-range naval missile forces. Japan has also agreed to extend its responsibility (out to 1,000 nautical miles) for protection of the sea-lanes surrounding Japan.

To bolster its relationship with the United States, the Japanese government has granted permission for the forward deployment of F-16 aircraft at Misawa AB in Aomori Prefecture, and, for the first time, has decided to allow the export, on a commercial basis, of critical electronics and other strategically significant technologies to the United States.

Constitutional Constraints

Nevertheless, Japan's assumption of a greater defense burden is not without problems. The postwar constitution expressly prohibits participation in collective defense endeavors. This could restrict the extent to which the Japanese self-defense forces might contribute to cooperative security arrangements with the United States and the Republic of Korea.

Likewise, constitutional constraints on the role of the self-defense forces could hinder the evolution of US-Japanese cooperation on maritime security issues. Already in Japan there are conflicting interpretations as to what "sea-lane defense" entails. In contrast to the United States, which conceives a broad strategic application in the phrase, many Japanese interpret it in the narrower sense of unimpeded access to raw materials and resources.

The constitutional issues notwithstanding, other problems hamper the assumption by Japan of a broader security role. There is controversy within Japan among the country's self-defense ground, air, and maritime forces over the allocation and procurement of scarce resources and manpower. Consensus exists among Japanese defense analysts on the need to modernize and augment Japan's self-defense forces, but there is little agreement over force-procurement priorities or even the types of self-defense capabilities that are most appropriate for an expanded Japanese defense role.

Vulnerable to Intimidation

As is the case with all nations, Japanese conceptions of Japan's security requirements are related to the nation's unique geostrategic setting and demographic characteristics. As a member of the Western family of nations, Japan, like NATO Europe, exists under the shadow of the vast military might of the Soviet Union, a fact that has conditioned Japanese security policy since World War II. An island nation strategically located astride the major maritime routes linking the Soviet Union to Southeast Asia, the Pacific, and, through the Strait of Malacca, Southwest Asia and the Middle East/Persian Gulf region, Japan is particularly vulnerable to Soviet intimidation based on its formidable deployment of an impressive array of military power.

Since the decade of the 1960s, the Soviet Union has undertaken to modernize and augment its military forces—conventional and nuclear—assigned to its Far Eastern Military Districts. Soviet ground forces, organized into fifty-two divisions, have been improved qualitatively and quantitatively through deployment of such equipment as the T-72 tank, armored fighting vehicles, surface-to-air missiles, and multirocket launchers. Soviet air forces assigned to the Pacific Far Eastern

military theater have, likewise, been upgraded, with the result that more than sixty percent of the aircraft deployed in the Far East are third-generation types, such as Backfire and the MiG-23 Flogger.

Enhanced Soviet Posture

More significant, perhaps, from the Japanese perspective have been the modernization and growth of Soviet Pacific Fleet naval forces, which not only constitute the largest unit of the Soviet Navy but also deploy their own marine infantry troops in divisional proportion.

Together with the deployment of significant nuclear forces—the theater-based SS-20 IRBMs and the strategic land-based SS-18 and SS-19 ICBMs and sea-based Delta III SS-N-18 ballistic missile systems—the Soviet Union has enhanced its combat readiness by deploying military forces capable of conducting independent operations along its Far Eastern Front. Recently the Soviet Union undertook to reorganize its ground and air forces and established an overall Far Eastern theater command. Both measures are designed to give the Soviets greater flexibility and enhanced command and control in the event of maritime operations.

From the Japanese perspective, the growth of Soviet military power in the Asian-Pacific region provides a basis for aggressive action against Japan. As described in the Defense of Japan White Paper for 1983, the Soviet Union could mount several types of offensive actions against Japan, including a direct attack upon Japanese territory, intervention in civil disturbances, subversive activities, or, more likely, violation of territorial airspace and waters and control of the sea-lanes vital to the survival of this resource-poor nation.

Against such threats Japan has sought to develop a self-defense posture based on the National Defense Program Outline that was adopted by the National Defense Council and the Japanese Cabinet in 1976. The Outline provides for the limited expansion of Japanese forces to offset the growth and modernization of Soviet offensive forces in the Asian-Pacific region, including maritime forces for sea-lane control, ground forces for defense against a Soviet surprise attack on Hokkaido, and air defense forces, especially airborne early warning capabilities to furnish instantaneous warning of enemy intrusions into Japanese airspace, as happened in 1976 when a Soviet MiG-21 fighter pilot was able to underfly, without detection, Japanese radars.

Priorities Not Clear

However, the Defense Outline fails to articulate defense priorities clearly. As a result, an approach to defense planning that is pragmatic and piecemeal has developed in Japan. This piecemeal approach is unresponsive to the emerging security requirements of Japan and the Western Pacific as a whole.

A growing number of strategists in Japan, therefore, reject the Outline as an adequate basis upon which to develop Japanese defense capabilities and force posture for the 1980s and the 1990s. In particular, they question its basic premise, which assumes that US forces will be available in a conflict to provide for the defense of the Japanese islands.

The Outline, furthermore, demonstrates little appreciation for differentiation between a local or regional Asian conflict, in which US and friendly forces in the area may have available reinforcement resources from, for example, the Atlantic or Central (Southwest Asia) Commands, and a global war, during which the United States most assuredly would not have the "luxury" of relying on reinforcements from other theaters. It also fails to recognize that Japanese interests are at stake in such distant theaters as the Middle East and Persian Gulf, from which Japan imports upwards of seventy percent of its energy supplies.

Japan's ability to provide for its own defense is equated to national self-esteem. Three of the Japanese Air Self-Defense Force's interceptor squadrons use the F-104J, one of which here undergoes maintenance.

Independent Capability

In the view of many Japanese defense analysts, Japan will have to develop military forces independently capable of repelling and perhaps even removing Soviet forces from Japanese territory, since the aid of US troops may not be available in an East Asian contingency. Against the perceived Soviet capability for a surprise attack against Japan the Japanese must deploy, in a forward defense mode, forces having a high degree of readiness and reinforced by credible reserve troops.

In other words, Japan must move away from an exclusive defense posture that is currently based on the

presumption of a limited, small-scale enemy attack and full-scale US assistance. To do so, however, Japan will have to increase defense spending and renounce the 1976 governmental decision to contain defense spending at a level of less than one percent of the country's Gross National Product. With the third largest GNP in the world, Japan can well afford to devote a somewhat larger percentage of spending to its national security needs.

Notwithstanding the optimism of the Defense White Paper with regard to the enhancement of Japan's role in the defense of the Western Pacific, Japan's official projected defense authorizations for FY '84–87 fall short of the spending levels necessary to provide the basis for a greater security role for Japan. For Fiscal Year 1983, Japanese defense spending increased 6.88 percent above the FY '82 budget figure of 2,754.2 billion yen to a figure of 2.9 trillion yen.

In its Fiscal Year 1984 budget, the Japanese government has approved a 6.55 percent increase in defense authorizations. This spending increase, while significant in the context of the Japanese national budget for Fiscal Year 1984, nevertheless falls short of the Defense Agency's original recommendations for a larger increase for the FY '84 defense authorization. As a result of the government's reduction of the Defense Agency's funding request, selected program authorizations have had to be reduced or eliminated altogether, and defense priorities reassessed.

Two Japanese F-4EJ Phantoms flank a USAF F-15 Eagle during last fall's Cope North 83-4 combined exercise. The F-15 was from the 12th Tactical Fighter Squadron, Kadena AB, Okinawa. (USAF photo by SSgt. Steve McGill)

Security and Economics

Japan has long embraced a concept of security that places equal if not greater emphasis on economic strength as compared to military power. In no small measure, this concept of comprehensive security has been facilitated by Japan's reliance on the United States for a security guarantee.

Japan's fiscal budget for 1983 was its most austere since 1955. It froze overall expenditures at the 1982 fiscal level, with the exception of defense spending. As a consequence, defense authorizations are widely perceived as impinging upon politically significant domestic programs in such areas as welfare, education, and public-works projects. As a result, the willingness of the Japanese Diet (Parliament) to approve further increases is likely to be restrained, despite persistent efforts by the United States to secure increased Japanese defense spending. In general, the Japanese public remains ambivalent on defense issues. US pressure on Japan to increase defense spending threatens to undercut the fragile Japanese consensus supporting a broader defense role.

Nevertheless—and even though the US's extended deterrent is perceived by a majority of Japanese as providing the basis for Japanese security in the region and in areas beyond, such as the Persian Gulf, where Japanese interests are also at stake—Japan will have to come to grips with the obligations imposed by a broader defense role. The recent decision by the Japanese government to transfer sensitive technologies to the United States marks a useful beginning. However, more needs to be done.

Unless the Japanese government commits itself to the development of an enhanced defense posture, the capability of Japan to undertake the strategically important missions of sea-lane protection (out to 1,000 nautical miles) and control, in wartime, of the Soya, Tsugaru, and Tsushima Straits will be exceedingly constrained.

Implications for US

For the United States, the strategic implications of an enhanced Japanese security role in the Western Pacific should not be underestimated.

If Japan is willing to commit itself to take on greater defense responsibilities, the United States must reaffirm its defense commitment to Japan, especially in the context of bilateral US-Soviet arms-control negotiations on Intermediate-range Nuclear Forces. An arms-control agreement that results in no constraints on Soviet deployments of SS-20 IRBMs in the Asian territories of the USSR would profoundly affect the stability of the Western Pacific region and raise questions in Japan (and elsewhere) about the reliability of the United States as a friend and ally. Certainly it is not in the interest of the United States to allow that to happen.

The US-Japanese relationship is crucial to the security of the West; it transcends even the difficult economic problems that persist today between the two nations. ■

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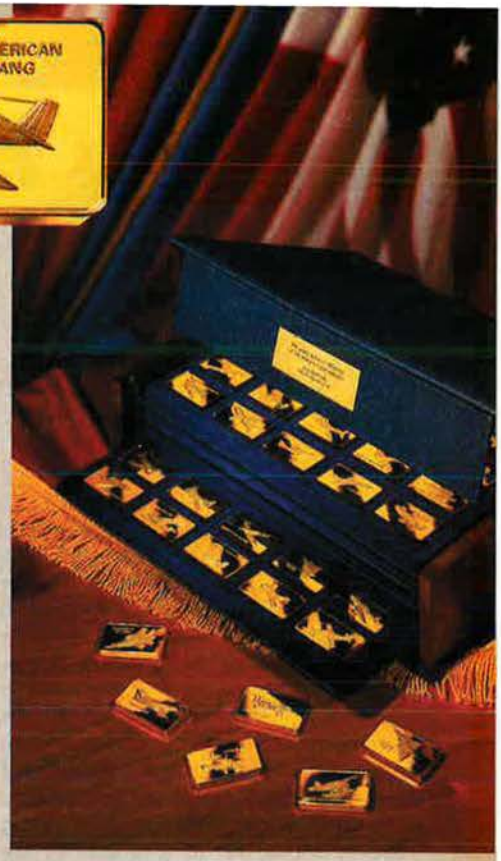

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Preparing for Change

BY THE HON. VERNE ORR
SECRETARY OF THE AIR FORCE

The future requires modernization of strategic, tactical, and airlift forces.

A French poet said not long ago that "the trouble with our times is that the future is not what it used to be." Precisely because we agree with that observation, at least as it describes the changing world threats to our security, the Air Force is taking a hard look at the 1990s and planning how we will meet those threats. Our work to strengthen the Air Force, after several years of neglect, is showing results. However, to prepare for tomorrow we must continue current trends in keeping good people, building readiness and sustainability, and procuring modern weapon systems. I've talked often about keeping good people and staying ready; now I'd like to focus on plans to modernize our forces.

Strategic Aircraft

For more than a quarter century, the B-52 has proven its utility in a number of missions as the workhorse of our strategic aircraft fleet. But it's getting old, and we can modify it only so much to keep it effective into the 1990s. The solution: We're building the B-1B to replace it while devoting research and development attention to the Advanced Technology Bomber. And contrary to what some have argued, the Air Force fully supports the phased program of 100 B-1Bs followed by the ATB.

My firm conviction is that manned systems are the most flexible and least destabilizing element of the strategic force. Recent history confirms this view. In its conventional role, the manned bomber acts not only as a weapon system but also as a visible instrument of national policy. Inherent maritime capabilities, such as sea surveillance, harbor mining, and ship attack, add to this flexibility.

To keep the B-52 effective across this spectrum, we're installing a modernized Offensive Avionics System. On many of the aircraft, we are installing the air-launched cruise missile (ALCM). By modernizing avionics and upgrading the weapons carriage capability of the B-52 to carry a mix of ALCMs and bombs, we challenge Soviet air defenses and prevent them from concentrating their defenses against either the bomber *or* the cruise missile.

By the end of this decade, the B-1B will replace many of these aging B-52s. Though smaller, lighter, and one one-hundredth the size on radar, the B-1B can carry a greater payload. So far, we're delighted with the production program—it's on cost, ahead of schedule, and we expect to roll out the first B-1B in September of this year. By every indication, we are on track to achieve initial operational capability in 1986.

But Soviet defenses have never been static. Further US technological advances to challenge them are on the horizon in the form of the Advanced Technology Bomber. This system combines the most favorable characteristics of the B-1B with the advantage of low-observable "Stealth" technology. Its capability as an advanced manned penetrator will provide a deterrent well into the next century, releasing the B-1B and B-52 aircraft to assume cruise-missile and conventional roles.

Our ICBM Force

At the same time, we are modernizing our land-based intercontinental ballistic missile force. Most visible has been the work on the Minuteman force and the 100 Peacekeeper missile deployment in existing Minuteman silos. Less publicized is what we are doing to develop and deploy a small ICBM.

Why a small missile? The concept evolved from the desire to promote nuclear stability in the long term. The missile's single warhead would make it a relatively unattractive target, while its small size would improve the prospects for survivable basing. The combination of reduced target value and increased survivability would decrease Soviet incentives to launch a first strike, thus strengthening stability.

The small missile could be based in either a "hard" or "soft" road-mobile system. The "soft" small missile would rely mostly on mobility to survive the effects of an attack—it would have to be far enough away so that the blast effects are negligible. Unfortunately, survivability becomes a function of the land area available for dispersal. The missiles must remain well apart from each other to make the concept work.

The "hard" system, on the other hand, includes some physical protection from blast, heat, radiation, and electromagnetic pulse. These missiles could disperse in much smaller areas, but still survive an attack. We are studying whether this system might let us keep the missile on government land and consequently simplify security, improve safety, and minimize its impact on the public.

The whole concept of a "mobile" small missile is not without some technological hurdles. For example, we'll need to protect the mobile launchers against effects of nuclear blast even at some distance. We're also taking a long look at the increases in manning that mobility demands. We plan, however, to work such problems aggressively as we pursue the stabilizing influence of the small ICBM.

Airlift

With force projection, no single element is more important than our airlift capability. Our efforts to improve that capability are twofold—increase the capability of existing assets and modernize our aging fleet.

We have long recognized that,

Secretary of the Air Force Verne Orr addresses AFA luncheon in his honor.

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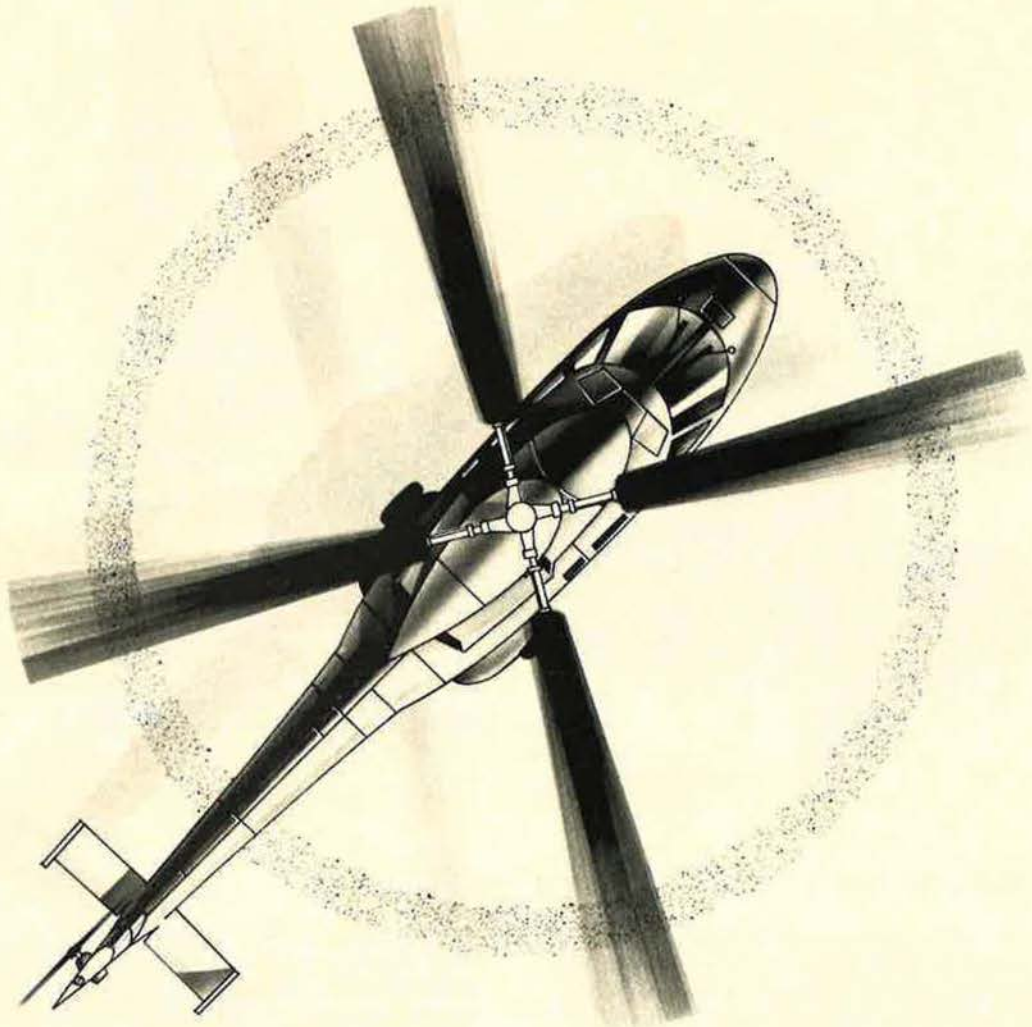

The Fairchild Vapor Cycle Cooling System

Helicopters with air cycle cooling systems literally "bleed" part of the compressed air from the engine to make this system work.

This means that air cycle cooling systems also bleed the engine of some of its power. The helicopter's lift capability is reduced. Its duration and range of flight are reduced. And when the aircraft is on the ground, the system cannot even provide adequate cooling. This results in sweltering cabin conditions on hot days. In other words, when you bleed compressed air from the engine with an air cycle cooling system, you also bleed the engine of its efficiency.

Fairchild Control's vapor cycle cooling system does not bleed air from the engine. It's a closed loop cooling system that utilizes fresh air, not bleed air. The operating advantages are enormous.

For example, a modern twin-turbine helicopter can gain up to 7% more usable SHP and use 4% less fuel. Lift capability is far greater, especially in high-hot conditions. Range and duration are markedly increased. This improved performance means greater safety and fewer flight limitations. You travel in a comfortable environment with five tons of cooling available in flight or while idling on the ground.

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whether carrying cargo between or within theaters, our airlift force cannot meet all wartime requirements. Even with the projected force of C-5Bs, KC-10s, C-19s (Air National Guard Boeing 747s), increased spares, and an improved CRAF program, we reach only seventy-five percent of the airlift we need under certain scenarios. Furthermore, we will remain unable to haul outsize equipment to the vast majority of the free world's airfields. These fields, many with relatively short runways and austere facilities, will be needed to prevent saturation of main operating bases in theater.

Compounding these deficiencies, the airlift force is getting old and technologically dated. We are constrained currently by the reduced payloads on the C-130 when routes within theater approach 1,500 miles, as they do in Southwest Asia and Africa. At present flying rates, we will begin retiring older C-130s in the early 1990s and older C-141s in the late 1990s. We need new aircraft, and we need them quickly.

Several years ago, I selected the C-17 to fulfill this role, among others. This aircraft will deploy combat forces and equipment rapidly from the United States directly to austere airfields near the battle area. Such versatility opens three times as many airfields to outsize cargo, reduces main operating base congestion, and eliminates transshipment of cargo from main operating bases to the battle area.

However, that is only part of the story. Equally important, the C-17 will have fewer support requirements and higher utilization rates than existing airlift aircraft for equal capability. We expect the C-17 to compare with our C-141 in operating, maintenance, supply, and manpower costs, with twice the capability.

Tactical Fighter Roadmap

As we modernize our strategic offensive and airlift forces for the challenges of the 1990s, we cannot neglect the growing tactical threats to our fighter forces. To prevail in the sophisticated combat environment of the future, we will need new and more efficient equipment, tactics, and people.

The demands on tactical fighter capability have never been greater. Present planning calls for the equivalent of forty tactical fighter wings by 1989 to perform a broad range of air-to-air and air-to-ground missions. Our tactical fighter force must be able to maintain air superiority, interdict supply and communications, attack airfields deep in enemy territory, destroy enemy second-echelon forces, and provide close air support. That force must be able to fly these missions regardless of conditions: day, night, or in bad weather.

To get these capabilities, we've mapped our fighter acquisition plans into the next decade. This roadmap begins with upgrades to our present fighter force. We plan improvements not only to extend the primary roles of our operational fighters but also to improve their reliability and maintainability. One such upgrade is LANTIRN—Low-Altitude Navigation and Targeting Infrared for Night. This system will give us the navigation and attack capability we need at night or in bad weather.

New acquisitions are also part of the plan. For the next few years we plan to buy between 275 and 315 fighters annually—a balanced mix of F-15s and F-16s. Also, we believe that somewhere near forty percent of our total tactical force requires both air-to-air and air-to-ground capability. Therefore, the dual-role F-15E is a key element of our fighter roadmap.

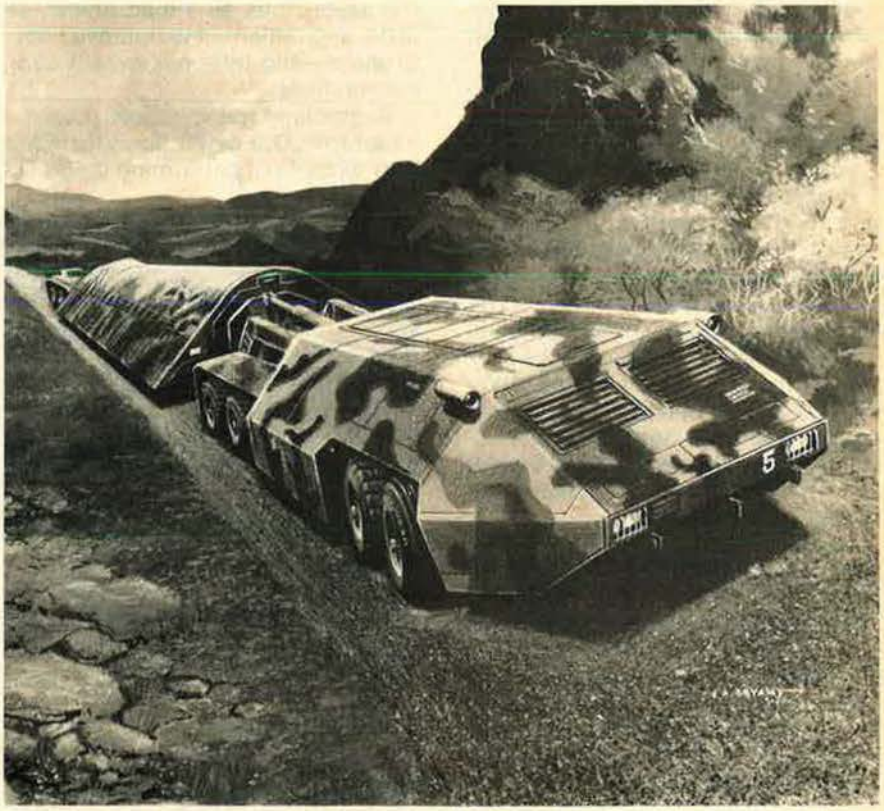
Looking beyond this current generation of aircraft and their derivatives, we expect major advances in the enemy threat over the battlefield. Our response will be the Advanced Tactical Fighter (ATF), with technology study already under way. It will have to be highly efficient at supersonic speeds, project low radar and infrared signatures, and be highly maneuverable. At the same time, it must possess advanced avionics, outstanding range, excellent supportability, and an inherent air-to-surface capability.

Finally, we have developed an engine roadmap to parallel our fighter requirements into the mid-1990s. The recent dual award for General Electric's F110 and Pratt & Whitney's improved F100 engines ensures that we have the opportunity to continue to benefit from competition. Also, if the future threat warrants, we will look to both companies for engines with improved performance.

The Goal of Modernization

Modernizing the Air Force will not be easy. As that French poet implied, the future will never stay the same. Critical to this effort is the role of our dedicated men and women who operate, maintain, and support our weapon systems.

The Air Force is in better shape than it has been for years. Our people, forces, readiness, and sustainability have improved, and we have built a solid foundation to meet tomorrow's threat. I am confident we will remain equal to the task demanded of us. ■



USAF's Small Intercontinental Ballistic Missile (SICBM) may be deployed in a Hard Mobile Launcher resembling this artist's drawing of a Boeing/Goodyear design concept.

Flying More— And Flying Safer

BY GEN. CHARLES A. GABRIEL
CHIEF OF STAFF, UNITED STATES AIR FORCE

Technology was part of it, but professionalism and dedication made it happen.

In 1983, the Air Force recorded its lowest aircraft accident rate in history—1.73 major mishaps per 100,000 flying hours. To put this record in perspective requires a quick trip through the history of military aviation.

We didn't start keeping official records of mishaps until 1922. In that year, the Army Air Service recorded 330 major accidents in 65,000 flying hours. This translates to a mishap rate of 506 per 100,000 flying hours. If we had an accident rate like that today, we would lose our entire inventory of aircraft in about six months—not to mention the horrible price that would be paid in human lives.

In 1943, we experienced more aircraft accidents than in any other year of our history. Granted—it was during a period of our greatest inventory, with intense training requirements. However, counting only accidents that occurred in the United States and excluding combat, there were more than 20,000 mishaps—killing 2,264 pilots and 3,339 other crew members.

In 1950, when I began to fly, the F-51 had an accident rate of 111 per 100,000 hours. The overall Air Force rate was thirty-six, or about 140 major accidents a month. By 1955 the overall rate had been cut by more than one-half, down to seventeen.

In 1978, the accident rate fell to 3.16 per 100,000 flying hours. Had our accident rate stayed at the 1978 level over the last five years, we would have lost 123 more aircraft than we actually did. That's four to five squadrons of aircraft that the Air Force is flying today, worth nearly three-quarters of a billion dollars. Even more important, many lives were saved.

Hard Work, Professional People

Reaching the 1983 record of 1.73 hasn't been easy. It's taken a lot of hard work—flying more hours, under much more demanding and realistic training conditions than in the past. Our formal safety organization has played an important role, but safety people will be the first to tell you that the record is the direct result of the professionalism, leadership, and dedication of people at all levels—commanders, engineers, designers, crew chiefs, and aircrews.

Every major command contributed to this significant achievement. MAC and PACAF had their safest years ever, SAC had its second-best year, TAC had its lowest mishap rate in nine years, USAFE had its lowest mishap rate in seven years, and AFSC and AFLC had perfect years, with no major mishaps. We are beginning to realize the payback on all the programs, efforts, and initiatives to improve effectiveness—and thus our overall combat readiness.

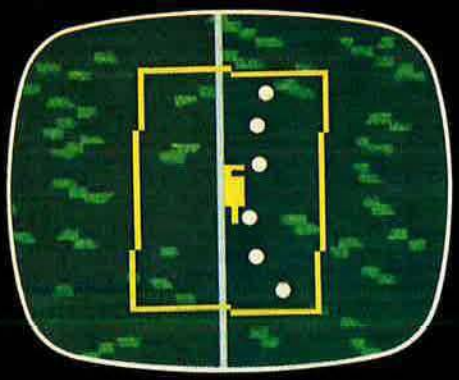
Technology has certainly played a major role. Our newer aircraft are not only capable of performing their missions better, but they are also inherently safer than previous front-line aircraft. Designers and engineers throughout the aircraft industry are capitalizing on the many significant advances in aerodynamics and computer technology to produce aircraft that are sounder to fly and easier to maintain.

To parallel the technology effort for aircraft, we also have a more effective family of training devices to support our weapon systems. These devices allow aircrews to learn, practice, and integrate the skills necessary to cope with emergency situations—situations that could not otherwise be experienced in training.

System safety engineering, which identifies and corrects hazards during design and development, has paid big dividends. By building in safety, we have gained more trouble-free flight hours, reduced the need for costly modifications and retrofit programs, and lowered the chances of losing an aircraft and aircrew in a flight mishap.

Our safety record also reflects successes in aircraft maintenance. A few years ago we identified two significant maintenance issues with aircraft mishap potential—the *lack of skilled personnel* and the *loss of skilled technicians* to the private sector. Large numbers of our experienced people were leaving us; this, in turn, had a disastrous effect on our ability to train new people. Improved retention and the recruitment of more than 6,000 prior-service maintenance personnel have greatly improved our situation. As a direct result, we have had a remarkable reduction in flight mishaps

USAF Chief of Staff Gen. Charles A. Gabriel inspects one of the myriad aerospace displays at AFA's National Convention last September in Washington, D. C.



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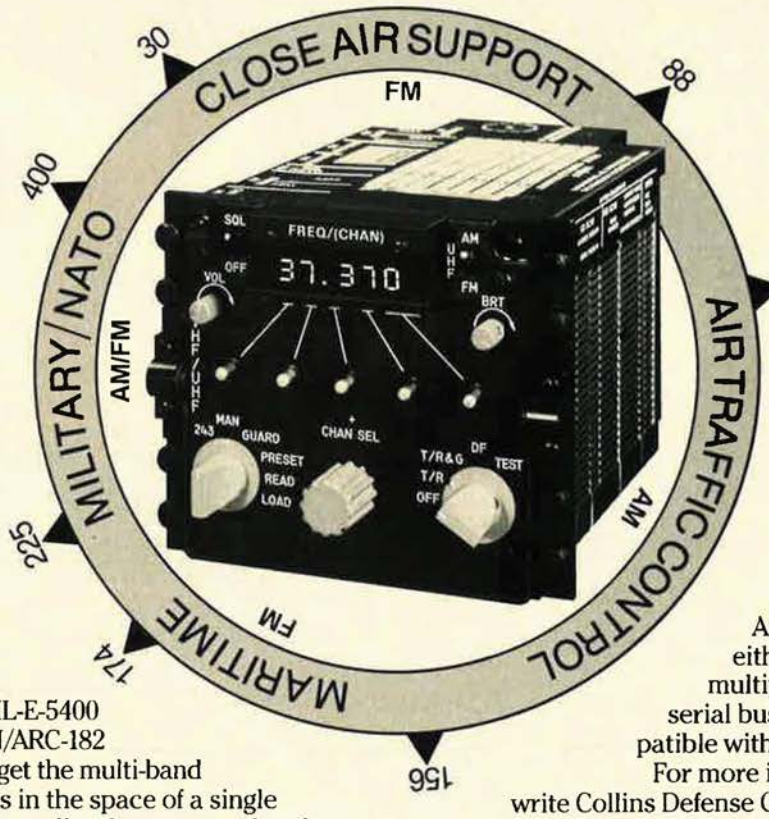

The Collins AN/ARC-182 Airborne Transceiver. The most compact multi-mode/ multi-band communications system.

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And remember, while you decrease the size and weight of your communications system, you increase your total communications capabilities. The ARC-182 gives you the multi-band coverage of VHF-FM and VHF-FM and AM, and multi-channel scanning and voice Satcom. Thus, you can completely integrate communications with close air support, air traffic control, military and NATO forces, and maritime bands. A total of 11,960 channels in all, in frequencies ranging from 30 to 400 MHz, AM and FM, with or without encryption.

In addition, the Collins AN/ARC-182 features a built-in test that quickly detects and isolates faults to the module level for rapid maintenance. Its rugged design makes it ideal for a variety of aircraft, shipboard and ground applications. Various mounting hardware is available to suit nearly every application for single or dual (auto relay) applications. And it can operate from either a MIL STD 1553 multiplex data bus or built-in serial bus system, and is compatible with Have Quick appliques.

For more information, call or write Collins Defense Communications Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, Iowa 52498. USA phone (319) 395-5932. TELEX 464-435.

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attributable to logistics factors—from forty-one mishaps in 1982 to only eighteen in 1983.

Increased funding for spare parts and supplies and increased flying hours have also played a major role in safety. Adequate parts and supplies mean less cannibalization of parts from other aircraft, fewer maintenance hours per flight hour, and higher reliability rates. Increased flying hours improve the experience of our aircrews, add to the quality of training, and raise our overall level of readiness.

A Right To Be Proud

An equally important ingredient in our safety success story is leadership. I'm referring to leadership at all levels—commanders, flight-line supervisors, and maintainers. Commanders know their people, care about them, and spend time on their problems. Commanders know that if they take care of their people, their people will take care of the mission. Air Force leaders are involved in better two-way communication, are more attuned to feedback, and are cultivating the key leadership traits of integrity and sensitivity.

Improved technology, better designed aircraft and training devices, faster resolution of safety-related problems, increased funding for readiness, and leadership—together these provide a solid foundation for our efforts to reduce aircraft mishaps further. However, the real key to mishap prevention lies with Air Force men and women, especially those aircrews and maintainers in the day-to-day business of flying.

USAF F-15s from Holloman AFB, N. M., rendezvous with a KC-10 tanker from Barksdale AFB, La. The KC-10 has proved its mettle on such extended fighter training missions.

Our Air Force today is made up of high-quality people at all levels—men and women who are bright, skilled, and enthusiastic about the jobs they are doing. They came in the Air Force because they wanted to, they have pride in what they do, and they are staying in because they want to. They work long hours, often under extremes of weather and temperature as well as under severe operational conditions. But they respond—they work hard, they work smart, and they are getting the job done better and safer than ever before.

Comparing 1983 to 1982 (our previous best year for flight safety), we see some impressive numbers. In 1983 we had seventy-eight fewer fatalities and lost twenty fewer aircraft than in 1982. The aircraft itself is the tool we use to do our job; people are ultimately the real basis for our readiness. The Air Force did a great job of keeping our people and aircraft safe in 1983. We have a right to be proud. ■

A camouflage-painted MAC C-5 heads out on a mission. As General Gabriel notes, MAC and PACAF "had their safest years ever" in 1983—with SAC and TAC not far behind—as the Air Force at large "recorded its lowest aircraft accident rate in history."

Building Quality

BY CMSGT. SAM E. PARISH
CHIEF MASTER SERGEANT OF THE AIR FORCE

A "stockholders report" on the enlisted force.

During my short tenure, I've had the opportunity to visit many installations throughout the Air Force and to talk with hundreds of enlisted personnel. I get many questions when I'm on the road, ranging from what my job's like to the status of quality-of-life items. I'd like to use this space so graciously provided by our Air Force Association to answer some of the questions and to give you an abbreviated enlisted "stockholders report."

I entered this job last August much like any other NCO who's entering a new job—with very mixed emotions. I was extremely proud—overjoyed really—at how far we have come in the past few years; I was also apprehensive whether I would be accepted or was qualified enough for the job expected of me. In other words, I felt the same as many of you did when you reported to your first duty station or entered a new job. Will I measure up to expectations? Will I disappoint those who placed their trust in me? Will my family be accepted by the new community? Will I be a good representative for the Air Force?

The jury's still out on me, but it's not on Air Force members who have proven themselves—especially during this past year.

I'm convinced we have the most people-oriented senior leadership that we've ever had—from Secretary Orr to General Gabriel to MAJCOM commanders down to and including the lowest level of command. They're "super" people-oriented, but they never forget the reason for our being in the Air Force. They're tough but firm, fair, and consistent in their policies and decisions. I don't believe we could ask for any better.

Complementing this people-oriented senior leadership, we have the highest quality enlisted force that we've had in our history. Thanks to our recruiters, 98.1 percent of our new recruits last year had high school diplomas. Moving up the spectrum, ninety percent of our chiefs have more than one year of college. Much the same can be said for all the ranks in between—we are all better educated.

It's not just the education, though, that makes our enlisted force so great. The dedication, the attitude, the motivation, and the discipline that I see in our folks make me very proud to represent the enlisted force. We have the highest first- and second-term retention ever, and our discipline problems are way down. The patriotic feeling that runs through our ranks is a pleasure to see and be a part of.

Now I don't want to paint such a glowing picture that we get complacent. We still have problems, and tougher times may be ahead—especially in the recruiting, retention, and quality-of-life areas. Today our military services need one out of every six of the male eighteen- to twenty-one-year-old high school graduates we have in the nation. In five years we'll need one out of every three high school graduates to meet our requirements. With an improving economy and talk of reducing or cutting out items that affect our quality of life—including retirement, health care, commissaries, and other entitlements—tougher times may indeed be ahead.

Chief Master Sergeant of the Air Force Sam E. Parish—a "people-oriented chief."

In addition to future recruiting, retention, and quality-of-life challenges, some other issues facing us include:

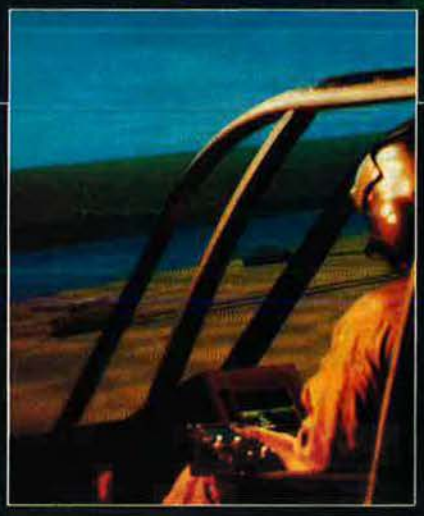
- **Quality Force.** Our quality force standards have not really changed—we have just placed increased emphasis on some areas. The reason for the increased emphasis is simple: If we can't build a quality force for tomorrow's Air Force based on today's retention and the quality of people we have on board, then we'll never have one. We've made some mistakes over the past few years, and we're trying to effect necessary adjustments. For example, we've seen individuals promoted to the rank of staff sergeant, technical sergeant, or master sergeant who, to say the least, were of questionable quality; we've seen individuals transferred to another unit or who were reenlisted with little thought given to their quality.

I don't or can't blame the supervisor or commander for all of this—the institution must share some of it. So to rectify some of these shortcomings, we recently implemented new PCS rules and rules governing reenlistment and are looking at the Weighted Airman Promotion System. It's too early to say whether the promotion system will change or what form the changes will take if they occur. At the very least, we can expect increased emphasis in the quality force area in the future. We are not on a witch-hunt—all we're asking is that the subpar performers be identified and action taken to get them up to par or separate them.

- **Professional Relationships.** This is an issue that is receiving more and more emphasis and one that we have to recognize and learn to deal with. Many of our people seem to think that when we talk of professional relationships or "fraternization," we are only talking about officer-enlisted relationships—and that just isn't the whole story. We're talking about the relationships between supervisors and subordinates that are necessary to do our jobs and to ensure good order and discipline.

It means to me that I must maintain a professional relationship in my dealings with all of our people. It means that I can't become overly sociable or familiar with airmen, subordinates, or the officer corps. This is also true of the senior officer to the junior officer, the officer to enlisted, senior NCO to airman, and supervisor to subordinate. "Fraternization" does not mean that we don't know our people and

KEEPING AMERICA SAFE IS THEIR JOB



TRAINING THEM TO SURVIVE IS OURS

The experience to fight and win can be gained before the first engagement begins.

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their families, it doesn't mean that we shouldn't have good rapport with our superiors and subordinates, and it doesn't mean that enlisted people are second-class citizens.

To most of us, professional relationships are a vital part of our Air Force heritage and nothing more than good common sense. Due to the nature of our calling, we need to continue to emphasize this and ensure that we establish the necessary professional relationships so that if the whistle blows, we can do our jobs without regard to friendship.

• **Drug Abuse.** We simply have no place in our Air Force for anyone who knowingly uses or experiments with illegal drugs. The jobs we have in the Air Force today are just too important to entrust to those who do not have total control of their faculties.

While our efforts to reduce drug abuse have been successful, we still have people who refuse to conform to the policy. We can ill afford to have this continue. Personnel identified as drug abusers will be dealt with, either through disciplinary measures or separation action. Air Force policy will continue to emphasize that substance abuse is incompatible with an Air Force career and will not be tolerated.

• **Alcohol Abuse.** Although the Air Force has always placed emphasis on alcohol abuse, this emphasis has been intensified lately. Each year, many of our service members are killed or injured in alcohol-related accidents. The Air Force is serious—if you drink, don't do it to excess. We cannot afford to place people who can't control their individual lives in positions of responsibility.

The current guidance against alcohol abuse is for commanders to conduct strong prevention, education, and rehabilitation programs aggressively, and to separate those abusers who will not or cannot be rehabilitated. The Air Force goal to combat drug and alcohol abuse is quite simple—maximum deterrence and swift, firm action when abuse occurs.

• **Military Couples.** This is another area about which I get many questions. In 1975, military couples made up a little less than three percent of our Air Force. Today, less than a decade later, the number of couples has tripled to a little more than nine percent of the force. Not only has there been a significant increase in the numbers, but there has also been an increase in the grades of these couples. This is significant because it is much more difficult to assign senior-grade couples jointly than it is to assign the most junior-grade personnel.

Because of these two items, the limited permanent change of station funds, and, most important, the Air Force mission, we have seen some changes in the Join Spouse Assignment program. Even with the changes, AFMPC has been able to keep almost ninety percent of our military couples together. But if the number of couples continues to grow and if both members continue in the system, we may see this percentage decrease. However, Air Force policy will be to continue to keep our military families together where possible and consistent with requirements.

• **Physical Fitness and Weight Control.** The physical well-being, physical endurance (readiness), and the professional image we portray of our Air Force in the eyes of society demand that we adhere to the standards established in these areas. With the recent changes in promotions, reassignments, voluntary retraining, reenlistments, and airman performance reports, a strong, clear signal has been sent that Air Force weight standards are mandatory and that noncompliance will not be tolerated.

Along these same lines, in an effort to increase readiness and encourage a life-style of regular exercise for our personnel, we are testing an Enhanced Physical Fitness program. The enhanced program is composed of three parts—a personal exercise program, fitness evaluation, and fitness improvement training. The program is designed to encourage our people to participate in regular exercise for their own good as well as for the good of the Air Force. The bottom line is that the mission demands that our people be physically fit. It's an individual responsibility to ensure that this is so.

• **Military Retirement.** It's our number-one career incentive and has become one of the most sensitive issues in the Air Force today. Its primary purpose is to ensure our readiness in peace and war. However, there are those who believe the retirement system is getting too expensive and that changes are needed. Our top military leaders are very concerned with the impact that a change to the present system would produce. Specifically, the effects on morale, readiness, and retention of quality people could be devastating.

A1C Jeffrey Brabec patrols a missile site perimeter during SAC's Global Shield 83 exercise.

While I strongly believe the retirement system should remain intact, some changes may be in the making. Rest assured, however, because our senior leaders are committed to ensuring that change, if it cannot be avoided, will be made equitably and fairly. They are also firmly opposed to any change that could hurt the services' ability to retain sufficient numbers and quality of personnel needed to protect our nation in the years ahead.

• **Enlisted Military Education.** The education of our enlisted force is better than ever. We have many programs and people to thank for this: our recruiters for bringing in bright young high-school graduates, the Community College of the Air Force for providing an outstanding continuation program in higher education, our technical training schools, our base education offices, ad infinitum. However, the one program that has meant the most to me in my career is the Professional Military Education program, which is one of the greatest steps taken for enlisted people in the history of the Air Force. If we take advantage of the opportunities available in all of these areas, there's no doubt that we can assume greater responsibilities and meet the challenges that lie ahead.

I've attempted to give you an abbreviated enlisted "stockholders report" on items that I get the most questions on. It is indeed sketchy and was meant to be. But I'd like to reemphasize that our senior leadership is very people-oriented but firm, fair, and consistent and is doing all it can to ensure that the quality of life we enjoy remains sufficiently appealing to attract and retain the high-quality force needed for today's and tomorrow's Air Force.

We have the most productive and highest quality enlisted force that I've seen in my twenty-nine-plus years; we are a well-disciplined, hard-performing force, dedicated to completing the mission—and doing it with a positive, patriotic attitude. We still have pockets of detractors and will always have them. Let's not let this deter us; let's identify them for what they are and spend our time taking care of the thousands of outstanding people we have on board. ■

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Air Force Communications Command

"Providing the Reins of Command" for the Air Force today and beyond: As Air Force Communications Command's motto implies, AFCC's mission touches virtually every level of leadership within the Air Force and the National Command Authorities, enabling the effective control and employment of forces to deter or defeat any armed threat to our vital national interests. It is a mission shaped by the dynamics of an increasingly sophisticated threat, a radically changing telecommunications industry, and the unceasing advance of technology.

Fundamentally, AFCC provides onbase, interbase, and combat communications, data automation, and air traffic services and systems for DoD, the Air Force, and the other services. To accomplish these tasks, the command operates, maintains, and evaluates a multitude of teleprocessing systems and flight facilities and also performs systems engineering, program management, and installation services for new systems entering the Air Force inventory.

This diverse mission is carried out by some 51,000 active-duty military and civilian members stationed at 433 separate locations worldwide. At any given time, more than thirty-six percent of AFCC personnel are serving overseas.

Complementing the active force are nearly 15,000 Air National Guard and Air Force Reserve members from 183 air reserve force units. They contributed more than 79,000 man-days training for and supporting AFCC mission tasks in 1983 and provided more than fifty percent of the Air Force tactical communications support for JCS-directed exercises.

A central theme permeating the AFCC mission is the concept of command control and communications, or C^3. The importance of C^3 was underscored by President Reagan in October 1981 when he emphasized the development of a modern, reliable, and survivable strategic C^3 infrastructure as one of the five major areas critical to America's deterrence and warfighting capabilities.

To that end, AFCC has been deeply involved in numerous programs, perhaps none more promising than the next-generation military satellite communications system called Milstar. For the past two years, AFCC has been laying the groundwork for this multicommand and triservice effort. Highly jam-resistant and survivable, Milstar is scheduled for deployment in the late 1980s and will fulfill the minimum essential C^3 requirements of our National Command Authorities well into the twenty-first century.

A milestone in current C^3 improvement was passed in April 1983 when AFCC's Defense Satellite Communications System (DSCS) Operations Center at Sunnyvale AFS, Calif., took control of the first DSCS III satellite. The Center controls the communications equipment on the satellite and reallocates channels to meet the priority needs of the Joint Chiefs of Staff and ever-changing DoD mission requirements.

A key force-multiplier in any combat equation, C^3 is a valuable commodity at the tactical as well as the strategic level. One critical service at the tactical level is air traffic control. The ability to provide these two essential services quickly to a deployed field commander can easily determine the success of an operation. For that reason, select AFCC combat communicators and air traffic controllers, along with special communications personnel, maintain twenty-four-hour readiness to deploy and operate in the most remote and austere parts of the world.

Air Force Communications Command's air traffic controllers handled 13,000,000 aircraft operations in 1983.

The recent Grenada rescue operation provided a major test of their capabilities. Time and security constraints allowed for only a bare minimum of planning and preparation. Yet within a few hours after notification, AFCC's combat communicators and air traffic controllers, Hammer Ace (a specially equipped contingency communications team), and other selected communications technicians were ready to deploy to the operations area. Upon arrival, these AFCC personnel provided critical communications and air traffic services to all elements involved in the operation. Hammer Ace also provided special communications support to the State Department and the newly formed Grenadian government.

Two other major AFCC contributions to Air Force readiness and combat capability were the initial implementation of the newly developed aircraft surge launch and recovery (ASLAR) procedures by selected tactical air forces and the engineering and installation of communications and instrument landing systems at designated NATO bases to support the deployment of the first ground-launched cruise missiles.

The ASLAR procedures, developed by a multicommand task force chaired by AFCC, greatly increase aircraft recovery rates under a wide variety of flying conditions, effectively eliminating air traffic control as a constraint in sortie generation.

The year 1983 was a watershed for AFCC and the communications industry. American Telephone & Telegraph Inc. prepared to divest itself of its local operating companies. Almost simultaneously, decreased federal regulation brought about increased competition and the availability of new communications services in the commercial market. These external factors have effectively changed the manner in which the Air Force acquires telecommunications equipment and services and have raised concerns about securing reasonable tariff rates and ensuring the contrac-

An AFCC unit sets up shop during one of many combat exercises in 1983. C³ support is essential in combat.

tual integrity of leased systems and services.

In response, AFCC created a Tariff Regulatory Law Office to represent the Air Force in state telephone rate increase actions, and it has been highly successful. The Air Force is paving the way for the other military services by building the legal framework for operating in this new communications environment.

Changing technologies are also affecting AFCC, resulting in a major reorganization of functional areas within the command's management structure. This reorganization will enable AFCC to take full advantage of emerging technologies while maintaining firm control over present and contingency mission commitments.

With computer hardware and software becoming increasingly embedded in new telecommunications systems and with more and more data-processing systems being interconnected by communications networks, the terms "telecommunications" and "data automation" are giving way to "teleprocessing" or "information" systems, a major redefinition of communications roles.

Perhaps the most visible effects of the changing technology can be seen in the new systems and equipment being fielded today. Inefficient, difficult to maintain electromechanical communications equipment and third-generation data-processing systems are being replaced.

For example, through AFCC's Base Level Data Automation (Phase IV) program, 277 base-level and supply computers are being replaced with 154 new ones at 118 bases worldwide. These new computers will provide increased on-line processing capability and will enhance management of virtually every base function. The first of the Phase IV computers was recently installed at Langley AFB, Va.

Upgrade of base telephone services also continued throughout 1983 with the replacement of four outdated government-owned and -leased telephone exchanges with modern electronic switching systems. Ultimately, some 200 telephone exchanges will be replaced under the AFCC Scope Dial and Scope Exchange programs. These new switches will provide base telephone users with better service and many of the user features now offered by industry.

New systems, new ideas, and a new environment are daily challenges to the men and women of Air Force Communications Command. Their efforts are not only meeting the challenge of supporting today's Air Force but are also reaching to the frontiers of technology to meet the needs of tomorrow's aerospace forces. ■

AIR FORCE COMMUNICATIONS COMMAND

Headquarters, Scott AFB, Ill.

Commander
Maj. Gen. Robert F. McCarthy

European Communications Division Kapaun AS, Germany	**Continental Communications Division** Griffiss AFB, N. Y.	**Pacific Communications Division** Hickam AFB, Hawaii	**Strategic Communications Division** Offutt AFB, Neb.
Tactical Communications Division Langley AFB, Va.	**Airlift Communications Division** Scott AFB, Ill.	**Space Communications Division** Colorado Springs, Colo.	**Engineering Installation Center** Tinker AFB, Okla.
Air Force Data Services Center Washington, D. C.	**San Antonio Data Services Center** San Antonio, Tex.	**Air Force Data Systems Design Center** Gunter AFS, Ala.	**Air Force Data Systems Evaluation Center** Gunter AFS, Ala.
Air Force Communications Computer Programming Center Tinker AFB, Okla.	**Federal Computer Performance Evaluation and Simulation Center** Alexandria, Va.	**Air Force Central NOTAM Facility** Carswell AFB, Tex.	**Air Force Automated Systems Project Office** Gunter AFS, Ala.
Air Force Computer Acquisition Center Hanscom AFB, Mass.	**1815th Test and Evaluation Squadron** Wright-Patterson AFB, Ohio	**1866th Facility Checking Squadron** Scott AFB, Ill.	**1872d School Squadron** Keesler AFB, Miss.
1980th Communications Group	**2000th Management Engineering Squadron** Scott AFB, Ill.	**Air Force Information Systems Doctrine Office** Keesler AFB, Miss.	**Air Force Frequency Management Center** Washington, D.C.

Air Force Logistics Command

Air Force Logistics Command (AFLC) has been making substantial changes to manage resources better, with the bottom line being more combat capability. In fact, there has been a fundamental shift in AFLC's approach to providing logistics support, one that focuses on supporting weapon systems according to their wartime tasking.

AFLC's mission is to supply the fuels, air munitions, spare parts, and maintenance support enabling the combat elements of the Air Force to defend this nation in whatever situation may develop. Each of AFLC's 95,000 members is an integral part of that combat mission: to deter war or to fulfill the combat objective of fighting to win. In 1983, AFLC headquarters underwent extensive reorganization to help carry out this mission better.

"We're now keyed to the weapon systems themselves, prioritizing our support by their relative importance in our nation's contingency war plans," according to Gen. James P. Mullins, Commander of AFLC. "In fact, under a major initiative, we've reorganized not to blindly optimize fill rates, not to simply reduce back orders for the sake of filling back orders, but rather to win wars."

On July 1, 1983, AFLC established the Logistics Operations Center to assure the logistics readiness and supportability of weapon systems. The LOC has strategic, tactical, airlift, training, space, and common support directorates, combining weapon system planning, programming budgeting, and program execution to put AFLC on a twenty-four-hour-a-day wartime footing.

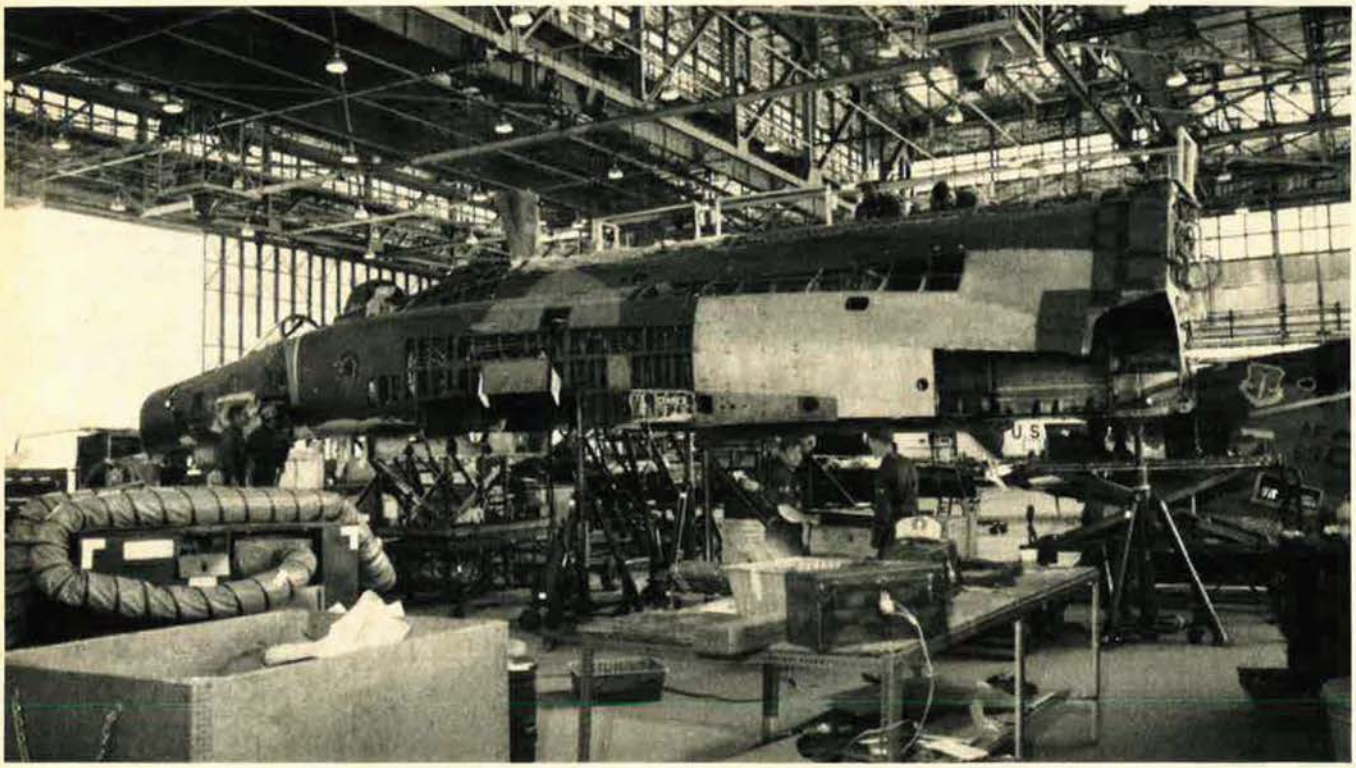
The Logistics Management Systems Center, also created in 1983, is dedicated to satisfying logistics needs through the application of information technology. The LMSC operates and maintains existing automated systems and manages the acquisition of new computer-based capability and the integration of new and old computer systems.

In October 1983, the Commanders of AFLC and Air Force Systems Command merged the acquisition logistics resources of both commands to form the Air Force Acquisition Logistics Center. AFALC will help develop more reliable and maintainable systems by designing in more reliability while new systems are still on the drawingboards. The new Center replaces the Air Force Acquisition Logistics Division.

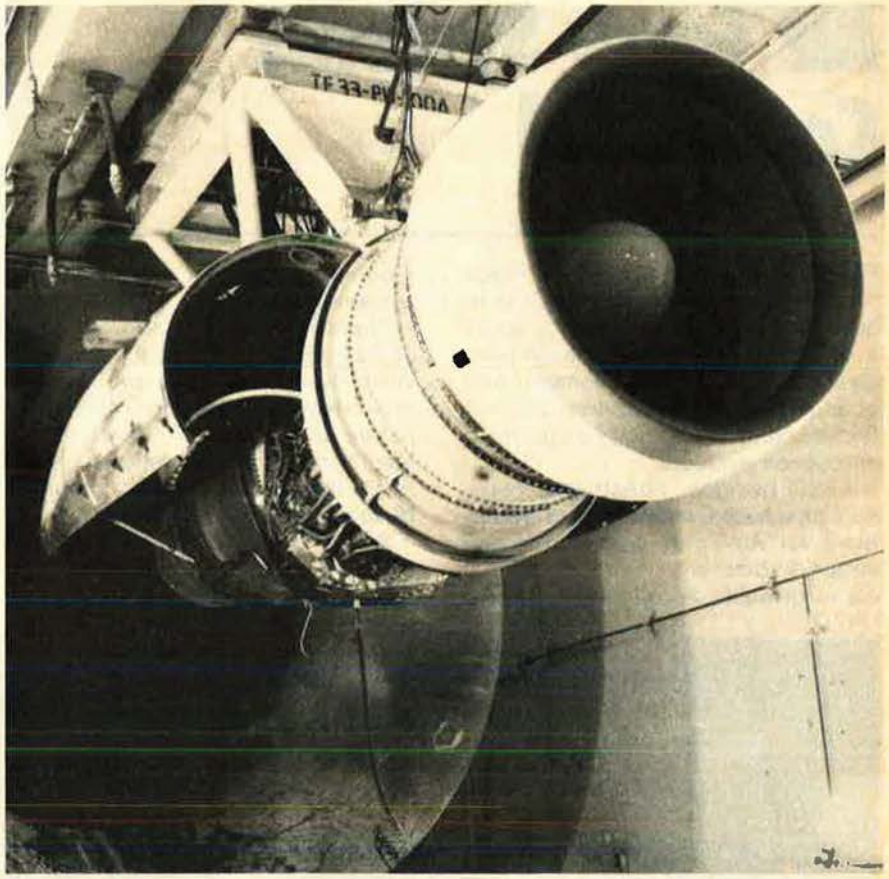
Several major AFLC programs got under way in 1983, including the procurement of an automated warehouse system for all five Air Logistics Centers. The program will use electronic systems to automate warehouses with computers and other equipment that will provide faster service for AFLC customers.

In addition, AFLC selected two contractors to build prototypes of the Requirements Data Bank System. The RDB program will speed up the materiel requirements planning process used by AFLC. At the end of a one-year period, a final selectee will be awarded a ten-year development contract.

In April 1983, AFLC activated its Logistics Support Center Europe as a



Air Force Logistics Command's 2952d Combat Logistics Support Squadron at Hill AFB, Utah, works on a severely burned F-4G after a fuel-cell explosion. The squadron is assigned to the Aircraft Crash/Burn Damage Repair Section at Hill AFB.



A Pratt & Whitney TF33-PW-100 turbofan engine is moved into a jet engine test cell at AFLC's Oklahoma City Air Logistics Center.

forward area maintenance facility at RAF Kemble, UK. The Support Center Europe will reduce maintenance turnaround time and improve aircraft availability to USAFE.

The San Antonio ALC (Kelly AFB, Tex.) took delivery of the first rewinged C-5s in February 1983. When this—the largest modification program ever managed by AFLC—is complete, the improvements will add years of life to the huge transport aircraft.

In preparation for B-1B acquisition, the Oklahoma City ALC (Tinker AFB, Okla.) received management assignment responsibility for B-1B offensive avionics hardware. In addition, the B-52G Cruise Missile Integration modification program is more than halfway complete.

In 1983, AFLC managed funds totaling more than $46 billion, including some $14 billion in Foreign Military Sales handled by the International Logistics Center, some $12 billion in stock fund operations, and more than $12 billion in contracting and manufacturing funds.

Included in this is the almost $3 billion in contracts managed by the Air Force Contract Maintenance Center. AFCMC focuses on the administration of Overseas Workload Programs contracts, which add a "forward" capability to AFLC's support of USAFE, NATO, and PACAF combat readiness.

In an effort to provide the American people with the defense they need at the lowest possible cost, AFLC has taken bold steps to control spare parts pricing. A fourfold program called Pacer Zero includes challenges to prices that appear to be excessive, greater competition for the Air Force's business, simpler procedures for potential bidders to obtain information about what the Air Force's needs are, and an intensive price screening of more than 1,800,000 separate parts used by the Air Force.

In conjunction with Pacer Zero, offices of the Competition Advocate were established at AFLC headquarters and each of the five ALCs. They will generate initiatives to minimize overpricing of spare parts to get the most defense at the least cost. ■

AIR FORCE LOGISTICS COMMAND

Headquarters, Wright-Patterson AFB, Ohio

Commander
Gen. James P. Mullins

- **Warner Robins Air Logistics Center** — Robins AFB, Ga.
- **Oklahoma City Air Logistics Center** — Tinker AFB, Okla.
- **Ogden Air Logistics Center** — Hill AFB, Utah
- **Sacramento Air Logistics Center** — McClellan AFB, Calif.
- **San Antonio Air Logistics Center** — Kelly AFB, Tex.
- **Logistics Operations Center** — Wright-Patterson AFB, Ohio
- **Logistics Management Systems Center** — Wright-Patterson AFB, Ohio
- **AFLC International Logistics Center** — Wright-Patterson AFB, Ohio
- **Aerospace Guidance and Metrology Center** — Newark AFS, Ohio
- **Military Aircraft Storage and Disposition Center** — Davis-Monthan AFB, Ariz.
- **Air Force Acquisition Logistics Center** — Wright-Patterson AFB, Ohio
- **Air Force Museum** — Wright-Patterson AFB, Ohio
- **Air Force Contract Maintenance Center** — Wright-Patterson AFB, Ohio
- **Logistics Support Center, Europe** — RAF Kemble, UK
- **Cataloging and Standardization Center** — Battle Creek, Mich.
- **USAF Medical Center** — Wright-Patterson AFB, Ohio
- **2750th Air Base Wing** — Wright-Patterson AFB, Ohio

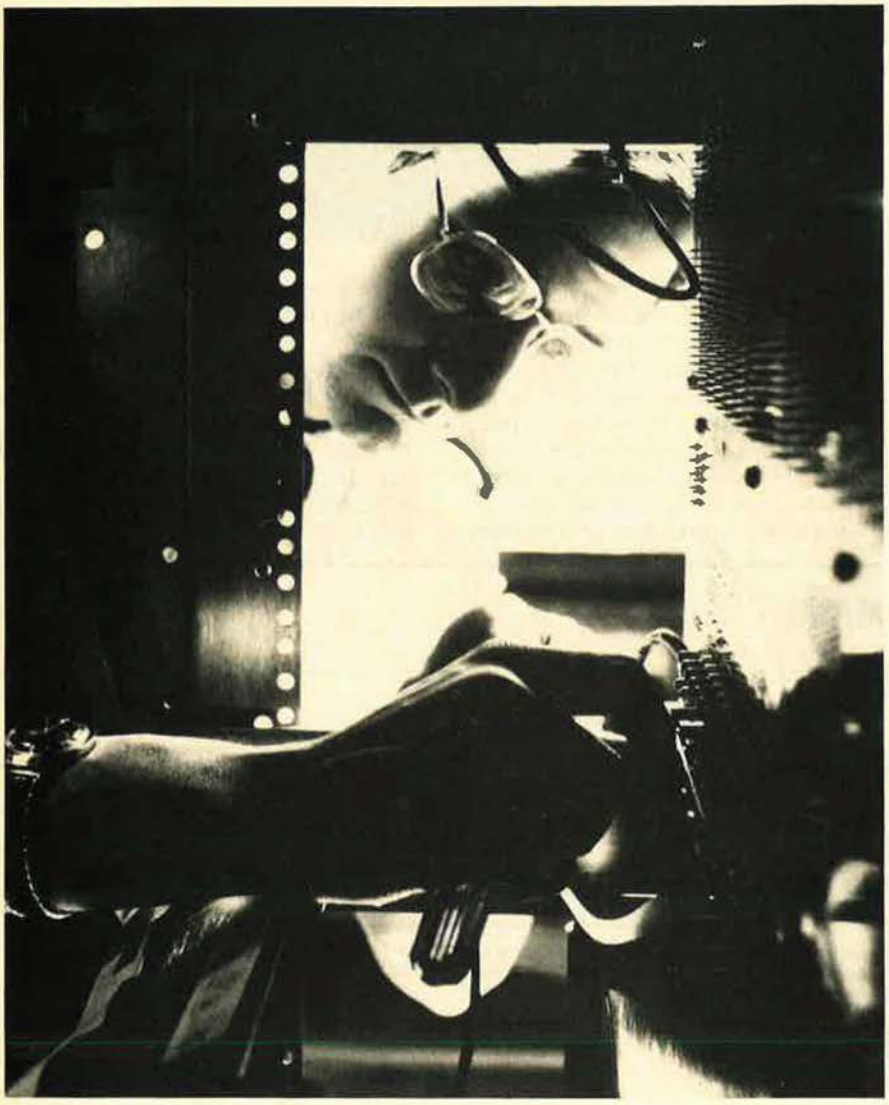
Air Force Systems Command

The primary mission of Air Force Systems Command (AFSC) is to advance aerospace technology, apply it to operational aerospace systems development and improvement, and acquire qualitatively superior, cost-effective, and logistically supported aerospace systems.

AFSC designs, constructs, tests, and purchases weapons and equipment for Air Force operational and support commands. Primary emphasis is given to aeronautical, space, electronic, missile, and armament systems.

The command has approximately 56,000 people—fifty-one percent civilian, twenty-eight percent enlisted, and twenty-one percent officer. The nature of its research, development, test, and acquisition mission makes AFSC the Air Force's major employer of scientists and engineers.

Systems Command will manage approximately $37.9 billion in FY '84. Of this amount, $22 billion goes for procurement of aircraft ($14.4 billion), missiles ($5.6 billion), and other equipment ($1.8 billion). In addition, $9.8 billion goes for research, development, test, and evaluation (RDT&E); $1.2 billion for operations and maintenance; and $0.7 billion for military construction. The remaining $4.4 billion includes foreign military sales ($2.5 billion), reimbursables ($1.2 billion), and military pay ($0.7 billion).



An electrical engineer from AFSC's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, checks out circuitry.

AFSC administers thirty-eight percent of the total Air Force budget, although comprising only 6.5 percent of Air Force people. The command currently administers more than 29,000 active contracts valued at approximately $108 billion.

Among the most significant research, development, and systems acquisition milestones recorded by AFSC during the past year:

- Headquarters AFSC established a new Deputy Chief of Staff for Information Systems to consolidate resources in data automation, audiovisual services, and administration. The new DCS will provide improved focus, integration, and priority to information and information-handling systems throughout the command.
- The B-1B strategic bomber program is ahead of schedule and on target in terms of cost. By avoiding irregular production rates due to annual funding by Congress, more than a billion dollars was saved through investment in multiyear procurement. (Congress requires application of multiyear procurement to programs already certified stable. The President has certified the stability of the B-1 program.)
- The Air Force successfully launched the first three Peacekeeper flight test missiles from Vandenberg AFB, Calif., in June, October, and December 1983. Congress tied Peacekeeper deployment to demonstrated progress on the Small Missile Program. The Small Missile Program Office was opened in May 1983 at the Ballistic Missile Office, Norton AFB, Calif. The office manages the development of the small, single-warhead ICBM.
- AFSC supported the space programs of NASA and Department of Defense organizations with support for twelve space launches, including four Shuttle launches. AFSC also geared up for the biggest buy of satellites yet, with a $1.2 billion contract for twenty-eight Navstar Global Positioning System satellites. The firm fixed-price block contract resulted in

Under AFSC auspices, the first test-launch of the new Peacekeeper ICBM begins at Vandenberg AFB, Calif.

savings of more than $200 million and accelerated the program by one and a half years.

• In tactical systems, Aeronautical Systems Division accepted the first LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) night attack system, which will give tactical aircraft increased capability to perform day and night navigation and precision weapon delivery.

• Also during the year, the F-15E and F-16XL were evaluated for selection as the Air Force's new dual-role fighter, television-guided GBU-15 glide bombs and the Low-Level Laser-Guided Bomb (GBU-24) were successfully tested, the first TR-1 reconnaissance aircraft was delivered, and the ground-launched cruise missile was deployed.

• At the 1983 Los Angeles symposium of the Air Force Association, AFSC Commander Gen. Robert T. Marsh said that acquisition of the McDonnell Douglas C-17 is among the highest airlift priorities and that—along with the KC-10 buy and acquisition of fifty additional C-5s—strategic airlift capability is expected to be doubled by 1989.

• Command control and communications was another area of improvement. Communications interoperability was ensured through the development of a Joint Tactical Information Distribution System, which will provide antijam communications between Navy and Air Force tactical aircraft and personnel on the ground.

• In the area of technology modernization, the command has twenty-six contractors and more than thirty subcontractors representing a government investment of $270 million through 1984. Projected cost avoidance is more than $2.5 billion.

• Improved cost-analysis techniques have resulted in significant savings. Eight such studies in 1982 using sophisticated and intense "should cost" analysis techniques resulted in savings of $264 million.

• The Competition Advocate program in 1983 turned twenty-three important procurement actions from sole source to a competitive strategy with estimated potential savings of $95 million, based on General Accounting Office estimates of savings achievable with competition.

Among other highlights for the year:

• The program to give the command and control E-4 aircraft an aerial refueling capability achieved a $20 million cost underrun. Allocation of the savings according to contractual incentive formulas resulted in savings of $14 million for the Air Force.

• To demonstrate the feasibility of adapting lasers for use as weapons, the Airborne Laser Lab, a version of the C-135 aircraft, destroyed five Sidewinder missiles launched toward it.

• Aeronautical Systems Division rolled out the production AGM-65D infrared-guided Maverick missile in November.

• Armament Division engineers at Eglin AFB, Fla., in early 1983 tested a rocket motor built from composite materials. The motor propelled a hypervelocity missile to four times the speed of sound.

• The Tethered Airborne Radar System, a balloon-borne radar developed by Electronic Systems Division and better known in AFSC as Project Seek Skyhook, was set up at Cape Canaveral to perform low-level air defense surveillance along the southern and eastern coasts of Florida. The blimp-shaped balloon, called an aerostat, hovers on a tether at 10,000 to 12,000 feet.

• Edwards AFB was the site of the first Space Shuttle night landing.

• The Electronic Systems Division at Hanscom AFB, Mass., began work on the Ground Wave Emergency Network, an automated system that can keep communications open even in a radioactive environment. ■

AIR FORCE SYSTEMS COMMAND

Headquarters, Andrews AFB, Md.

Commander
Gen. Robert T. Marsh

- **Space Division**, Los Angeles AFS, Calif.
  - **Space and Missile Test Organization**, Vandenberg AFB, Calif.
  - **Air Force Space Technology Center**, Kirtland AFB, N. M.
- **Electronic Systems Division**, Hanscom AFB, Mass.
- **Aeronautical Systems Division**, Wright-Patterson AFB, Ohio
  - **Ballistic Missile Office**, Norton AFB, Calif.
  - **Foreign Technology Division**, Wright-Patterson AFB, Ohio
- **Armament Division**, Eglin AFB, Fla.
- **Air Force Contract Management Division**, Kirtland AFB, N. M.
- **Aerospace Medical Division**, Brooks AFB, Tex.
- **Arnold Engineering Development Center**, Arnold AFS, Tenn.
- **Air Force Flight Test Center**, Edwards AFB, Calif.

Air Training Command

An Air Training Command student navigator gains proficiency at Mather AFB, Calif. ATC trained 1,019 new US navigators in 1983.

Recruitment of quality people followed by solid initial training has long been regarded as the cornerstone of Air Force strength and readiness. Air Training Command (ATC), headquartered at historic Randolph AFB, Tex., is charged with both missions.

ATC is responsible for recruiting new people into the Air Force and providing them basic military, initial flying, or technical training. The command also conducts precommissioning education through its Officer Training School (OTS) and Reserve Officer Training Corps (AFROTC), provides English language and survival training, and does research and analysis in selected areas.

ATC is composed of thirteen bases, approximately 100,000 people (permanent-party military, civilian employees, and students), and assets of nearly $4.01 billion. The command includes five technical training centers and a technical training wing, six pilot training bases, one pilot instructor training base, one basic and advanced navigator training base, three survival training locations, a network of field training units at ninety-two locations worldwide, and 151 AFROTC units at colleges and universities. ATC's annual operating budget is just under $3 billion.

During the course of their careers, virtually all Air Force officers and enlisted members receive some type of ATC training. Approximately eighty-seven percent of Air Force officer candidates get their commissions through either AFROTC or OTS. After recruitment and basic military training, approximately ninety-three percent of enlisted members are trained in one of nearly 350 technical skills. This technical training continues throughout their careers in the form of refresher and upgrade courses.

More than 64,000 enlisted men and women, including Air National Guard and Air Force Reserve personnel, completed basic military training at Lackland AFB, Tex., last year. Most of these also received follow-on technical training. In all, the command's technical training centers and the USAF School of Health Care Sciences at Sheppard AFB, Tex., conducted more than 3,000 resident and nonresident courses, which produced approximately 130,000 graduates. Another 128,000 completed field training courses at ATC's worldwide field training detachments.

More than 5,600 airmen from seventy-two friendly nations received tech-

AFROTC students at the University of Texas at Austin take a break between classes. AFROTC commissioned 3,619 lieutenants last year and will commission some 3,205 this year.

nical or flying training valued in excess of $200 million through the Foreign Military Sales program in FY '83. Also, more than 1,800 international students graduated from the Defense Language Institute's English Language Center at Lackland AFB in FY '83.

In FY '83, ATC trained 1,985 pilots and 1,019 navigators for the active Air Force, Air National Guard, and Air Force Reserve. In addition, 159 international pilots and ninety-seven international navigators were trained. Total programmed flying training production for FY '84 is 2,255 pilots, 900 navigators, 118 international pilots, and 110 international navigators. Air Force helicopter pilots are trained in association with the US Army at Fort Rucker, Ala. Some NATO and Air Force pilots are trained at Sheppard AFB, Tex., under an Undergraduate Pilot Training program entitled Euro-NATO Joint Jet Pilot Training (ENJJPT), which began in 1981. More than 350 women, trained as pilots and navigators in ATC flying training programs, are now serving on active duty. Some seventy more are currently in flying training.

Interservice navigator training produced 229 US Navy and Marine Corps graduates in FY '83. More than 12,000 Air Force crew members received survival training during the year.

While flying approximately nineteen percent of the Air Force's total flying hours in 1983, ATC experienced fewer than eight percent of USAF's Class A and B aircraft mishaps for a flying safety record of 0.90 mishaps per 100,000 flying hours. ATC operates a fleet of some 1,400 aircraft composed of the T-41A, T-37B, T-38A, and the T-43A, and has begun to acquire the CT-39A for support of the new Air Force Instrument Flight Center.

AFROTC, with 151 units serving more than 600 colleges and universities, commissioned 3,619 new lieutenants in FY '83 and projects commissioning of 3,205 new officers in FY '84. OTS commissioned 2,824 line officers in FY '83 and is programmed to commission some 2,510 in FY '84. FY '83 OTS graduates included 844 former airmen who had previously completed necessary degree requirements.

The Community College of the Air Force, located at Maxwell AFB, Ala.,

AIR TRAINING COMMAND

Headquarters, Randolph AFB, Tex.

Commander
Gen. Andrew P. Iosue

Technical Training Center
Lowry AFB, Colo.

3320th Correction and Rehabilitation Squadron

Technical Training Center
Chanute AFB, Ill.

Technical Training Center
Keesler AFB, Miss.

3480th Technical Training Wing
Goodfellow AFB, Tex.

Community College of the Air Force*
Maxwell AFB, Ala.

Air Force Reserve Officer Training Corps
Maxwell AFB, Ala.

Foreign Military Training Affairs Group
Randolph AFB, Tex.

Officer Training School, USAF
Lackland AFB, Tex.

San Antonio Contracting Center

San Antonio Real Property Maintenance Agency

Technical Training Center
Sheppard AFB, Tex.

USAF School of Health Care Sciences

Air Force Military Training Center
Lackland AFB, Tex.

Basic Military Training School, USAF
3250th Technical Training Wing
Defense Language Institute English Language Center**

USAF Recruiting Service
Randolph AFB, Tex.

Recruiting Groups

3501st—Hanscom AFB, Mass.
3503d—Robins AFB, Ga.
3504th—Lackland AFB, Tex.
3505th—Chanute AFB, Ill.
3506th—Mather AFB, Calif.

ATC Specialized Direct Reporting Units

3302d Computer Services Squadron
Randolph AFB, Tex.
3303d Contracting Squadron
Randolph AFB, Tex.
3304th School Squadron (ATC NCO Academy)
Lackland AFB, Tex.
3305th School Squadron
Randolph AFB, Tex.
3306th Test and Evaluation Squadron
Edwards AFB, Calif.
3307th Test and Evaluation Squadron
Randolph AFB, Tex.
3314th Management Engineering Squadron
Randolph AFB, Tex.
3507th Airman Classification Squadron
Lackland AFB, Tex.
3588th Flying Training Squadron
Fort Rucker, Ala.
Occupational Measurement Center
Randolph AFB, Tex.

Undergraduate Pilot Training

14th Flying Training Wing
Columbus AFB, Miss.

47th Flying Training Wing
Laughlin AFB, Tex.

64th Flying Training Wing
Reese AFB, Tex.

71st Flying Training Wing
Vance AFB, Okla.

80th Flying Training Wing
Sheppard AFB, Tex.

82d Flying Training Wing
Williams AFB, Ariz.

Navigator Training
323d Flying Training Wing
Mather AFB, Calif.

Pilot Instructor Training
12th Flying Training Wing
Randolph AFB, Tex.

3636th Combat Crew Training Wing* (Survival)

Eielson AFB, Alaska*
Nellis AFB, Nev.*
3612th Combat Crew Training Squadron*
(Fairchild AFB, Wash.)
3613th Combat Crew Training Squadron*
(Homestead AFB, Fla.)
3614th Combat Crew Training Squadron*
(Fairchild AFB, Wash.)

*Tenant Unit
**DoD Executive Agent

continues to grow while offering college-level education to enlisted members. During 1983, the college was recognized by the American Association of Community and Junior Colleges as the largest multicampus community, junior, or technical college in the nation. In the course of the 1983 academic year, the college awarded a record 5,344 Associate in Applied Science degrees to enlisted men and women. Growing at a rate of more than 3,600 registrants per month, by year's end the college's student population had expanded to nearly 185,000. Since its inception in April 1972, CCAF has awarded more than 27,000 associate degrees.

The US Air Force Occupational Measurement Center at Randolph AFB, Tex., continued its ongoing occupational analysis program. This comprises setting the Military Training Standard for all NCOs and developing all promotion tests administered to Air Force personnel as part of the Weighted Airman Promotion System. The Center also now includes the Training Development Service, which assists in training development efforts throughout the Air Force.

On July 1, 1983, Air University, which had been assigned to ATC since 1978, returned to major command status. ATC retained control of AFROTC.

During 1983, the command made excellent progress in plans toward the eventual replacement of the aging Cessna T-37 with the new Fairchild-Republic T-46A as the Air Force's primary jet trainer. The new trainer, when fully operational at all ATC flying training bases in the late 1980s, is expected to improve flying training greatly while substantially reducing fuel use. The Air Force plans to acquire approximately 650 of the new trainers.

The command began a "Back to Basics" program in 1983 focused on increased individual awareness of military customs and courtesies, appearance, patriotism, physical conditioning, and military discipline. Coming at a time when renewed patriotism is sweeping the nation, the "Back to Basics" program will significantly improve Air Force morale, performance, and readiness.

The quality of 1983 Air Force recruits was considered the best in recent history. That high quality coupled with realistic, highly effective training combine to create an optimistic future for the US Air Force. ■

Recruiting for Quality

United States Air Force Recruiting Service, with headquarters at Randolph AFB, Tex., met both enlisted and officer recruiting goals in Fiscal Year 1983 for the first time since the draft ended in 1973.

Almost 68,000 officers and airmen were recruited in 1983. Of the 60,489 airmen enlisting without prior military service, 98.1 percent were high-school graduates. Also enlisting were 3,102 people with prior military service. College graduates entering Officer Training School at Lackland AFB, Tex., numbered 3,161, and 812 health-care professionals received direct commissions in the Air Force Medical Service. Another 369 received health professions scholarships.

Recruiters will seek about 60,000 people as officers and airmen in Fiscal Year 1984 for today's high-technology Air Force.

Recruiting Service is made up of a headquarters staff that assists and monitors the activities of five recruiting groups and thirty-five recruiting squadrons nationwide. Approximately 1,250 recruiting offices are staffed by some 1,800 recruiters assigned throughout the fifty states, Puerto Rico, and Guam. Because of the large numbers of dependents living overseas, recruiters are also located in West Germany, England, and the Philippines.

About 400 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 CMSgt. Fred Negast, Recruit-the-Recruiter Team Chief, at AUTOVON 487-2812.

Student and instructor pilots take to the flight line at Williams AFB, Ariz., one of six Air Training Command (ATC) pilot training bases. ATC trained nearly 2,000 new pilots for the Air Force in 1983.

Neither heat, nor EMI, nor massive Gs can keep fluidic controls and sensors from their appointed mission.

There's a definite limit to how far you can depend on certain types of sophisticated electronic sensing and control systems for operation in hostile environments.

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- A high-response, low-cost projectile stabilization system that withstands 16,000 G launch forces.
- A gun stabilization system for armored vehicles that provides high-reliability despite severe shock loads.
- A Gatling-gun firing rate control system, unaffected by EMI or high G forces.
- A re-entry vehicle stabilization system, impervious to EMI, EMP, and radiation.
- A simplified turbofan fuel mass-flow meter with no moving parts.
- A direct temperature measurement system that senses up to 2,000° F gas temperatures.
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Air University

Air University (AU) meets the challenges of today's complex military environment by providing professional military education (PME), degree-granting technical and managerial education programs, and continuing career education for officers, NCOs, and civilians who will be the leaders of tomorrow's Air Force. Headquartered at Maxwell AFB, Ala., and redesignated as a Major Command in July 1983, AU manages a large group of specialized agencies.

Most of AU's major PME schools are located on Chennault Circle at Maxwell. These include the Air War College for senior officers, Air Command and Staff College for mid-career officers, and Squadron Officer School for company-grade officers. The Air Force Senior Noncommissioned Officer Academy, the highest level of NCO PME, is located at nearby Gunter AFS.

Other major AU organizations include the Leadership and Management Development Center for selected officers and civilians of all grades in various designated fields; the Center for Aerospace Doctrine, Research, and Education; the Educational Development Center; Air University Library; and USAF support of the Civil Air Patrol, all at Maxwell; the Extension Course Institute and the Air Force Logistics Management Center at Gunter AFS; and the Air Force Institute of Technology, located at Wright-Patterson AFB, Ohio.

Nearly 3,500 military and 1,750 civilian personnel are permanently assigned to the command. Last year, more than 6,600 officers and 1,250 senior NCOs completed resident AU classes. Thousands more completed PME courses through nonresident seminar and correspondence programs. In fact, nearly half of the Air Force population—active duty, civilian, and ready reserve—as well as selected personnel from sister services, other government agencies, and many international forces participate each year in one or more of AU's professional education programs.

The year 1983 was filled with achievements for Air University. On July 1, AU became a separate Major Command, underscoring the importance of professional military and continuing education in the Air Force.

The Center for Aerospace Doctrine, Research, and Education (CADRE) was established in January 1983 to assist in the development of Air Force doctrine, concepts, and strategy and to research, formulate, test, and publish concepts. CADRE consists of the Airpower Research Institute, the AU Press, and the Air Force Wargaming Center. Construction for the Wargaming Center began in June 1983. By 1986, the Center will provide wargaming and other exercises in direct support of Air Force PME at AU; by 1987, it will link the Air War College to DoD, Army, and Navy wargaming centers for joint activities; and, by 1989, it is programmed to add "real-world" operational wargaming for Air Force warfighting commands and agencies.

Also in January, the Extension Course Institute (ECI) honored its 5,000,000th graduate. The world's largest school, ECI provides correspondence courses for Air Force on-the-job training, PME courses, study materials for the Weighted Airmen Promotion System, and other professional specialized courses to personnel worldwide from all branches of the military. During 1983, more than 319,000 students were enrolled in ECI correspondence programs.

The PME schools also experienced growth and change during 1983. In March, Air Command and Staff College introduced an Air Force first with a four-week "Space Course" to prepare staff officers for duties in space operations. On May 13, the USAF Senior Noncommissioned Officer Academy (AFSNCOA) came under the direction of CMSgt. Bobby G. Renfroe, the first enlisted commandant in the Academy's ten-year history. On July 8, Squadron Officer School (SOS) dedicated Heritage Hall to commemorate the contributions of company-grade officers to airpower. SOS also received permission to expand each class enrollment from 688 to 800, starting in 1984.

In October, the Leadership and Management Development Center (LMDC) hosted a first for AU, a highly successful Leadership and Management Symposium attended by more than 250 military and civilian members. LMDC also continued to offer

Civil Air Patrol 1st Lt. Carter Jones of the Georgia CAP Wing radios in his position after attending "victim" Cadet Jim Blair at the May 1983 CAP Southeast Region Search and Rescue Competition in Knoxville, Tenn. Training and reacting are constant companions in the emergency services activities of CAP. In 1983, Civil Air Patrol aircrews flew 1,745 Air Force-authorized emergency services missions totaling 16,725 hours. CAP air and ground rescuers were credited with 1,074 finds and an all-time-high 154 saves. (USAF photo by SSgt. Rand McNatt)

research and consultation services to Air Force personnel at installations worldwide. Numerous base and wing commanders, maintenance officers, chaplains, judge advocates, comptrollers, civilian and military personnel managers, leadership and management instructors, unit historians, and directly commissioned officers all benefited from LMDC's specialized courses and materials.

During November, a team of officers from the Educational Computer Science Branch and the Air War College Combined Air Warfare Course directed the first use of an Air University theater-level air wargame by the RAF Staff College at Bracknell, UK. The British join the Canadian Forces Command and Staff College as annual participants in the Theater War Exercise.

During the year, AU developed a program to improve instruction in science and technology in the local primary and secondary schools. Called Maxwell-Gunter Help Educate for Local Progress, or MAXHELP, the program is the first of its kind in the Air Force and is expected to grow in 1984. In the last quarter of 1983, more than 1,000 Montgomery-area school students and teachers attended computer orientations and heard Air Force experts speak about careers in computers and scientific/technical fields, both in the military and private sector.

Other AU activities also continued to progress. The *Air University Review,* the professional journal of the Air Force, won another of the coveted Blue Pencil Awards. The review published stimulating articles and essays on such vital issues as airpower doctrine, strategy, tactics, technology, leadership, and other topics of concern to military and aerospace professionals. It is published bimonthly in English and quarterly in Spanish and Portuguese, with a circulation of 27,000.

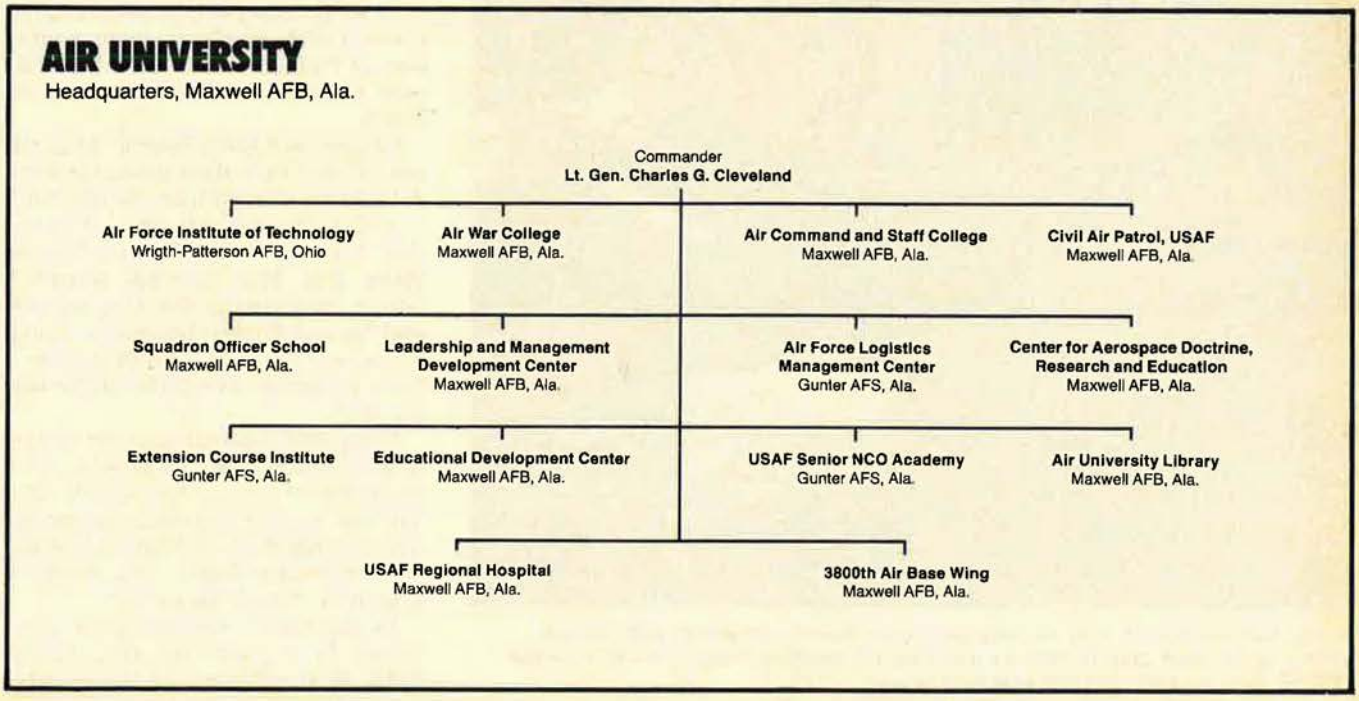
The Educational Development Center, formerly the Academic Instructor and Foreign Officer School, combines three functions: The Academic Instructor School is the USAF "teachers' college" for instructors; the International Officer School prepares international officers for attendance at USAF schools; and AU Television provides high-quality TV production services to AU schools and other military organizations.

The Air Force Institute of Technology (AFIT) continued to provide education and training in scientific, technological, managerial, medical, and other fields for more than 26,000 Air Force, DoD, and international personnel. AFIT meets these requirements through degree-granting programs and professional continuing and specialized education programs conducted by its three resident schools: the School of Engineering, School of Systems and Logistics, and School of Civil Engineering. The AFIT Civilian Institutions program manages academic programs for more than 5,000 people at some 300 colleges and universities worldwide.

The AU Library, at the hub of Chennault Circle, remained a focal point for the entire AU educational system. Its collections and services are specifically designed to support the demanding academic research needs of the AU staff and students. Its holdings include almost 1,500,000 books, bound periodicals, military-specific documents, maps, and charts. The comprehensive collection covers military affairs, international relations, aerospace operations, higher education, leadership and management, and social sciences.

Hq. CAP-USAF, the Air Force organization that performs the liaison functions of advising and assisting Civil Air Patrol, also remained active under the AU umbrella. Its primary missions are aerospace education and training, cadet programs, and emergency services. With headquarters at Maxwell, CAP has some 260 Air Force military and civilian personnel assigned to offices throughout the US and Puerto Rico.

From such traditional PME studies as military history to new courses in computers and space operations, Air University leads the way. The overriding consideration at AU is total commitment to professionalism and quality education in support of the combat forces. ■



Alaskan Air Command

Alaska, with its 586,000 square miles, is not always a land of ice and snow, yet the harsh Arctic environment and the war against cold are factors the men and women of Alaskan Air Command must contend with in fulfilling the command's motto of providing "Top Cover for America."

AAC is charged with providing early warning of an air attack on the US and Canada, guarding the sovereignty of US airspace, and providing air-to-ground support of Alaskan-based ground forces.

A 21st Tactical Fighter Wing security policeman guards Elmendorf AFB, Alaska, during an air base ground defense exercise. His Multiple Integrated Laser System (MILES) gear records rifle hits and near misses.

Responsibilities for AAC's vast area of operations lie with the 787 officers, 6,866 enlisted people, and 1,201 civilian employees of the command.

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.

The AAC Commander also serves as Commander, Alaskan North American Aerospace Defense Command Region. As the senior military officer in Alaska, he is the coordinating authority for all joint military administrative and logistic matters in Alaska and is the military point of contact for the state.

In the event of natural disaster, emergency, or hostilities other than air defense, or when directed by the Joint Chiefs of Staff, the AAC Commander becomes the Commander, Joint Task Force-Alaska.

In addition to numerous command post exercises, the JTF-AK concept of operations is field-tested every other year during Brim Frost, a major joint Arctic training exercise.

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 for alert F-15 Eagle aircraft from Elmendorf.

AAC is headquartered at Elmendorf, home of the 21st Tactical Fighter Wing and 21st Combat Support Group. Assigned to the wing are the 43d Tactical Fighter Squadron, flying F-15s, and the 5021st Tactical Operations Squadron, flying the T-33 Shooting Star.

Eielson AFB is headquarters for the 343d Composite Wing and 343d Combat Support Group. The wing's 18th Tactical Fighter Squadron operates the command's A-10 Thunderbolt IIs, while the 25th Tactical Air Support Squadron flies O-2A aircraft.

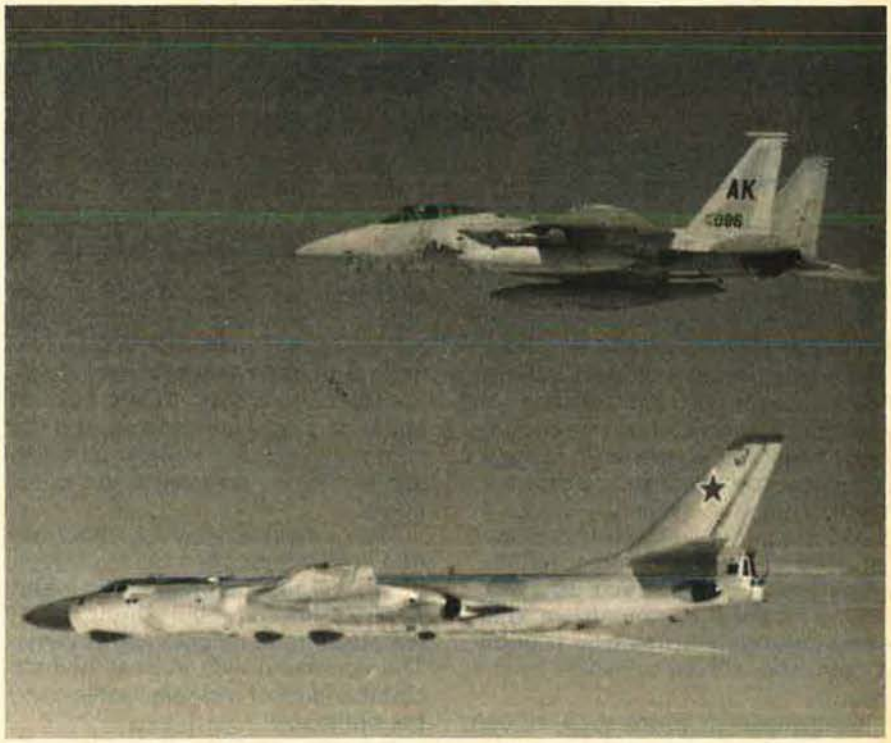
Modernization and innovation continued to characterize AAC during 1983. Modernization of the twenty-

five-year-old Alaskan Air Defense and CONUS Tactical Warning System was begun with the activation and integration of the newly activated Joint Surveillance System (JSS) Region Operations Control Center at Elmendorf.

In the new system, data from the command's radar sites is received via satellite 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 system modernization allowed the withdrawal of all military people from the thirteen aircraft control and warning squadrons located along the western periphery and interior of the state. On October 1, 1983, the AC&W squadrons were deactivated. Maintenance and caretaker duties at the radar sites are performed by contractor maintenance personnel.

The Seek Igloo program also marked a major milestone in 1983 with the installation and successful completion of initial operational testing and evaluation of the prototype minimally attended radar (MAR) at King Salmon. Based on the success, full-scale production was begun with the first seven of twelve additional state-of-the-art MARs scheduled for installation between June and October 1984. These radars will substantially reduce contractor manning and, in turn, costs for operating the command's remote long-range radar sites. The combination of the two upgrade programs will save the Air Force more than $1 billion over the next twenty years.



A 21st Tactical Fighter Wing F-15 keeps watch on a Soviet Badger reconnaissance bomber near Shemya in the Aleutian Islands chain.

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

AAC operates the Elmendorf Rescue Coordination Center. The RCC coordinates search and rescue efforts involving aircraft and people from all military services in the state, plus many civil agencies. During 1983, the RCC coordinated emergency assistance for 109 military and civilian persons in distress and was credited with saving forty-eight lives. Since its inception in October 1961, the RCC has recorded more than 3,695 saves and assisted more than 10,801 people. ■

ALASKAN AIR COMMAND

Headquarters, Elmendorf AFB, Alaska

Electronic Security Command

The Electronic Security Command is an Air Force major command with headquarters at Kelly AFB, Tex. It is commanded by Maj. Gen. John B. Marks. Technological advances in modern weapon systems have introduced new vulnerabilities in communications, command and control, and other electronic systems. The command's major objective is to seek out and exploit these electronic "chinks" in an enemy's armor and weaponry and to render them ineffective while simultaneously protecting friendly forces from similar activities by the enemy.

Composed of more than 12,000 men and women at locations worldwide, the command is made up of two centers, three wings, six groups, twenty-five squadrons, numerous operating detachments and locations, and five major command liaison staffs at locations around the world. Additional support is provided by mobile units and US Air Force Reserve mobilization augmentees. Ninety percent of ESC's people are enlisted, and the command has the highest percentage of women specialists in the Air Force.

The command plays an important role in developing the US Air Force's offensive and defensive command control and communications countermeasures techniques and systems. The command also advises combat commanders of their electronic combat options.

The offensive role demands proficiency at developing ways to exploit, analyze, jam, confuse, or destroy opposing command control and communications systems. The command's defensive role involves ensuring that the enemy cannot do the same to US communications.

Combat decision-makers are provided with command control and communications countermeasures support and advice by specialists who maintain and operate modern electronic equipment. The options offered include both nonlethal and lethal choices of action.

Nonlethal choices include jamming, deception, or degradation of hostile communications systems. This involves seriously disrupting or manipulating an enemy's ability to maneuver, resupply, and coordinate forces. However, some enemy targets are so critical that only one choice is suitable—destruction.

The defensive element of electronic warfare minimizes the vulnerability of Air Force command control and communications systems to hostile exploitation or manipulation.

The Air Force Cryptologic Support Center is collocated with command headquarters at Kelly AFB. The center's members buy, store, distribute, and account for cryptologic communications security devices used by the Air Force and Department of Defense

SSgt. Stanley M. Griffith prepares to install a tape in a Sperry 1100/80 computer, the newest computer system at Electronic Security Command (ESC) headquarters, Kelly AFB, Tex. The computer has sixteen tape drives for data recording.

agencies. Center engineers help design, construct, and evaluate equipment to meet immediate mission requirements of the command.

The center's Communications Security Education and Training Division is responsible for all communications security training and education programs Air Force-wide. Division personnel develop posters, pamphlets, films, and other informative media to support these programs on a continuing basis.

The Air Force Electronic Warfare Center, also collocated with command headquarters, provides electronic warfare analysis and support to Air Force elements. Formed during the Vietnam conflict, the center analyzed air combat results. Today, its people use high-speed computers to review realistic exercises, such as Red Flag, and other data to assist strategic and tactical commanders in making electronic combat decisions. They also advise on planning, developing, testing, and using the latest warfare equipment.

One of the command's communications security units serves the entire continental United States. Special teams work to prevent security leaks. Communications technicians using the latest equipment play the adversary role and listen to Air Force communications, both real-time and in exercises, to determine if any classified information has been compromised.

The command's mobile units deploy to support such single- and joint-service exercises as Cold Fire, Central Enterprise, Border Star, Red Flag, Maple Flag, Green Flag, Bright Star, Team Spirit, and many others.

Support to tactical and strategic commanders is given by Electronic Security Command officers stationed at the headquarters of Strategic Air Command, Tactical Air Command, Space Command, United States Air Forces in Europe, and Pacific Air Forces. The mobile units also provide support. These staff officers are integrated into the commands they support and assist those commanders in their daily operations and planning.

Command units around the world are linked to the headquarters through the facilities of the twenty-four-hour Alert Center at Kelly AFB. This nerve center provides immediate guidance to its worldwide units.

Since the command was formed in 1948 as the US Air Force Security Service, activities have reaped great benefits by strengthening US defenses. Growth from that time, both in people and missions, led to the formation of the Electronic Security Command in August 1979. Today, the command plays a key role in employing US forces more effectively and in the success of modern, electronically dependent air operations. ■

ELECTRONIC SECURITY COMMAND

Headquarters, San Antonio, Tex.

Commander
Maj. Gen. John B. Marks

Electronic Security Pacific
Hq. Hickam AFB, Hawaii

6903d Electronic Security Group
Osan AB, Korea

6920th Electronic Security Group
Misawa AB, Japan

6922d Electronic Security Squadron
Clark AB, Philippines

6924th Electronic Security Squadron
Wheeler AFB, Hawaii

6990th Electronic Security Group
Kadena AB, Japan

Electronic Security Strategic
Hq. Offutt AFB, Neb.

6949th Electronic Security Squadron
Offutt AFB, Neb.

Electronic Security Alaska
Hq. Elmendorf AFB, Alaska

6981st Electronic Security Squadron
Elmendorf AFB, Alaska

6985th Electronic Security Squadron
Eielson AFB, Alaska

Electronic Security Tactical
Hq. Langley AFB, Va.

Det. 1, Eglin AFB, Fla.

OL-HL, Hurlburt Field, Fla.

Det. 2, Davis-Monthan AFB, Ariz.

OL-TB, Bergstrom AFB, Tex.

Det. 3, Nellis AFB, Nev.

OL-TS, Shaw AFB, S.C.

OL-TT, Tinker AFB, Okla.

Electronic Security Europe
Hq. Ramstein AB, Germany

6910th Electronic Security Wing
Lindsey AS, Germany

6911th Electronic Security Squadron
Hahn, AB, Germany

6913th Electronic Security Squadron
Augsburg, Germany

6915th Electronic Security Squadron
Bad Aibling, Germany

6918th Electronic Security Squadron
Sembach AB, Germany

6912th Electronic Security Group
Tempelhof Airport, Berlin

6916th Electronic Security Squadron
Hellenikon AB, Greece

6917th Electronic Security Group
San Vito AS, Italy

6931st Electronic Security Squadron
Iraklion AS, Crete, Greece

6950th Electronic Security Group
RAF Chicksands, UK

6952d Electronic Security Squadron
RAF Alconbury, UK

6988th Electronic Security Squadron
RAF Mildenhall, UK

DIRECT REPORTING UNITS

Air Force Electronic Warfare Center
Hq. San Antonio, Tex.

Air Force Cryptologic Support Center
Hq. San Antonio, Tex.

6940th Electronic Security Wing
Hq. Fort George G. Meade, Md.

6941st Electronic Security Squadron
Fort George G. Meade, Md.

6942d Electronic Security Squadron
Fort George G. Meade, Md.

6943d Electronic Security Squadron
Fort George G. Meade, Md.

6944th Electronic Security Squadron
Fort George G. Meade, Md.

6947th Electronic Security Squadron
Homestead AFB, Fla.

6994th Electronic Security Squadron
Fort George G. Meade, Md.

6960th Electronic Security Wing
Hq. San Antonio, Tex.

6906th Electronic Security Squadron

6923d Support Squadron

6948th Electronic Security Squadron

6960th Security Police Squadron

6964th Computer Services Support Squadron

6993d Electronic Security Squadron

Military Airlift Command

A Civil Reserve Air Fleet (CRAF) crew loads up. In a contingency, CRAF could provide more than 300 passenger and cargo aircraft to augment MAC.

From headquarters at Scott AFB, Ill., the Military Airlift Command (MAC), a specified command, directs more than 94,000 active-duty military people and civilians as well as almost 1,000 aircraft at more than 340 locations in twenty-five countries. MAC-gained ANG and AFRES assets comprise 62,000 people and approximately 390 aircraft.

MAC operates fourteen bases in the United States and is the host Air Force major command at US facilities at Lajes Field in Portugal's Azores and at Rhein-Main AB, Germany. The command is "the backbone of deterrence" for US fighting forces. MAC's major airlift missions include deployment, employment, and redeployment of combat forces and their support equipment and logistical resupply.

OPERATIONAL AIRCRAFT ASSIGNED TO MAC

(As of November 19, 1983)

Type	Number
T/UH-1F/P	26
UH-1N	58
HH-1H	22
UH-60A	9
C/HH-3	46
C/HH-53	29
C-5	77
C-6A	1
C-9A/C	23
C-12	5
C-20A	3
CT-39	97
C-130	255
HC-130H/N/P	28
WC-130E/H	13
AC-130	10
MC-130	14
WC-135B (incl. C-135B/C)	13
C-137	5
C-140	11
C-141	268
TOTAL	1,013

MAC's unique airlift capabilities were successfully demonstrated in October 1983 during the Grenada operation, Urgent Fury. MAC crews flew more than 850 missions, transporting 15,000 tons of cargo and 36,000 passengers.

The command also serves as the executive agent for DoD airlift and moved more than 458,000 tons of cargo and almost 2,200,000 passengers in 1983.

MAC's active-duty airlift forces con-

Troops of the 101st Airborne Division deplane from a MAC C-5 at Roosevelt Roads NAS in Puerto Rico during Universal Trek 83.

stitute about half of the military capability available to the command under full mobilization. When mobilized, the Air Reserve Forces (ANG and AFRES) provide approximately sixty percent of intratheater airlift and fifty percent of intertheater capability. Reserve Associate units provide nearly half of the aircrews and more than a third of the maintenance personnel for the C-141 and C-5 aircraft. Additionally, they provide forty-two percent of the aircrews and twenty-five percent of the maintenance personnel for the C-9 aeromedical airlift aircraft. Additional airlift is also available through the Civil Reserve Air Fleet (CRAF) program to meet contingency and wartime requirements.

For more than thirty-two years, the CRAF program has constituted a highly successful and vital partnership between the civil air industry and DoD. The twenty-six participating commercial carriers stand ready to provide more than 300 passenger and cargo aircraft, or nearly half the combined passenger and cargo airlift capability available to MAC during crises or contingencies.

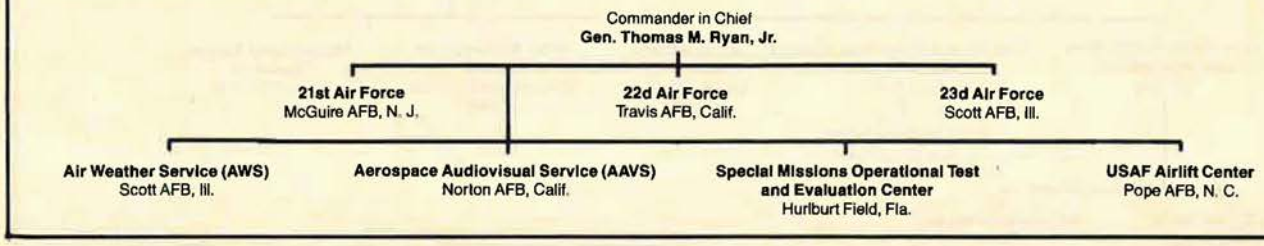
In September 1983, the Air Force awarded a CRAF enhancement contract to Pan American. The contract calls for $42.3 million to fund the modification through the Boeing Aircraft Co. of one existing Boeing 747 and all nonrecurring costs associated with opening a modification line. The contract also includes options for Boeing modification of eighteen additional B-747s. The option for the second through fifth aircraft was exercised in January 1984.

The average unit cost for retrofit and twelve years of additional operating costs is $26.7 million in FY '83 dollars. The modification takes a Pan Am passenger aircraft, adds a cargo door and strengthened floor, and then returns it to the carrier to be operated in the passenger configuration. The aircraft will fly commercially only in the passenger mode. If needed in the cargo airlift role by MAC, these aircraft would add 2,900,000 ton-miles a day of capability to the CRAF cargo fleet.

Several other initiatives are also under way to enhance the posture of airlift forces. MAC has placed three

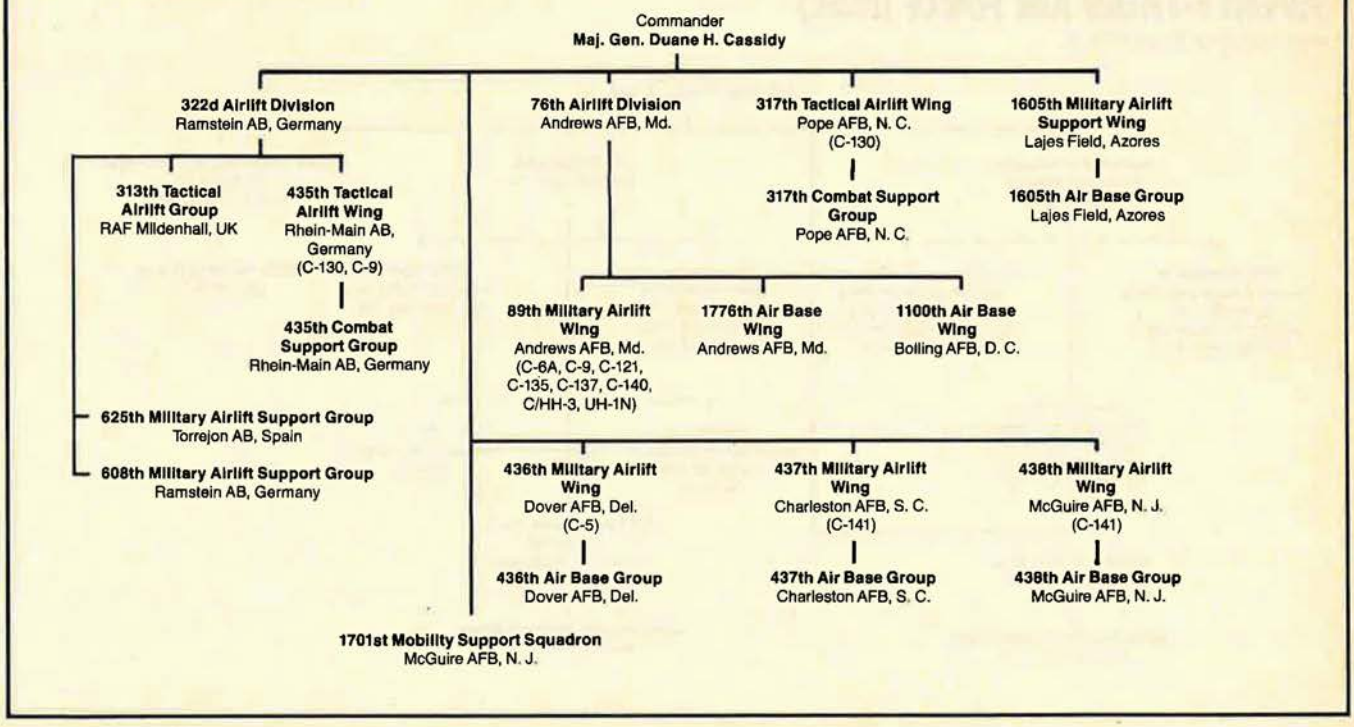
MILITARY AIRLIFT COMMAND

Headquarters, Scott AFB, Ill.



TWENTY-FIRST AIR FORCE (MAC)

Headquarters, McGuire AFB, N. J.



C-20A (Gulfstream III) aircraft into service to support the special airlift mission of the 89th Military Airlift Wing. The first C-20A aircraft was delivered to the Air Force at Andrews AFB, Md., in September 1983.

A modification program has been instituted to strengthen the wings of the C-5 fleet and provide an additional 30,000 flying hours of aircraft service life. The first C-5 was delivered to the modification facility in January 1982, and all C-5s will be modified by mid-1987. The program also increases lift capability and will extend the life of the fleet into the next century.

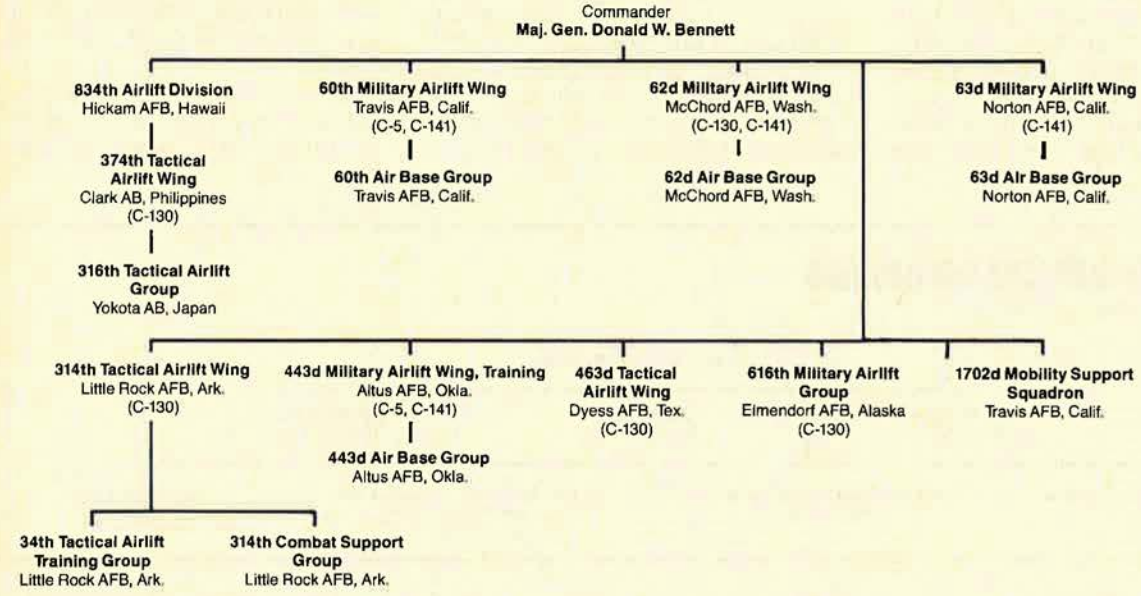
To increase near-term airlift, the Air Force began acquisition of fifty C-5B aircraft for MAC and forty-four more KC-10 aircraft to be assigned to SAC in a mobility role. The first C-5B aircraft is scheduled for delivery in December 1985.

The Air Force has also initiated a development program for the C-17 aircraft. The C-17 will increase MAC's long-range airlift capability, provide an outsize theater airlift capability, and serve as a replacement for aging C-130 and C-141 aircraft.

Aside from airlift, MAC commands a number of technical services and

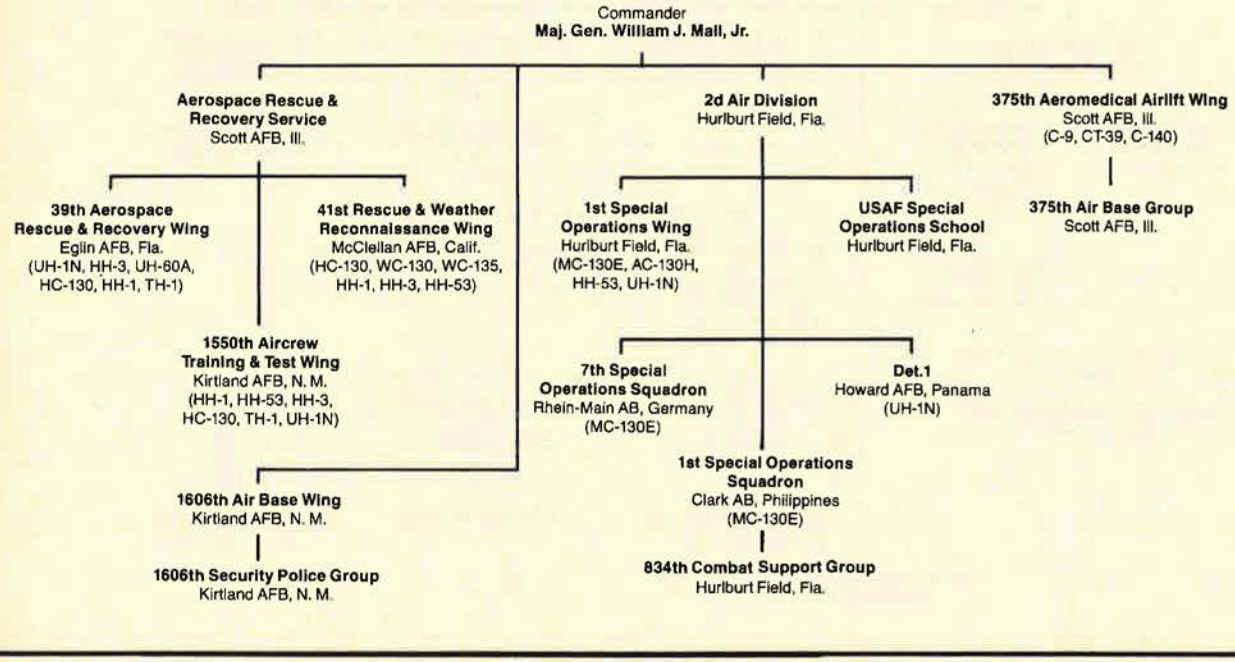
TWENTY-SECOND AIR FORCE (MAC)

Headquarters, Travis AFB, Calif.



TWENTY-THIRD AIR FORCE (MAC)

Headquarters, Scott AFB, Ill.



the Air Force special operations forces.

In March 1983, MAC consolidated its long-standing Aerospace Rescue and Recovery Service (ARRS) mission with that of worldwide Air Force special operations forces (SOF). In January 1984, the 375th Aeromedical Airlift Wing joined ARRS and SOF under the command of Twenty-third Air Force.

Twenty-third Air Force is MAC's only numbered Air Force with worldwide responsibility. It commands all Air Force special operations forces, rescue and recovery forces, aeromedical evacuation and CONUS operational support airlift forces, worldwide weather reconnaissance, air sampling, drone recovery, Space Shuttle support, and support for SAC missile sites.

Twenty-third Air Force rescue and weather reconnaissance units fly the HC-130, WC-130, and WC-135 fixed-wing aircraft, as well as various HH-1, HH-3, HH-53, and UH-60A helicopters. Full-scale engineering and development of the HH-60D Night Hawk helicopter, specifically designed for combat rescue, is well under way.

As executive management agency for search and rescue (SAR) within the forty-eight continental United States, ARRS operates the Air Force Rescue Coordination Center (AFRCC) at Scott AFB to provide humanitarian assistance by coordinating all inland SAR using ARRS, Civil Air Patrol, and other military and civilian assets. The AFRCC works closely with state and local agencies and solicits services of police and sheriff departments as well as the US Coast Guard. Rescue is credited with saving more than 20,000 lives during the past thirty-seven years.

ARRS also operates the US Mission Control Center for the Search and Rescue Satellite-Aided Tracking (SARSAT) system. SARSAT uses a low-flying satellite to "listen" for distress signals from aircraft and ships at sea. Currently in a testing stage, SARSAT, when fully operational, is expected to aid immeasurably in locating emergency transmitter signals coming from any point on the globe.

As part of the ARRS/SOF consolidation, the 2d Air Division was activated at Hurlburt Field, Fla., to provide management of special operations forces.

The air division has command and control over Air Force SOF units in the United States and administrative control and supervision of SOF units under the operational control of theater commanders.

Special operations include unconventional warfare, collective security, counterterrorist operations, psychological operations, and civil affairs measures. SOF units fly MC-130 and AC-130 fixed-wing aircraft and UH-1N and HH-53 helicopters. Special operations forces will soon receive additional MC-130 assets (Combat Talon II aircraft) to augment the current force. This, plus the procurement of the HH-60D Night Hawk helicopter, will greatly enhance the operational capability and deployment flexibility of special operations forces.

Paratroopers from Fort Bragg, N. C., line up to board a C-141B at Pope AFB, N. C., for flight to Grenada. Military Airlift Command C-141s and C-130s moved troops and equipment to and from Grenada and Barbados during last October's combined-forces rescue mission.

The Air Weather Service (AWS) is responsible for providing environmental support to the Air Force, Army, designated unified and specified commands, and other agencies as directed. During contingencies and wartime, weather support is a vital part of the decision process in the deployment, employment, and redeployment of air and ground forces. During peacetime, AWS support is essential for protection of military personnel and equipment from severe weather, for safe and efficient air and ground operations, for realistic and productive training exercises, and for research and development of effective weapon systems. With Twenty-third Air Force, AWS provides critical tropical storm surveillance through aerial weather reconnaissance. AWS also provides vital solar environmental data to DoD space programs to ensure the safety of man's activity in space.

The Aerospace Audiovisual Service (AAVS) headquartered at Norton AFB, Calif., is the Air Force's single management agency for combat and humanitarian audiovisual documentation. AAVS operates five squadrons and subordinate units around the world. These units provide motion picture, television, and still photographic coverage for all Air Force activities. In addition, AAVS produces intracommand training products, provides optical instrumentation and technical documentation of Air Force space and missile tests, and manages base audiovisual service centers and regional film libraries.

Aeromedical airlift is another important MAC mission. In 1983, MAC aircrews, nurses, and medical technicians provided aeromedical evacuation for more than 18,000 airmen, 12,000 sailors, 8,000 soldiers, 17,000 dependents of active-duty military members, 20,000 retired personnel and their dependents, and 1,000 others (civilians, foreign nationals, etc.). The 77,922 patients, a 6.3 percent increase above 1982, were moved on a total of 4,342 C-5, C-9A, C-130, and C-141 missions.

MAC's operational-support CT-39 airlift fleet carried more than 64,000 passengers on time-sensitive government missions in 1983. The C-21A jet and C-12F turboprop aircraft will begin to replace the CT-39 in the spring of 1984. The active-duty ops support CT-39s are scheduled to be phased out of the MAC inventory by the end of 1985.

The newly acquired C-23 aircraft will provide assured transportation for the European Distribution System. This twin-engine turboprop aircraft will have an initial operational capability by mid-1985.

Another airlift unit, the 89th Military Airlift Wing, continues to provide airlift for the President, other US government officials, and foreign dignitaries.

For purposes of deterrence, our nation needs a manifest capability to project military power rapidly to any area of the world where US vital interests may be challenged. ■

Pacific Air Forces

Force modernization, realistic training, and quality-of-life improvements continued to be the major Pacific Air Forces (PACAF) initiatives during 1983. PACAF modernized its forward air controller force, made major facility improvements throughout the command, and introduced increased realism in its tactical training to meet the increasing threat in the Pacific.

As the principal air arm of the US Pacific Command, PACAF maintains security and defends US interests in an area of responsibility extending from the west coast of the Americas to the east coast of Africa and from the Arctic to the Antarctic. This area covers more than half the earth's surface and is home for 2,000,000,000 people living under more than thirty-five different flags. PACAF has more than 38,000 people—26,900 military and 11,400 civilians.

In October 1983, Gen. Jerome F. O'Malley became the first four-star commander of PACAF since 1977. The decision to upgrade the position was a reflection of the vital nature of US economic and treaty interests in the Pacific and the threat posed by the Soviet Union in the area. To illustrate: Trade with Asia-Pacific nations is approximately thirty percent of the US total—greater than any other area of the world. Five of the seven collective security pacts to which the US is a signatory are with Pacific nations.

The need for these security agreements can be seen in the following: Between 1979 and 1981, the number of new Soviet fighters deployed in the Pacific to replace older aircraft was three times greater than the entire PACAF fighter inventory. Major Soviet Far East forces include fifty-two ground divisions, more than 800 ships and submarines, approximately 1,700 fighter aircraft, and almost 350 bombers.

The PACAF tactical air team now includes 325 fighter/recce aircraft, among them seventy-two F-15s, forty-eight F-16s, seventy-two F-4s, twenty-four A-10s, and eighteen RF-4s. In mid-1985 the first elements of a new F-16 wing will arrive at Misawa AB, Japan. PACAF modernized its forward air controller force in a dual swap action. Hawaii-based O-2 aircraft were retired and replaced with OV-10s from Korea. The OV-10s in Korea were replaced with OA-37 aircraft.

PACAF's intensive training and evaluation programs remain key ingredients in maintaining a high level of force readiness. PACAF units flew more than 11,000 sorties in more than sixty exercises, of which ninety percent were conducted with another branch of the US armed forces and seventy percent were conducted with the air forces of other nations. PACAF also has an aggressive program of maritime operations and participated in several exercises with the US Navy during the past year.

Team Spirit 84, the free world's largest joint combined training exercise with more than 200,000 participants, was held in the Republic of Korea during February and March. This annual exercise demonstrates PACAF's ability to augment assigned forces rapidly and to integrate combat operations with other US and Republic of Korea forces.

Cope Thunder plays a key role in PACAF's combat training program. The PACAF Red Flag equivalent is a series of realistic tactical air warfare training exercises conducted seven times annually on the Crow Valley Range near Clark AB in the Philippines. In this series, USAF, US Navy, Marine Corps, and Army forces from throughout the Pacific train in a simulated combat environment. To date, seven Pacific region air forces (New Zealand, Korea, Australia, Malaysia, Singapore, Thailand, and the Philippines) have either observed or participated in Cope Thunder.

In May 1983, PACAF conducted the largest operational readiness inspection in the command's history, which involved theater-wide deployment and saw five flying units generate more than 1,200 sorties in four days.

A Theater Large Force Employment Exercise involving more than 250 combat and support aircraft was

Airmen from the 3d Munitions Maintenance Squadron at Barbers Point NAS, Hawaii, prepare laser-guided bombs for loading on a USAF F-4 Phantom.

flown in Korea in late November 1983. The largest multiforce massing of aircraft in the Pacific since Linebacker II, the exercise demonstrated PACAF's capability to launch, assemble, and employ mass airpower and provided valuable training in theater force planning and execution.

PACAF security police will soon be operating the Stinger air defense missile at primary Korea bases. Stinger is a man-portable, shoulder-fired, infrared missile system capable of engaging high-speed fighter-bombers and helicopters. This is a new responsibility for the Air Force—and PACAF is setting the pace with this new initiative to help solve a long-standing shortfall in air base defense.

The year 1983 was also a banner year for people initiatives and major facility improvements. The main runway at Osan AB, Korea, underwent major repair from August to November 1983, requiring the repositioning of aircraft normally based there. Also nearing completion is the $53 million program under which the Republic of Korea built facilities for beddown of A-10 aircraft, equipment, and personnel at Suwon AB, Korea. The A-10s have been operating there since mid-1982.

At Kadena AB, Japan, the largest base-level mechanized materiel-handling system in the Air Force is being installed at a cost of $3.5 million. Major dining facility renovations were completed at Clark AB and at Kadena and Yokota ABs in Japan. Construction of a new 400-person dormitory for unaccompanied enlisted members was completed at Kunsan AB, Korea, as part of an extensive modernization program for Korea, which began in 1981 and will be completed in 1988 at a cost of $185 million. After a decade of underfunding, PACAF now has more than 1,000 projects under construction.

PACAF's aggressive Morale, Welfare, and Recreation improvement program has expended more than $16 million for fifty-six projects in the last three years. Eighty projects are currently approved and funded at a cost of $30.9 million. Since 1981, PACAF has opened three Family Support Centers and has plans for three more.

The men and women of the Pacific Air Forces operate and maintain the world's most capable aircraft and accomplish the most realistic combat training possible. In 1983, they did it with a Class A mishap rate of 1.1 per 100,000 flying hours—the lowest in the command's history and more than three times better than the previous best set in 1971.

United States interests in the Pacific have never been protected by better-equipped, better-trained, and better-managed forces than the Pacific Air Forces of 1984. ■

The Major Units of Pacific Air Forces (PACAF)

Unit	Location	Aircraft
326th Air Division	Wheeler AFB, Hawaii	OV-10
15th Air Base Wing	Hickam AFB, Hawaii	EC-135, T-33 (+ ANG F-4C)
Fifth Air Force, Hq. Yokota AB, Japan		
314th Air Division	Osan AB, Korea	
8th Tactical Fighter Wing	Kunsan AB, Korea	F-16
51st Tactical Fighter Wing	Osan AB, Korea	F-4E
5th Tactical Control Group	Osan AB, Korea	OA-37
497th Tactical Fighter Squadron	Taegu AB, Korea	F-4E
25th Tactical Fighter Squadron	Suwon AB, Korea	A-10
313th Air Division	Kadena AB, Japan	
18th Tactical Fighter Wing	Kadena AB, Japan	RF-4C, T-39, F-15, E-3A (TAC)
475th Air Base Wing	Yokota AB, Japan	T-39, UH-1
6112th Air Base Wing	Misawa AB, Japan	
6171st Air Base Squadron	Kwang Ju AB, Korea	
Thirteenth Air Force, Hq. Clark AB, Philippines		
3d Tactical Fighter Wing	Clark AB, Philippines	F-4E, F-4G, F-5, T-39, T-33, C-130, MC-130, HH-3 (MAC)

Space Command

The Space Command, established in September 1982, is the focal point for space systems as they pass from the development stage to the operational arena and is a part of the organizational framework that will permit the US to take full advantage of man's presence in space. The command's motto, "Guardians of the High Frontier," reflects the spirit and determination that our pioneer forefathers had as they met the unknowns of a new continent. That same spirit and determination are hallmarks of Space Command as the Air Force meets the challenges of the new frontier—space.

The Space Command mission is to manage and operate assigned space assets, centralize planning, consolidate requirements, provide operational advocacy, and ensure a close interface between research and development activities and operational users of Air Force space programs. Space Command is also the major command responsible for the strategic defense mission area.

The Commander of Space Command also serves as Commander in Chief of the North American Aerospace Defense Command, a binational command consisting of US and Canadian forces, and as Commander in Chief of the Aerospace Defense Command, a US specified command.

The Vice Commander of Space Command also is the Commander of the Air Force Systems Command's (AFSC) Space Division, located at Los Angeles AFS, Calif.

On October 1, 1982, the Air Force established the Air Force Space Technology Center at Kirtland AFB, N. M., which reports to Space Division (AFSC). Within this framework, space systems are developed in a logical progression: The Air Force Space Technology Center works on basic technology; Space Division is responsible for research, development, acquisition, launch, and checkout; and the operational Space Command then assumes on-orbit control, management, and protection responsibilities.

Space Command has approximately 6,000 Air Force military and civilian personnel and about 2,000 contractors worldwide. It has three bases: Peterson AFB, Colo.; and Thule and Sondrestrom ABs in Greenland; and four Air Force stations: Clear AFS, Alaska; Cavalier AFS, N. D.; Falcon AFS, Colo.; and Cape Cod AFS, Mass. Additional Space Command resources include:

- **Satellite Systems:** Initially assigned are two operational satellite systems—the Satellite Early Warning System and the Defense Meteorological Satellite Program and associated ground control and tracking networks. The Space Command also will operate and manage two satellite systems currently under development—the Department of Defense navigational satellite system called the Global Positioning System (GPS), and Milstar, the next-generation strategic and tactical military satellite communications system.
- **Missile Warning and Space Surveillance Sensors:** The Space Command operates twenty-two worldwide space and missile warning units. The missile warning and space surveillance network consists of radars and optical sensors.
- **The 1st Space Wing:** The 1st Space Wing was established on January 1, 1983, at Peterson AFB to manage the operational satellite systems and the ground-based sensors throughout the world. Together these sensors continuously monitor strategic ballistic missile and space launch sites as well as provide more than 20,000 space observations a day to the Space Defense Operations Center in the Cheyenne Mountain Complex. The 1st Space Wing is responsible for the operational readiness of assigned assets to include administration, training, standardization, and evaluation.
- **Space Communications Division:** The Space Communications Division, one of seven divisions under Hq. Air Force Communications Command, was established January 1, 1983, to support the communications needs and air traffic control services of the Space Command, Aerospace Defense Command, and North American Aerospace Defense Command. The division, with sixteen subordinate units and more than 1,400 personnel located worldwide, operates and maintains communications-elec-

Space Command personnel at NORAD's Space Surveillance Center keep track of the more than 5,000 man-made objects now in space.

tronics systems for space surveillance and missile warning and selected data-processing equipment for the Cheyenne Mountain Complex. The Commander, Space Communications Division, is dual-hatted as the Deputy Chief of Staff, Communications, Electronics and Computer Resources on the Space Command staff.

• **The 4th Weather Wing:** The 4th Weather Wing, a Military Airlift Command unit, was established at Peterson AFB on October 1, 1983. The new wing manages the twenty-two worldwide solar observatories and weather detachments, providing a full range of weather services to the Space Command.

• **The Space Defense Operations Center:** The three space defense tasks—satellite surveillance, satellite protection, and satellite negation—are now or will be performed from the Space Defense Operations Center located in the Cheyenne Mountain Complex. This one-of-a-kind space command post is a fusion center where intelligence and operations come together. This center also maintains the status of all national security and civilian satellites.

• **The Consolidated Space Operations Center:** Groundbreaking for the Consolidated Space Operations Center (CSOC) took place in May 1983. CSOC is on the new Falcon AFS, located nine miles east of Peterson AFB. It will have two primary missions: controlling operational spacecraft and also planning, managing, and controlling all Department of Defense Space Shuttle flights. By 1986, CSOC will have more than 2,000 personnel, about half of whom will be active-duty Air Force personnel. Total manning is programmed to increase to about 3,000 by 1990.

One side of the Consolidated Space Operations Center will be a Satellite Operations Complex, which will be interoperable with the Satellite Test Center at Sunnyvale AFS in California. The other side will be a Shuttle Operations and Planning Complex that will functionally replicate the capability of the Johnson Space Center at Houston, Tex.

The Satellite Operations Complex should be operational in 1986, and the Shuttle planning and control capability by the late 1980s.

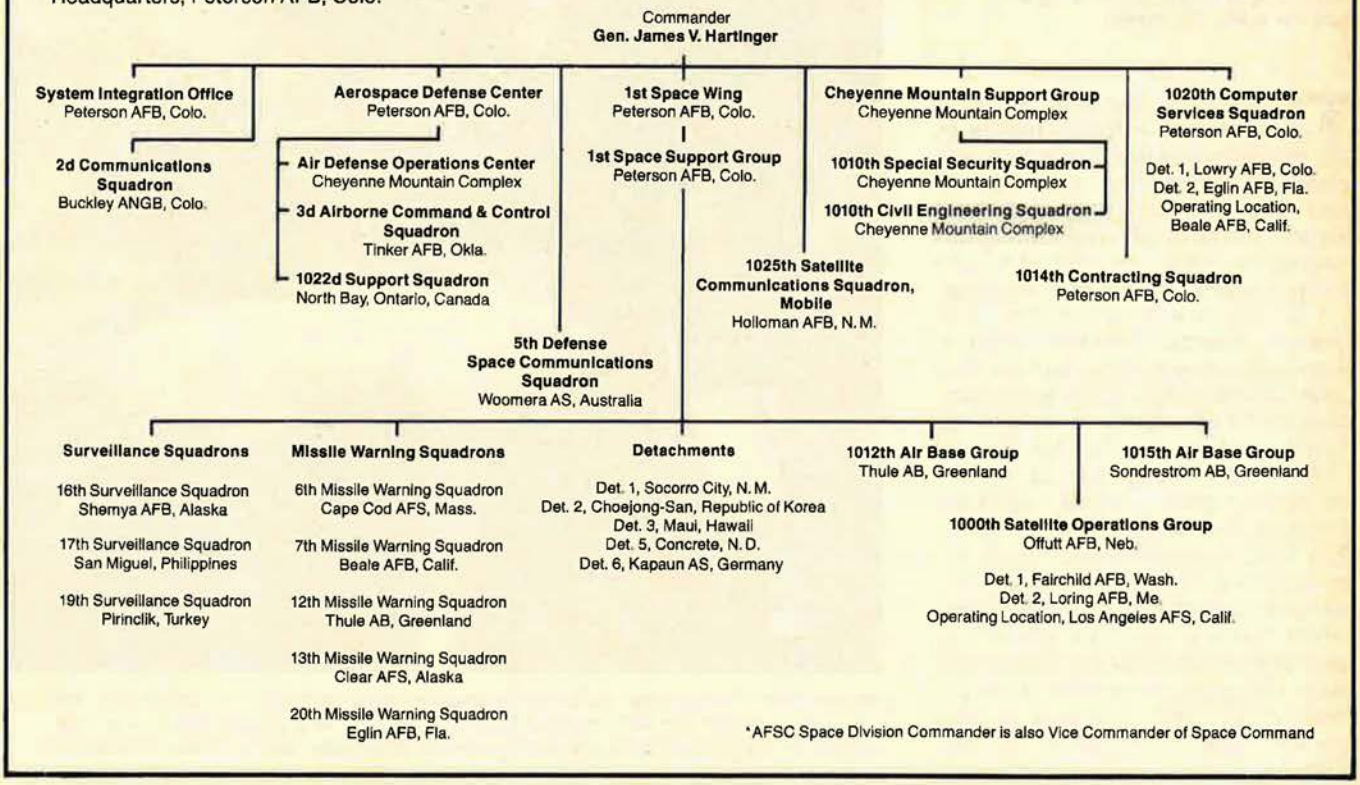
• **Test, Development, and Training Center:** The Space Command plans to build a Test, Development, and Training Center on Peterson AFB. The center will perform software and hardware testing and maintenance and operational training to support Space Command systems and the Cheyenne Mountain Complex. Construction is programmed to begin in June 1984 with occupancy in August 1985.

• **Contingency Support Operations:** The Department of Defense has transferred responsibilities for Space Transportation System contingency support operations from the Air Force Systems Command to the Space Command. This means the Space Command plans and trains people to respond to Shuttle contingencies—such as an unscheduled landing at one of the worldwide recovery bases. This task is in addition to providing collision avoidance information to the National Aeronautics and Space Administration for the orbiting Shuttle and both predicting and confirming where the external tank will land in the Indian Ocean.

It is clear that space is the place for the future. As the command with the responsibility for strategic defense, and as the Air Force command for space, the future offers tremendous opportunities to challenge the "Guardians of the High Frontier." ■

SPACE COMMAND

*Headquarters, Peterson AFB, Colo.



*AFSC Space Division Commander is also Vice Commander of Space Command

Strategic Air Command

SSgt. Ricky Harmon of the 22d Field Maintenance Squadron, March AFB, Calif., inspects a main landing gear axle on a KC-135 tanker.

The mission of Strategic Air Command (SAC) is to contribute to the deterrence of war, particularly nuclear war, by providing ready, flexible, and credible strategic offensive forces capable of responding decisively across a spectrum of threats to the nation's vital security interests.

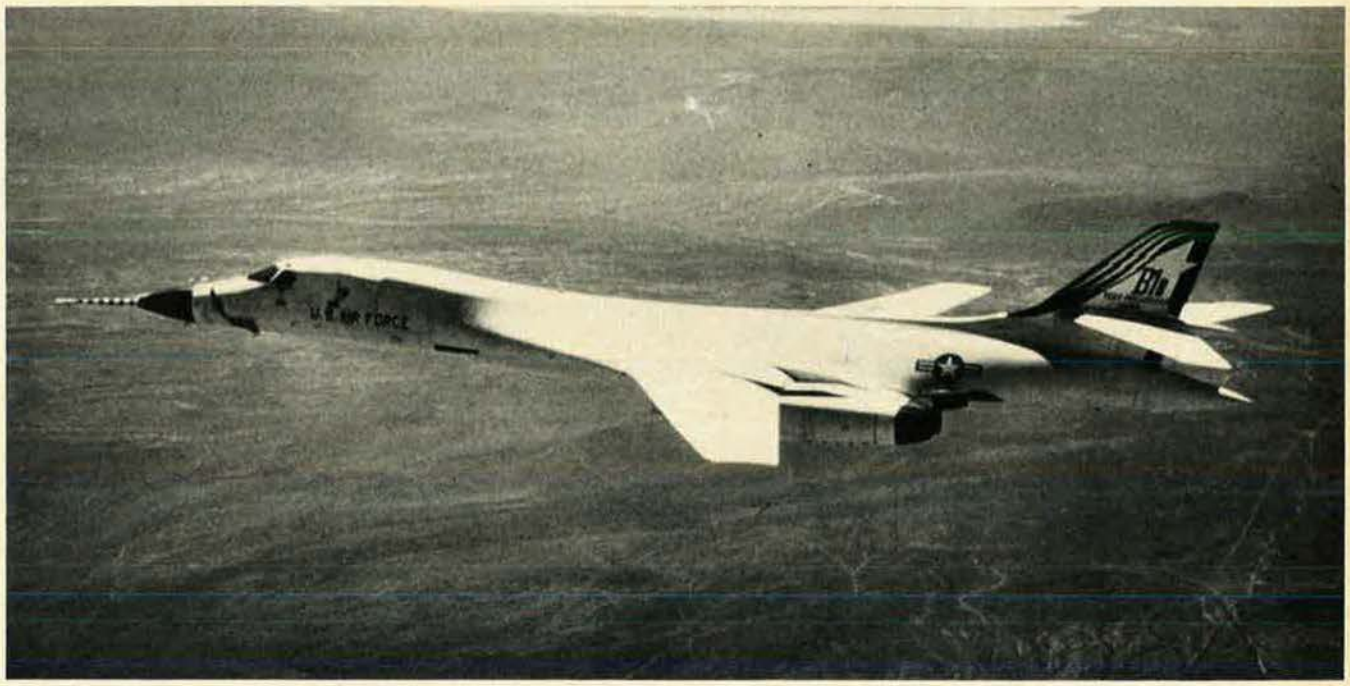
The SAC force is composed of intercontinental ballistic missiles, manned bombers, aerial tankers, and other aircraft. SAC's ICBM force numbers 1,000 Minuteman missiles (450 Minuteman IIs and 550 Minuteman IIIs) and about forty Titan IIs that are continuing their gradual phaseout. The bomber-tanker force has about 260 B-52 Stratofortresses, sixty supersonic FB-111s, 615 KC-135 Stratotankers, and twenty KC-10 Extender aircraft with more to be added this year. With aerial refueling, the bomber force has global capability. Other aircraft in the SAC inventory include the SR-71, U-2, TR-1, T-38, RC-135, EC-135, and E-4.

SAC is a specified command made up entirely of Air Force people, reporting directly to the Secretary of Defense through the Joint Chiefs of Staff. The command has more than 120,000 people at twenty-five SAC bases and twenty-three other installations where SAC units are tenants.

Some of the force modernizations presently under way or being planned to help SAC perform its mission are the addition of the air-launched cruise missile (ALCM), the B-1B bomber and new Advanced Technology Bomber, and the Peacekeeper missile.

The first operational ALCM squadron, flying B-52Gs, is at Griffiss AFB,

Members of Strategic Air Command's Disaster Response Force at Offutt AFB, Neb., move in to decontaminate an EC-135 aircraft as part of a Global Shield exercise. Decon teams assemble on the flight lines, do their jobs, and are then checked for contamination.



The B-1B test-bed aircraft turns it on. SAC expects to have its first B-1B operational at Dyess AFB, Tex., in March 1985.

N. Y. Wurtsmith AFB, Mich., and Grand Forks AFB, N. D., are also operational with missiles and modified aircraft. Blytheville AFB, Ark., and Fairchild AFB, Wash., are scheduled to become ALCM-operational this year. Eventually, as many as twenty of these small, aircraft-like missiles with highly accurate terrain-contour-matching guidance systems could be carried by a single B-52.

In addition, the Air Force and Navy continue to test Harpoon missiles on B-52s as the sister services explore new avenues for coordinated defense of US sea-lanes.

SAC anticipates receiving its first operational B-1B aircraft in March 1985 and achieving an operational capability of fifteen aircraft by September 1986. Dyess AFB, Tex., will be the first base to receive the bombers, beginning in 1985.

Testing of the Peacekeeper missile continues at Vandenberg AFB, Calif. This testing and additional planning will proceed along with environmental assessments of the recommended deployment area at F. E. Warren AFB, Wyo. Defense leaders remain confident that the Peacekeeper will modernize the land-based leg of the triad in the near future.

The command's reconnaissance capability continues to expand with TR-1s based at RAF Alconbury, UK, and the acquisition of additional aircraft.

SAC's tanker fleet was beefed up with more KC-10 Extenders. Located at March AFB, Calif., and Barksdale AFB, La., the modified DC-10 commercial freighter provides a refueling and cargo-carrying capability that is unmatched. The Extender demonstrated its long-range capability throughout the year by supporting TAC and MAC deployments across the Atlantic and Pacific Oceans. The unique drogue and boom capability of the KC-10 permits air refueling for Navy and Air Force aircraft on the same mission.

Modernization of the KC-135 fleet is

STRATEGIC AIR COMMAND

Headquarters, Offutt AFB, Neb.

Commander in Chief
Gen. Bennie L. Davis

8th Air Force
Hq. Barksdale AFB, La.

7th Air Division
19th Air Division
40th Air Division
42d Air Division
45th Air Division

1st Strategic Aerospace Division
Hq. Vandenberg AFB, Calif.

394th ICBM Test Maintenance Squadron
4315th Combat Crew Training Squadron
4392d Aerospace Support Group

15th Air Force
Hq. March AFB, Calif.

3d Air Division
4th Air Division
12th Air Division
14th Air Division
47th Air Division
57th Air Division

1st Combat Evaluation Group
Barksdale AFB, La.

544th Strategic Intelligence Wing
Offutt AFB, Neb.

3902d Air Base Wing
Offutt AFB, Neb.

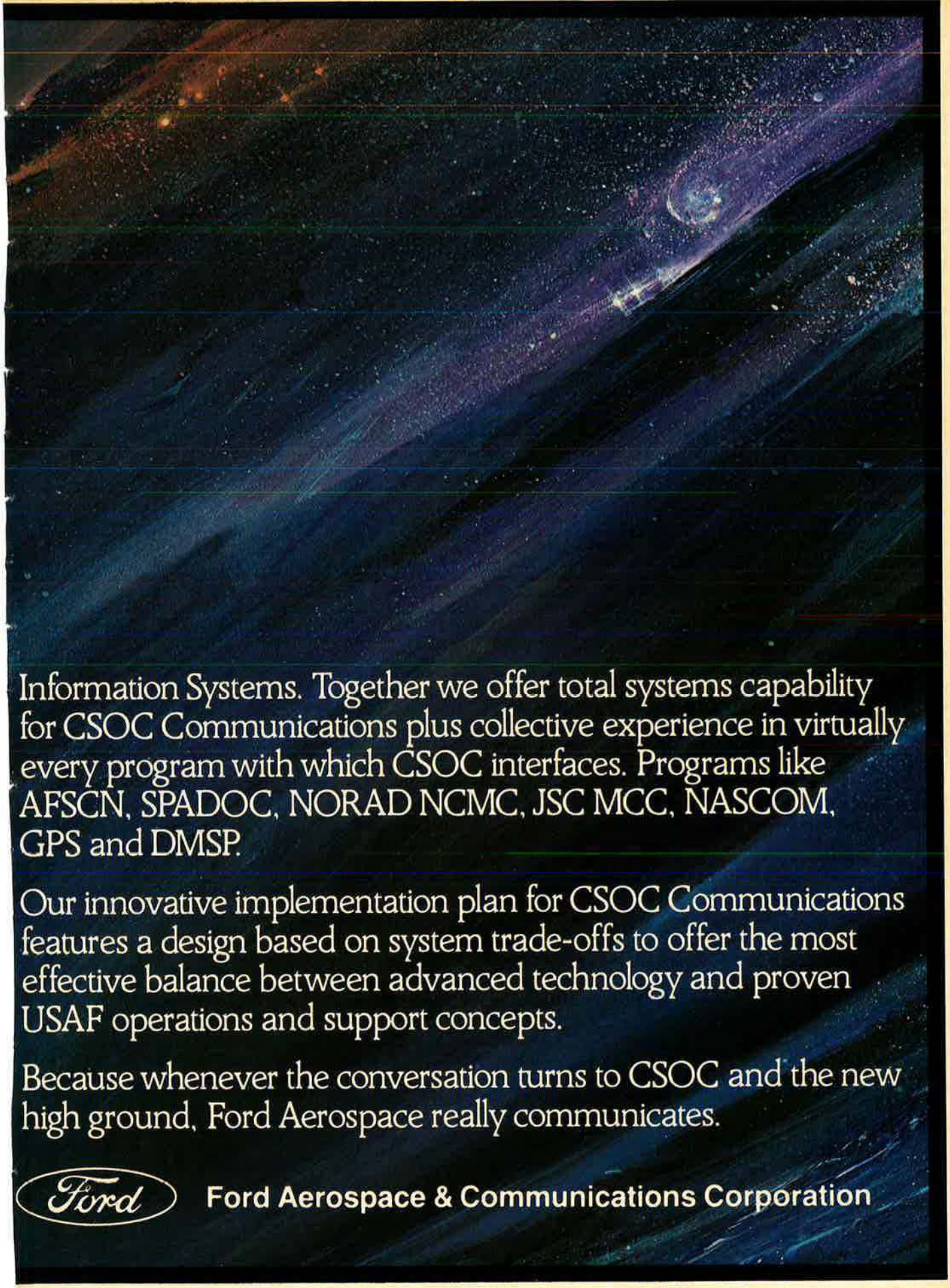
New High Ground: Space Communications

We speak the language.

At Ford Aerospace, we've been involved in high ground communications for over a quarter-century. Involved successfully with the people and the systems that helped bring space communication operations down to earth.

Today, we're applying our capabilities and legacy of experience to a new space mission support challenge: The Consolidated Space Operations Center [CSOC] Communications Program. Communications for the command and control of DoD space shuttle and satellite missions and integration of military and NASA space operations.

To reinforce our commitment to CSOC Communications, we've teamed with the Harris Corporation, ORI, and CONTEL



Information Systems. Together we offer total systems capability for CSOC Communications plus collective experience in virtually every program with which CSOC interfaces. Programs like AFSCN, SPADOC, NORAD NCMC, JSC MCC, NASCOM, GPS and DMSP.

Our innovative implementation plan for CSOC Communications features a design based on system trade-offs to offer the most effective balance between advanced technology and proven USAF operations and support concepts.

Because whenever the conversation turns to CSOC and the new high ground, Ford Aerospace really communicates.

Ford

Ford Aerospace & Communications Corporation

proceeding with continued flight-testing of the first KC-135Rs. With its improved engines and other modifications, the service life of the KC-135 fleet will be extended beyond the year 2000.

As part of the President's strategic modernization program, Titan II missiles continue to be deactivated at Davis-Monthan AFB, Ariz. This program is scheduled to result in the complete deactivation of the Titan II missiles by October 1987.

SAC tested and demonstrated its readiness throughout the year by participating in exercises including Global Shield, Busy Brewer, Team Spirit, Red Flag, Ocean Venture, Maple Flag, and Gallant Eagle.

The strategy of SAC hinges on the philosophy that the perceived threat of retaliation must be sufficient to deter aggression. As Gen. Bennie L. Davis, SAC Commander in Chief, stated: "No sane man, military or civilian, wants war . . . but if war is forced upon us, we want the warfighting capability to set a price on our opponents' objectives that he cannot afford to pay." ■

EIGHTH AIR FORCE (SAC)

Headquarters, Barksdale AFB, La.

Commander
Lt. Gen. William T. Campbell

7th Air Division
Ramstein AB, Germany

306th Strategic Wing*
RAF Mildenhall, UK

11th Strategic Group
RAF Fairford, UK

17th Reconnaissance Wing
RAF Alconbury, UK

19th Air Division
Carswell AFB, Tex.

340th Air Refueling Group*
Altus AFB, Okla.
(KC-135)

351st Strategic Missile Wing
Whiteman AFB, Mo.
(Minuteman)

7th Bomb Wing
Carswell AFB, Tex.
(B-52, KC-135)

381st Strategic Missile Wing
McConnell AFB, Kan.
(Titan II)

384th Air Refueling Wing
McConnell AFB, Kan.
(KC-135)

308th Strategic Missile Wing*
Little Rock AFB, Ark.
(Titan II)

40th Air Division
Wurtsmith AFB, Mich.

379th Bomb Wing
Wurtsmith AFB, Mich.
(B-52, KC-135)

410th Bomb Wing
K. I. Sawyer AFB, Mich.
(B-52, KC-135)

416th Bomb Wing
Griffiss AFB, N. Y.
(B-52, KC-135)

42d Air Division
Blytheville AFB, Ark.

19th Aerial Refueling Wing*
Robins AFB, Ga.
(KC-135)

68th Aerial Refueling Group*
Seymour Johnson AFB, N. C.
(KC-135)

97th Bomb Wing
Blytheville AFB, Ark.
(B-52, KC-135)

2d Bomb Wing
Barksdale AFB, La.
(B-52, KC-10, KC-135)

305th Air Refueling Wing
Grissom AFB, Ind.
(KC-135)

45th Air Division
Pease AFB, N. H.

380th Bomb Wing
Plattsburgh AFB, N. Y.
(FB-111, KC-135)

509th Bomb Wing
Pease AFB, N. H.
(FB-111, KC-135)

42d Bomb Wing
Loring AFB, Me.
(B-52, KC-135)

*Tenant Units

FIFTEENTH AIR FORCE (SAC)

Headquarters, March AFB, Calif.

Commander
Lt. Gen. James E. Light, Jr.

3d Air Division
Andersen AFB, Guam

43d Strategic Wing
Andersen AFB, Guam
(B-52)

376th Strategic Wing*
Kadena AB, Japan
(KC-135)

4th Air Division
F. E. Warren AFB, Wyo.

319th Bomb Wing
Grand Forks AFB, N. D.
(B-52, KC-135)

321st Strategic Missile Wing
Grand Forks AFB, N. D.
(Minuteman)

90th Strategic Missile Wing
F. E. Warren AFB, Wyo.
(Minuteman)

12th Air Division
Dyess AFB, Tex.

390th Strategic Missile Wing*
Davis-Monthan AFB, Ariz.
(Titan II)

22d Aerial Refueling Wing
March AFB, Calif.
(KC-10, KC-135)

96th Bomb Wing
Dyess AFB, Tex.
(B-52, KC-135)

55th Strategic Reconnaissance Wing
Offutt AFB, Neb.
(RC/KC-135)

14th Air Division
Beale AFB, Calif.

9th Strategic Reconnaissance Wing
Beale AFB, Calif.
(SR-71, U-2, TR-1, KC-135)

93d Bomb Wing
Castle AFB, Calif.
(B-52, KC-135)

47th Air Division
Fairchild AFB, Wash.

92d Bomb Wing
Fairchild AFB, Wash.
(B-52, KC-135)

341st Strategic Missile Wing
Malmstrom AFB, Mont.
(Minuteman)

320th Bomb Wing*
Mather AFB, Calif.
(B-52, KC-135)

6th Strategic Wing
Eielson AFB, Alaska
(RC-135)

57th Air Division
Minot AFB, N. D.

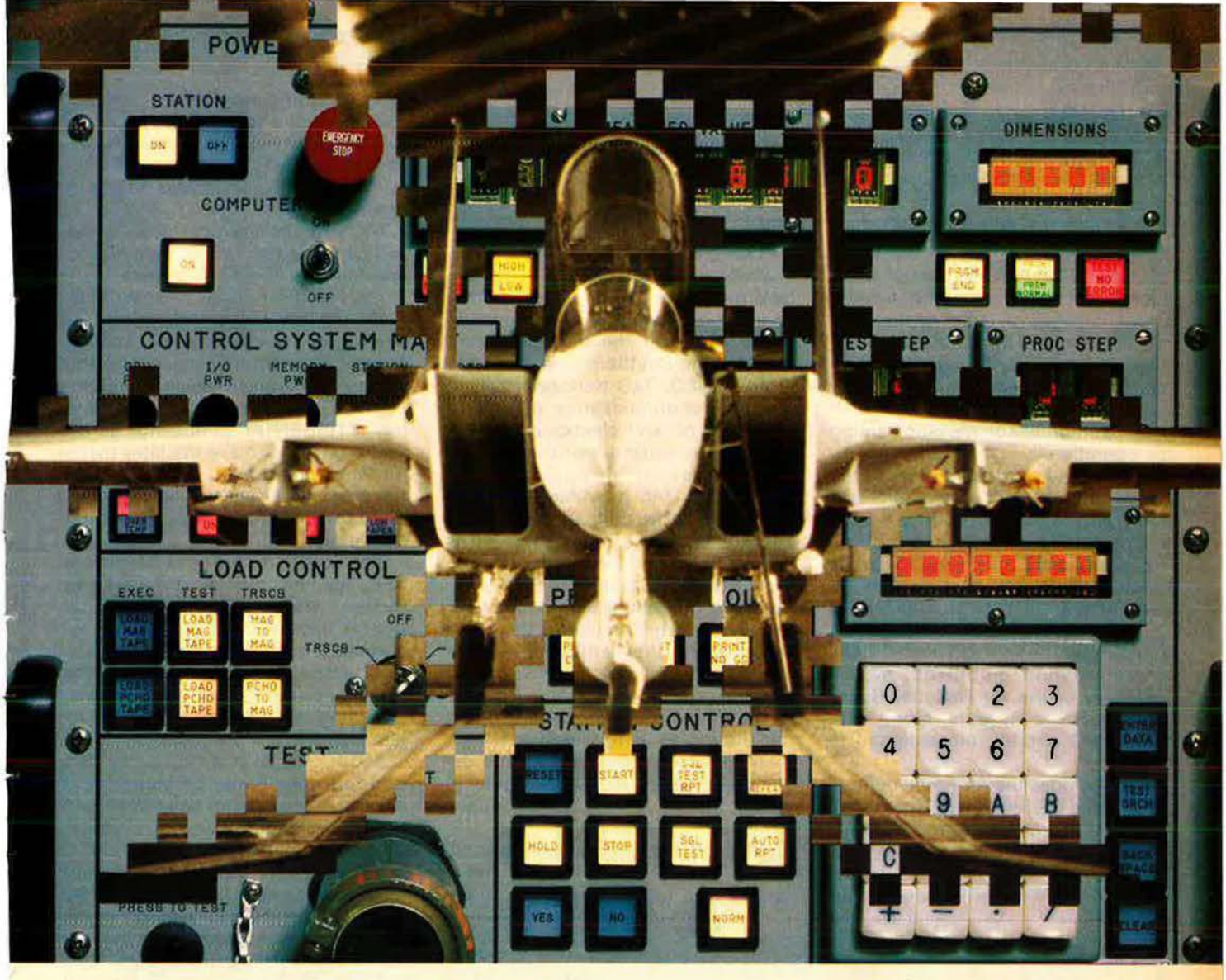
5th Bomb Wing
Minot AFB, N. D.
(B-52, KC-135)

91st Strategic Missile Wing
Minot AFB, N. D.
(Minuteman)

28th Bomb Wing
Ellsworth AFB, S. D.
(B-52, KC-135)

44th Strategic Missile Wing
Ellsworth AFB, S. D.
(Minuteman)

*Tenant Units



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ALLIED Bendix Aerospace

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 and strategic air defense forces ready to meet the challenges of peacetime air sovereignty and wartime air defense.

TAC's emphasis on realistic training for operational, maintenance, munitions, and support personnel is the key to its many successes. Units mobilize and deploy to both Stateside and overseas locations on a continuing basis, and they practice daily those combat skills necessary to destroy enemy air and ground forces.

TAC's active force consists of more than 114,000 people and almost 2,400 aircraft. When mobilized, 67,000 members of the Air National Guard and Air Force Reserve, along with their 1,500 aircraft, are assigned to TAC.

TAC provides the Air Force component of the US Readiness Command, the US Central Command, Atlantic Command, and Southern Command. The TAC Commander is triple-hatted as TAC/CC, CINCAFRED, and CINCAFLANT. TAC's Ninth Air Force Commander doubles as CINCUSCENTAF, and the Southern Air Division Commander at Howard AFB, Panama, is responsible for the air component tasks of the Southern Command.

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

TAC also provides strategic air defense forces to the Commander in Chief, North American Aerospace Defense Command, and to USCINCLANT for operations in Iceland. Air Defense TAC (ADTAC), with headquarters at Langley AFB, Va., maintains personnel, equipment, aircraft, and munitions to provide peacetime air sovereignty and early warning, attack assessment, and damage limitation from airborne threats to North America.

TAC's forces are organized under two numbered air forces, plus ADTAC and four direct reporting units.

The Ninth Air Force at Shaw AFB, S. C., has ten wings performing tactical fighter operations and training as well as reconnaissance and the tactical air control mission. The Commander, Ninth Air Force, when serving as USCENTAF, commands all US Air Force forces made available to the Air Force component of the US Central Command, which has responsibility for Southwest Asia (including the Persian Gulf area).

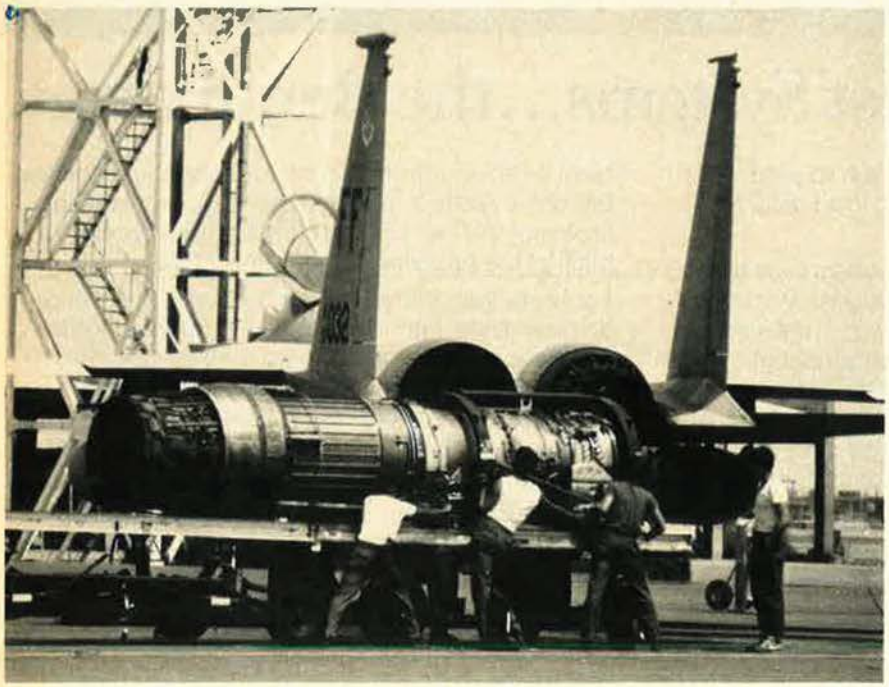
The Twelfth Air Force at Bergstrom AFB, Tex., has four air divisions and thirteen wings performing tactical fighter operations and training, reconnaissance, command and control, tactical air control, and a wide range of electronic combat missions, including "Wild Weasel" and support jamming.

ADTAC has four air divisions that conduct peacetime command and control of interceptor squadrons and the surveillance radars for strategic air defense of North America. ADTAC provides forces to Air Forces Iceland (AFI), located at Keflavik NAS. ADTAC is also responsible for support of the personnel and equipment on the Distant Early Warning (DEW) Line.

TAC's USAF Southern Air Division at Howard AFB, Panama, is the air arm of the joint US Southern Command in Latin America. USAFSO is responsible for air defense of the Panama Canal, assists in training Latin American air forces, provides air support for combined training exercises with Latin American military forces, and operates search-and-rescue activities in the region.

The USAF Tactical Air Warfare Center (TAWC), Eglin AFB, Fla., is responsible for all aspects of electronic combat activities and provides training and evaluation of C^{3}I assets through Blue Flag exercises. TAWC also conducts testing and evaluation of our latest air-to-air and air-to-ground tactical weapons.

The USAF Tactical Fighter Weapons Center (TFWC), Nellis AFB, Nev., conducts advanced schooling and testing in tactical air concepts, doctrine, weapons, and tactics. TFWC also evaluates equipment and munitions designed for tactical fighter op-



A USAF F-15 undergoes an engine change during the Arid Farmer deployment of F-15, KC-10, and E-3A aircraft to Khartoum in the Sudan last August. The deployment was in response to Libyan aggression against Chad.

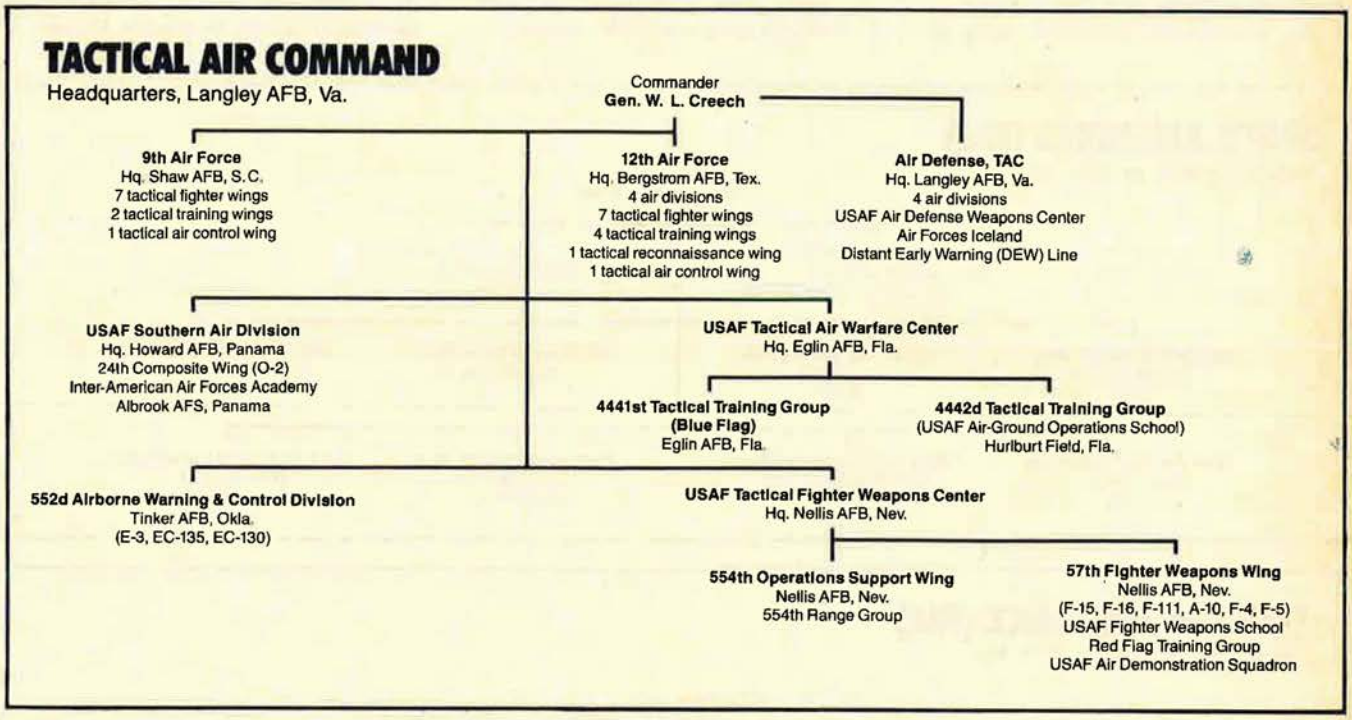
erations. The USAF Air Demonstration Squadron, the Thunderbirds, is a TFWC unit. The center is also responsible for all Red Flag activities and TAC's aggressor forces.

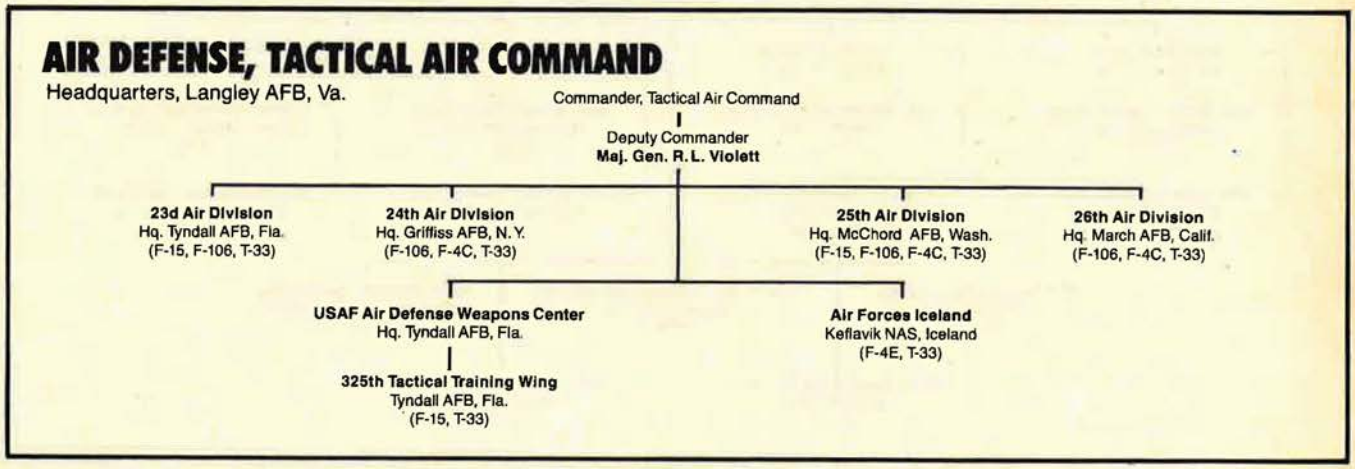
The 552d Airborne Warning and Control Division, Tinker AFB, Okla., operates E-3 AWACS, EC-130E, EC-130H, and EC-135 aircraft. The division maintains squadrons at Tinker AFB, Okla.; Kadena AB, Japan; Keflavik NAS, Iceland; Davis-Monthan AFB, Ariz.; and Keesler AFB, Miss. The E-3A provides surveillance and warning, control of friendly fighters, and airborne battle management. The two versions of the C-130 provide for 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.

To maintain their high state of readiness, TAC personnel conduct training exercises and overseas deployments and participate in numerous joint exercises. During the last year, TAC and TAC-gained units conducted thirty-one overseas deployments to ten countries, including Korea, Germany, Italy, the United Kingdom, and Egypt. Additionally, TAC fighter and tactical air control forces participated in several contingency operations, including the rescue operations in Grenada.

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

- Blue Flag provides real-time command control and communications training for battle staff personnel in realistic NATO, Korean, and Southwest Asian scenarios.
- Checkered Flag provides unit preparation for operations from overseas bases. Under Checkered Flag, every TAC fighter squadron is specifically assigned an overseas deployment base. Aircrews study and practice all facets of operation from these bases. Unit leaders visit their assigned bases yearly, and the units deploy to their overseas bases at least once every three years for realistic on-scene training.
- Red Flag furnishes tactical fighter training in this very large, combined exercise and gives aircrews training against simulated enemy





ground and air opposition. As many as 250 aircraft fly up to 4,200 sorties during each six-week exercise.

• Copper Flag is the ADTAC equivalent of Red Flag and is conducted at Tyndall AFB, Fla., to increase the readiness of strategic air defense forces. These exercises provide aircrew, weapons controller, and command and control training against enemy tactics and capabilities in scenarios covering the full range of attack and defensive options.

• Green Flag focuses on coordinating and increasing the electronic combat (EC) capabilities of the tactical air forces. Under the direction of TAWC, Green Flag personnel develop EC tactics and then provide the exercise scenarios in which to test and evaluate these tactics and our electronic combat systems.

Other significant events in TAC over the past year include completion of the first season for the USAF Air Demonstration Squadron, the Thunderbirds, in the F-16 Fighting Falcon. In 1983, the team flew seventy-eight demonstrations and carried the airpower message to more than 16,000,000 spectators.

Last year also saw the Joint Surveillance System, consisting of thirty-six USAF and FAA joint-use radars, eleven military radars, and four continental US Region Operations Control Centers (ROCC), replace the old Semi-Automatic Ground Environment (SAGE) air defense system. The final ROCC, located at March AFB, Calif., reached initial operational capability (IOC) status in December 1983. The new JSS/ROCC program performs the atmospheric surveillance and control mission for NORAD.

Also, an aerostat radar system was activated at Cape Canaveral AFS, Fla., to provide air surveillance data to NORAD and to the US Customs Service.

TAC's planned conversion of ADTAC squadrons from the F-106 to the F-15 Eagle continued with the equipping of the 318th Fighter Interceptor Squadron at McChord AFB, Wash. The 318th FIS is the second squadron to complete the conversion to the Eagle, and the 5th FIS, Minot AFB, N. D., will be the third when it converts in the fall of 1984. In conjunction with the F-15 interceptor squadron conversions, the reequipping of the 325th Fighter Weapons Wing, Tyndall AFB, Fla., began in October 1983. The 325th FWW has been redesignated the 325th Tactical Training Wing and is converting from the F-106 to the Eagle.

Finally, the past year saw Tactical Air Command receive some very prestigious awards. The men and women of the 31st Tactical Training Wing at Homestead AFB, Fla., were presented the Maintenance Daedalian Trophy, and the entire command was honored by being named the winner of the Major General Benjamin D. Foulois Memorial Award, which recognizes the most effective aircraft accident prevention program in the Air Force. ■

NINTH AIR FORCE (TAC)

Headquarters, Shaw AFB, S.C.

Commander
Lt. Gen. J. L. Piotrowski

- **1st Tactical Fighter Wing** — Langley AFB, Va. (F-15, EC-135, UH-1)
- **4th Tactical Fighter Wing** — Seymour Johnson AFB, N. C. (F-4E)
- **23d Tactical Fighter Wing** — England AFB, La. (A-10)
- **31st Tactical Training Wing** — Homestead AFB, Fla. (F-4D)
- **33d Tactical Fighter Wing** — Eglin AFB, Fla. (F-15)
- **56th Tactical Training Wing** — MacDill AFB, Fla. (F-16, UH-1)
- **347th Tactical Fighter Wing** — Moody AFB, Ga. (F-4E)
- **354th Tactical Fighter Wing** — Myrtle Beach AFB, S. C. (A-10)
- **363d Tactical Fighter Wing** — Shaw AFB, S. C. (F-16, RF-4C)
- **507th Tactical Air Control Wing** — Shaw, AFB, S. C. (O-2, OV-10, CH-3)

TWELFTH AIR FORCE (TAC)

Headquarters, Bergstrom AFB, Tex.

Commander
Lt. Gen. J. I. Gregory

- **831st Air Division** — George AFB, Calif.
  - **35th Tactical Fighter Wing** — George AFB, Calif. (F-4E)
  - **37th Tactical Fighter Wing** — George AFB, Calif. (F-4E/G)
- **832d Air Division** — Luke AFB, Ariz.
  - **58th Tactical Training Wing** — Luke AFB, Ariz. (F-16)
  - **405th Tactical Training Wing** — Luke AFB, Ariz. (F-15, F-5)
- **833d Air Division** — Holloman AFB, N. M.
  - **49th Tactical Fighter Wing** — Holloman AFB, N. M. (F-15)
  - **479th Tactical Training Wing** — Holloman AFB, N. M. (T-38)
- **836th Air Division** — Davis-Monthan AFB, Ariz.
  - **355th Tactical Training Wing** — Davis-Monthan AFB, Ariz. (A-10)
  - **602d Tactical Air Control Wing** — Davis-Monthan AFB, Ariz. (OA-37)
- **27th Tactical Fighter Wing** — Cannon AFB, N. M. (F-111D)
- **67th Tactical Reconnaissance Wing** — Bergstrom AFB, Tex. (RF-4C)
- **366th Tactical Fighter Wing** — Mountain Home AFB, Idaho (F-111A, EF-111A)
- **388th Tactical Fighter Wing** — Hill AFB, Utah (F-16)
- **474th Tactical Fighter Wing** — Nellis AFB, Nev. (F-16)

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United States Air Forces in Europe

Deter them—or defeat them. That's USAFE's mission should the Warsaw Pact powers consider aggression against the West.

It's a gauntlet the Pact won't throw down hastily.

For USAFE—US Air Forces in Europe—is well prepared along with its NATO counterparts to thwart aggression from the Eastern powers.

According to Gen. Billy M. Minter, USAFE's Commander in Chief and Commander of NATO's Allied Air Forces Central Europe, the command has continuously beefed up its warfighting capability, reflecting his conviction that "winning the air war is the main objective."

In the last year alone, USAFE strengthened its already tough combat force four major ways by:

- Converting three fighter squadrons to F-16s at Torrejon AB, Spain.
- Activating the NATO Alliance's first two units of ground-launched cruise missiles at RAF Greenham Common, UK, and Comiso AS, Italy.
- Adding the TR-1 reconnaissance aircraft to USAFE at RAF Alconbury, UK.
- Basing the command's first EF-111A electronic warfare aircraft at RAF Upper Heyford, UK.

These additions to USAFE's combat force, already girded by F-4, F-15, F-16, F-111, A-10, and RF-4 units, make for a formidable deterrent to potential Eastern aggression.

But USAFE has not been content with improvements to just its combat capability. The command has also reinforced the protection of its forces from enemy offensives. In 1983 these efforts included:

- New avionics maintenance facilities built to withstand bomb blast and insulated against chemical warfare agents. Two such "hardened" facilities, funded by NATO, have been installed at RAF Lakenheath and RAF Upper Heyford, UK. A third shelter is under construction at Bitburg AB, West Germany, and four more have been earmarked for Hahn, Ramstein, Spangdahlem, and Zweibrücken Air Bases—all in West Germany. Additionally, three more facilities are planned for NATO funding at Soesterberg AB, the Netherlands; Aviano AB, Italy; and Incirlik AB, Turkey.
- New designs for economical but hardened protection of people, equipment, and supplies. The command is now testing the design of a modular concrete shelter.
- Quick methods of repairing aircraft and runways damaged in battle.
- Camouflage and earth-toned paint on building exteriors.

Such measures are aimed at protecting USAFE's permanently assigned people, resources, and the augmentation personnel and aircraft that will reinforce Europe during heightened world tension.

In a crisis, for example, more than 2,000 aircraft would fly to preassigned allied European bases called collocated operating bases, or COBs. A long list of construction projects is on USAFE's agenda to ensure that our deploying forces can survive and fight from these locations.

Speeding the arrival of these reinforcements to Europe is another challenge on USAFE's agenda. Though the addition of C-5Bs and more KC-10s will improve the Air Force's long-range reinforcement capability, USAFE sees value in an aircraft combining strategic range and agility on

The Major Operating Units of USAFE

Unit	Location	Weapon Systems/Missions
	England	
10th Tactical Recon Wing	RAF Alconbury	RF-4, F-5, TR-1 (SAC)
20th Tactical Fighter Wing	RAF Upper Heyford	F-111, EF-111
48th Tactical Fighter Wing	RAF Lakenheath	F-111
81st Tactical Fighter Wing	RAF Bentwaters/Woodbridge	A-10, MAC rescue HC-130, HH-53
501st Tactical Missile Wing	RAF Greenham Common	GLCM BGM-109G
513th Tactical Airlift Wing	RAF Mildenhall	USAFE EC-135, MAC rotational C-130, SAC rotational KC-135
Det. 1, 10th Tactical Recon Wing	RAF Wethersfield	Support/civil engineer heavy repair squadron
7020th Air Base Group	RAF Fairford	SAC rotational KC-135
7274th Air Base Group	RAF Chicksands	Support and communications
	Spain	
401st Tactical Fighter Wing	Torrejon AB	F-16
406th Tactical Fighter Training Wing	Zaragoza AB	Tactical range support weapons training school, SAC rotational KC-135
	Italy	
40th Tactical Group	Aviano AB	Rotational USAFE aircraft
487th Tactical Missile Wing	Comiso AS	GLCM BGM-109G
7275th Air Base Group	San Vito AS	Support and communications
	Turkey	
Hq. TUSLOG	Ankara AS	
7217th Air Base Group	Ankara AS	Command and logistical management
39th Tactical Group	Incirlik AB	Rotational USAFE aircraft
7241st Air Base Group	Izmir AS	Support of NATO units
	Greece	
7206th Air Base Group	Hellenikon AB	Support and communications
7276th Air Base Group	Iraklion AS, Crete	Support and communications
	The Netherlands	
32d Tactical Fighter Squadron	Camp New Amsterdam	F-15
	Germany	
26th Tactical Recon Wing	Zweibrücken AB	RF-4
36th Tactical Fighter Wing	Bitburg AB	F-15
50th Tactical Fighter Wing	Hahn AB	F-16
52d Tactical Fighter Wing	Spangdahlem AB	F-4
86th Tactical Fighter Wing	Ramstein AB	F-4, MAC UH-1, T-39, C-140, C-12
600th Tactical Control Group	Hessisch-Oldendorf AS	Command control communications
601st Tactical Control Wing	Sembach AB	Command control communications, forward air control, OV-10, CH-53
7100th Air Base Group	Lindsey AS	Command control communications
7350th Air Base Group	Tempelhof Central Airport, Berlin	Support and communications
435th Tactical Airlift Wing (MAC)	Rhein-Main AB	MAC C-9, C-130

small runways—such as the C-17—to carry reinforcements directly from the United States to forward field locations. Such aircraft would avoid the logistical bottlenecks anticipated at the larger rear-echelon runways in wartime.

No matter how sophisticated its warfighting capability, USAFE recognizes it would be hampered without adequate means to communicate among its forces, pass commands, and gather and share intelligence. Improving these means, known as C³I (for "command control communications and intelligence"), remains a top USAFE priority.

A high priority in support of a sound air defense capability is the need for a NATO common identification system. USAFE continues to encourage the fielding of an acceptable system within NATO and supports the current USAF proposal, which is the Mark XV IFF/SIF system. Indirect identification systems, involving such sources outside an aircraft as a ground radar station, are another part of the ID solution. As one means of conveying this indirect ID information between users, the Joint Tactical Information Distribution System (JTIDS) offers many long-term growth possibilities because it has been accepted as the standard ground-air data link for NATO's air defense systems.

Thwarting comparable adversary use of C³I has taken on equal priority in USAFE. The command is readying for the imminent deployment of EC-130H aircraft, which are designed to hamper the C³I measures of hostile forces.

While enhancing its warfighting capability, USAFE has not neglected to improve things for the one readiness ingredient it prizes above all—its people. Statistics help tell the command's people story best: more than 66,000 uniformed members, some 63,000 family members, and about 11,000 civilian employees—all spread among thirty-three countries spanning more than 7,000,000 square miles. Supporting this large constituency are two new Family Support Centers, bringing to five the number of such facilities in USAFE. Also, new chapel, high school, dormitory, commissary, and a myriad of other support facilities are being erected and older ones are being renovated.

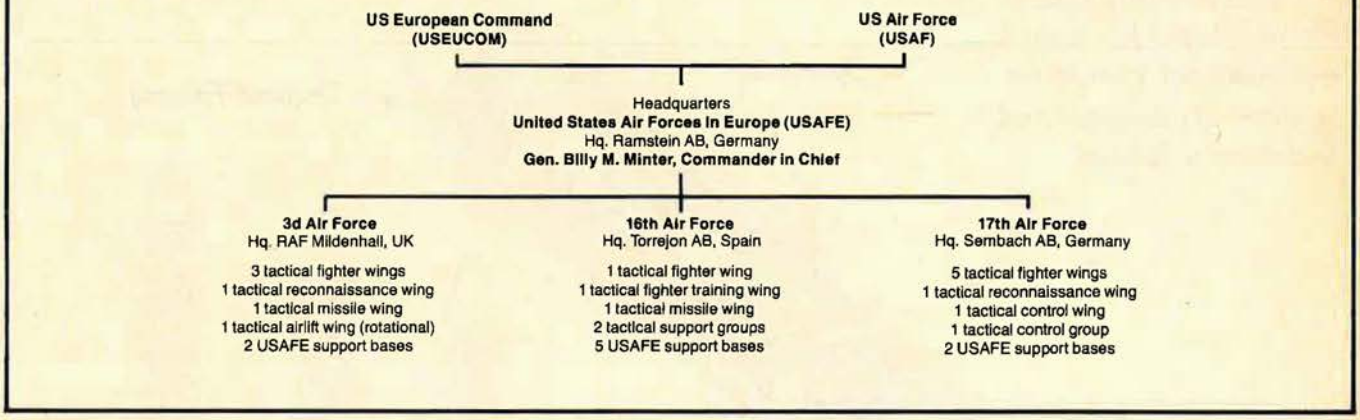
USAFE has continued to receive adequate O&M funds to maintain our physical plants, enhance people programs, and increase readiness. More than ten percent of our funding was directed to facility project improvements. We were able to finance the FY '83 dormitory furniture improvement program fully and provide well-funded morale and recreation activities. Most importantly, our readiness exercise program was at the highest participation levels we've ever experienced. USAFE's FY '84 funding levels should permit us to continue this very positive trend.

With its powerful forces—both people and equipment—it's no wonder USAFE is confident it can deter—or defeat—any potential adversary from the East.

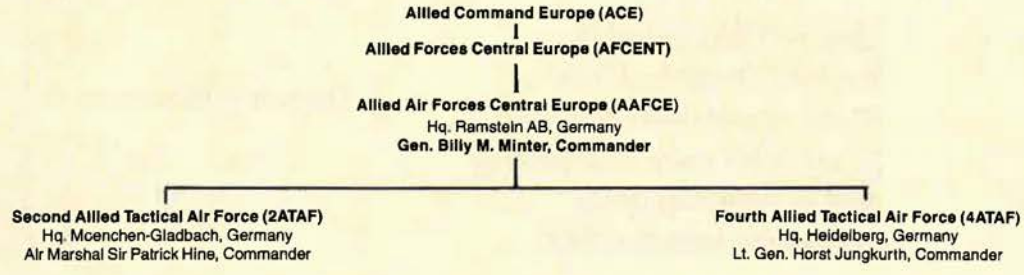
The command's past performance backs up this confidence. Largely because of American blue-suiters and aircraft, NATO's record of deterrence has remained intact for thirty-five years. ■

UNITED STATES AIR FORCES IN EUROPE

Headquarters, Ramstein AB, Germany

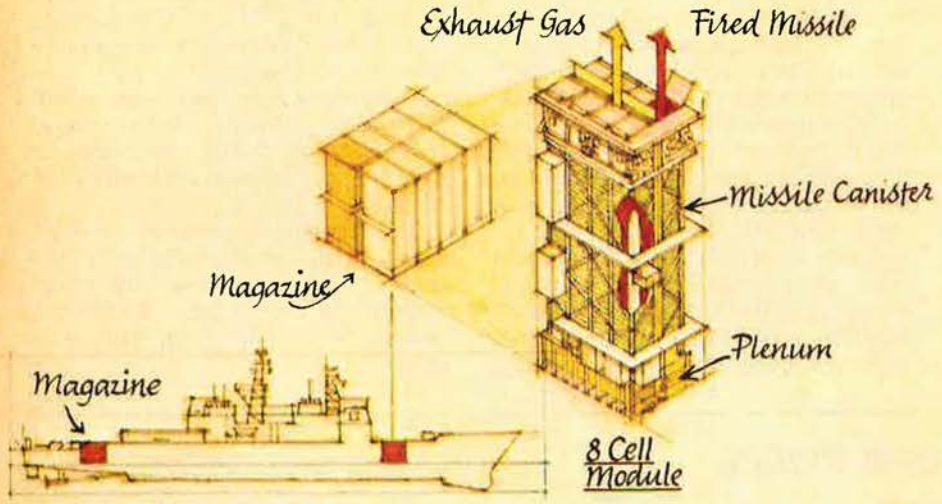


The USAFE organization chart above shows the lines of command that exist during peacetime. This chart shows the NATO command lines that would obtain in time of war.

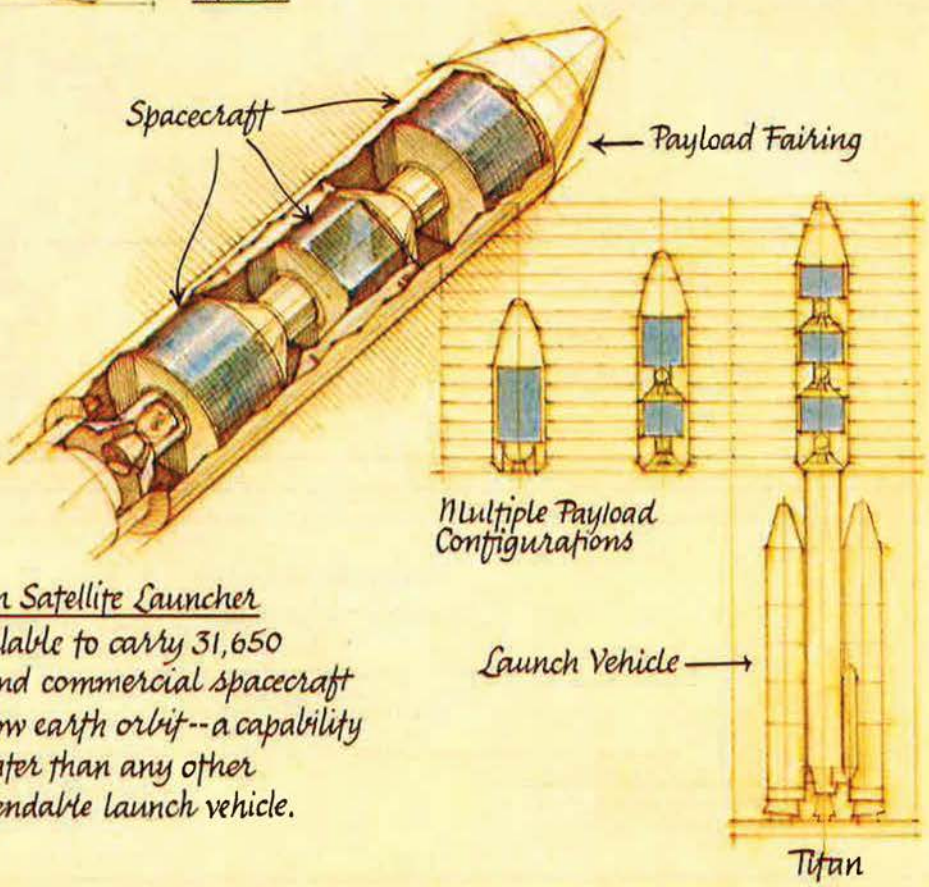


What's needed to generate advanced space and defense systems?

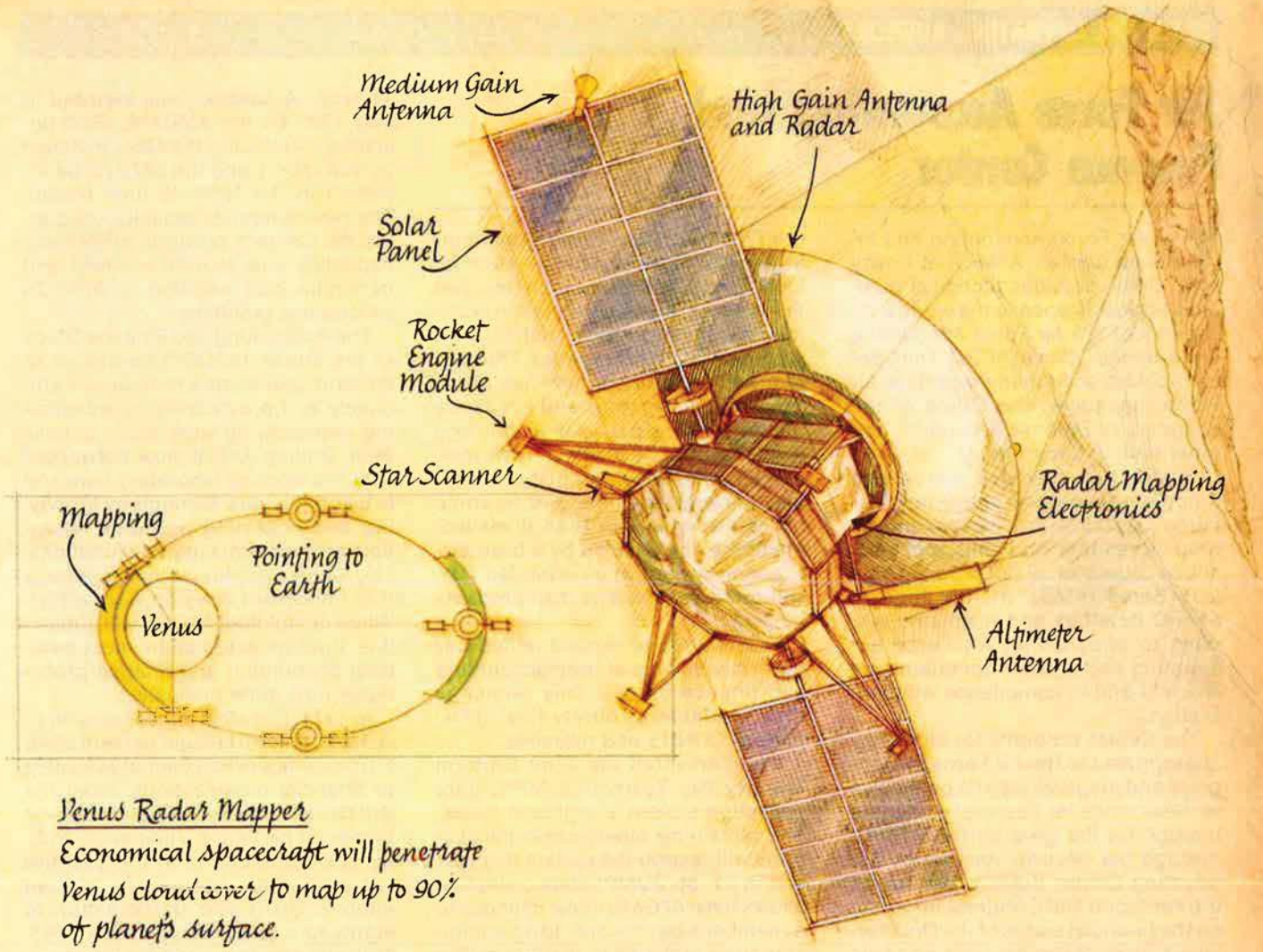
Generations of experience.



Vertical Launching System
Provides rapid fire launch capability for 61 missiles against air, surface and underwater targets.



Titan Satellite Launcher
Available to carry 31,650 pound commercial spacecraft to low earth orbit--a capability greater than any other expendable launch vehicle.



Venus Radar Mapper
Economical spacecraft will penetrate Venus cloud cover to map up to 90% of planet's surface.

Today's complex space and defense systems tax the resources of many organizations. Large systems developers are needed, with the generations of experience to marshal the many talents required for mission success.

Martin Marietta is a company with such capability. This capability is behind five generations of Titan space vehicles, the Pershing missile and many of this country's defensive weapons.

The same capability helps explain why we have participated in every major NASA program to explore the solar system, from building the Viking landers to developing key instruments for the Voyager spacecraft to Jupiter, Saturn, and beyond.

But organizational knowhow is only one reason these systems succeed. Their development and manufacture also require a formidable array of research and production technology.

Our technical staff is supported by 82 advanced research facilities, from vacuum chambers that simulate deep space to laboratories that model entire C^3 systems. These facilities are linked by a national computer network that can process two billion bytes of data a day. We're also using CAD/CAM techniques, automated testing programs, robotics, and computer controlled parts management and flow systems for volume manufacturing.

None of this came to pass overnight. Three decades of conceiving, designing, building and testing have led to these unique abilities. Abilities aimed at producing big systems that are affordable, producible and effective.

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Air Force Accounting and Finance Center

The Air Force Accounting and Finance Center (AFAFC) at Lowry AFB, Colo., provides technical guidance and assistance to the worldwide network of 125 Air Force Accounting and Finance Offices (AFOs). The Center provides accounting reports to Air Force managers, the Office of the Secretary of Defense, Congress, and other federal departments.

AFAFC also operates centralized functions to pay all active-duty Air Force personnel and reserve and retired personnel and bills, collects, and accounts for all DoD Foreign Military Sales (FMS). In this regard, AFAFC develops and maintains systems to ensure that Air Force accounting and finance operations are efficient and in compliance with legislation.

The Center accounts for all money appropriated to the Air Force by Congress and prepares reports on the use of these funds for financial managers throughout the government. AFAFC, through the Security Assistance Accounting Center (SAAC), also keeps the Pentagon and Congress informed on the financial status of the DoD Foreign Military Sales program and bills the countries to which sales are made.

In 1983, the Center's sixty-one officers, 159 enlisted people, and 2,100 civilians accounted for more than $10 billion, submitted more than 31,000 reports, and processed more than 7,000,000 disbursement and collection vouchers.

In 1983, the Accounting and Finance Center:

- Increased publicity about fund control requirements to increase awareness and management attention concerning AFR 177-16 (administrative control of appropriation) violations. An Air Force-wide briefing emphasized a commander's responsibilities for fund control. The Center also proposed a change to Title 31, United States Code, to allow agency heads to enforce certain AFR 177-16 violations without reporting such violations to the President and Congress. Under the proposal, only violations of appropriations, apportionments, or other statutory limits would be reported to the President and Congress.
- Finalized plans to start distributing military pay products—such as Leave and Earnings Statements, Net Pay Advices, and recertification statements—through base distribution systems for Stateside bases. This system was tested at twenty-five bases over the last two years and will save a million dollars per year in postage fees. It should be in effect by November. Experience shows that products are delivered on time and in some cases arrive sooner than if mailed. Members not serviced by a base distribution system, or on extended TDY, will continue to receive their products by mail.
- Continued to expand retired pay customer service at base accounting and finance offices. This service is now available at ninety-five AFOs, both in CONUS and overseas.
- Implemented the Joint Uniform Military Pay System (JUMPS) data collection system at eighteen bases. The remaining ninety-seven installations will receive the system this year and in FY '85. JUMPS data collection allows base AFOs to make changes to a member's pay record using a minicomputer in the finance office rather than through the base-level computer. The transaction turnaround time with the new system is one day, in most cases, instead of the previous five to seven days.
- Undertook a major effort to replace the Center's aging computer systems. A contract was awarded in July 1983 for the AMDAHL 5850 (installed in October), the 5860 (installed in November), and the 5870 (to be installed in the 1984–85 time frame). The new computer capacity will double the Center's previous processing capability and provide a timely and minimum cost solution to AFAFC's processing problems.

The Accounting and Finance Office of the Future (AFOOF) continues to develop procedures to increase efficiency and productivity in anticipating ever-growing work loads at base level. Bolling AFB is now networked with the working laboratory here and is using this new technology for paying and collecting accounts receivable and accounts payable functions. The Center continues to emphasize this important development effort. When completed, AFOOF will streamline, through automation, most base-level accounting and finance procedures now done manually.

In 1974, just after the conversion to JUMPS, only forty-eight percent of Air Force members had their checks sent to financial organizations under the SURE-PAY system. In 1978, there was fifty-eight percent participation. Public awareness efforts in the past five years created a twenty-nine percent jump in SURE-PAY participation to eighty-four percent in October 1983. This saves more than $5 million a year.

While continually looking for ways to improve efficiency, productivity, and service to its customers—Air Force people—AFAFC takes pride in providing today's Air Force with the best in modern financial management. ■

Kathy Salas of AFAFC's Directorate of Retired Pay, Lowry AFB, Colo., operates a Ragan machine. It photographs all incoming documents for computer storage.

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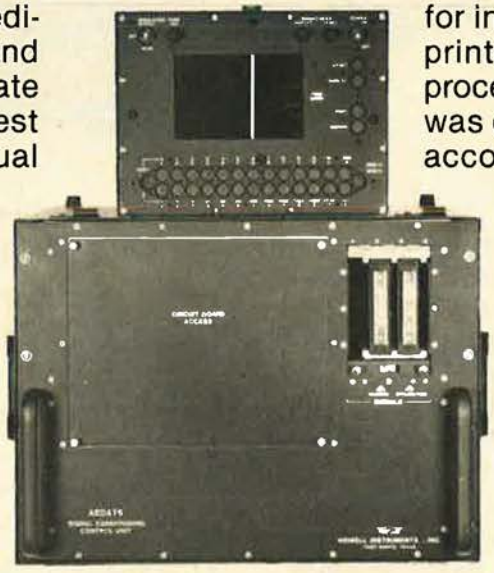

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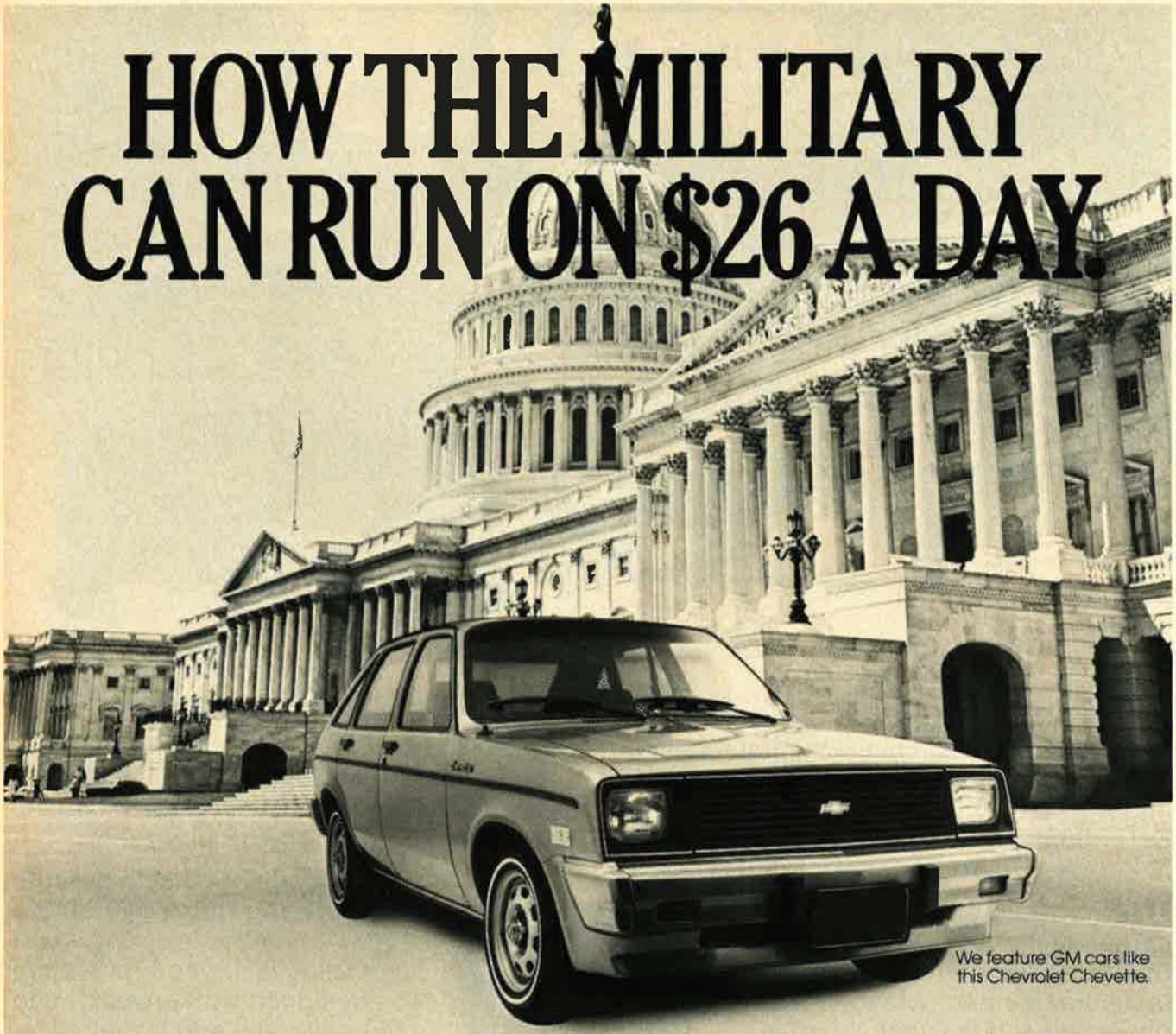

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Air Force Audit Agency

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.

Mr. J. H. Stolarow, the 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 the AFAA to be independent of the activities and functions it audits. (The Assistant Secretary of the Air Force [Financial Management] provides technical guidance and supervision on audit policy and management matters.) Col. Robert D. Reid, the Deputy Auditor General, is principal assistant to the Auditor General and also serves as the Commander, AFAA. Colonel Reid is stationed in the Pentagon and acts for the Auditor General by performing those AFAA functions that cannot be economically performed by Agency personnel located outside the Pentagon.

The AFAA is comprised of two directorates (Operations and Resource Management), and the following three line directorates:

- The Acquisition and Logistics Directorate, located at Wright-Patterson AFB, Ohio, directs the development and management of audits relating to supply, maintenance, acquisitions, weapon systems, and base-level concerns.
- The Forces and Support Management Directorate, located at Norton AFB, Calif., directs the development and management of audits relating to personnel and training, comptroller, automatic data processing, force readiness, and other support functions.
- The Field Activities Directorate, also at Norton AFB, manages installation-level audit work at eighty area audit offices located at major Air Force installations worldwide. Supervision of the eighty offices is exercised through six geographic region offices located at Andrews AFB, Md. (Northern); Langley AFB, Va. (Southern); Offutt AFB, Neb. (Central); McClellan AFB, Calif. (Western); Hickam AFB, Hawaii (Pacific); and Ramstein AB, Germany (European).

The Agency has two basic procedures for reporting audit results to Air Force management.

Reports of audit containing the overall results of centrally directed audit efforts (audits performed concurrently at several locations) are addressed to top major command and Air Staff management levels. Sixty-three reports were issued in FY '83. Reports of audit containing results of installation-level audits are addressed to local commanders. More than 1,600 installation-level reports were issued in FY '83.

The Agency employs more than 1,000 people and has a civilian/military ratio of seventy-five to twenty-five percent. Ninety-seven percent of the auditors have at least one college degree; forty percent also have graduate degrees. Also, forty-two percent are certified public accountants, certified internal auditors, and information system auditors. ■

Air Force Commissary Service

The primary mission today of the Air Force Commissary Service (AFCOMS) is to provide subsistence support to all authorized personnel in peace and wartime. This means ensuring that there are skilled personnel who are available to order, receive, store, and issue subsistence items to food-service and other authorized users. Headquartered at Kelly AFB, Tex., AFCOMS manages 114 troop support operations around the world. Last year, these operations supplied subsistence supplies worth more than $142 million.

AFCOMS's most visible mission is the day-to-day operation of 140 commissary stores at Air Force installations in the US and abroad. Authorized commissary patrons spent more than $2.1 billion in the stores in Fiscal Year 1983. This represents forty-seven percent of Department of Defense commissary sales.

Air Force commissaries sell goods at cost, plus a five percent surcharge required by law to pay for equipment, supplies, and construction. According to market-basket surveys that compare prices in commissaries with those in nearby commercial stores, commissary patrons save an average of twenty-five percent. Other customer savings include $56 million from special sales and $19 million from cents-off coupons.

In 1983, AFCOMS established new programs, continued to improve the operations and management of commissaries and troop support functions, and pursued an active new store construction program. In some of the recent initiatives, AFCOMS:

- Completed "resetting" Air Force commissaries. Resets realign merchandise in stores from horizontal to vertical displays. This allows shoppers to scan merchandise quickly as they stand in one spot, getting them through the store faster. The same advantage allows managers to determine their shelf stock position rapidly and to control empty shelves better.
- Contracted with the National Cash Register Corp. to install scanning checkout and general-purpose automatic data-processing capability in virtually all Air Force commissaries within the next three years. Scanning will improve customer throughput and increase checkout accuracy. It will also allow managers to track their item movement and stock positions automatically.
- Opened two new commissaries at McGuire AFB, N. J., and Los Angeles AFS, Calif. The new stores have wider aisles, energy-saving features, more attractive decors, and floor plans that ensure customers the fastest, easiest shopping possible.
- Formed staff-assistance teams to help store managers resolve problems quickly. The teams travel from store to store, looking for potential problems and training workers.
- Established an Inspector General office to lead an aggressive store inspection program to keep on top of operational compliance, internal controls, and potential fraud, waste, and abuse.
- Trained "backup" cashiers in every store. AFCOMS patrons shouldn't have to wait more than fifteen minutes in any checkout line. If the wait is longer than that, managers now put in backups to run vacant registers.
- Opened Health Food Centers in commissaries. Patrons wanted a

more complete selection of foods with low salt and sugar content or that were recognized for their special nutritive value. AFCOMS built on the diet-food section and, working with the Air Force Surgeon General's Consumer Health Education Division, began identifying foods that would contribute to a "Healthy Heart."

AFCOMS continues to look for new and better ways to serve its patrons and save them more time and money. In 1984, the agency will open seven more new replacement commissaries, work to get better price breaks for patrons overseas, and look for new ways to use technology to increase productivity. ■

Air Force Engineering and Services Center

The Air Force Engineering and Services Center (AFESC), with headquarters at Tyndall AFB, Fla., has a dual role: One is recommending and developing programs in support of Air Force headquarters; the other is assisting all commands and installations in its role as a separate operating agency.

More than 450 highly qualified, carefully selected professionals help the Center focus on its worldwide mission of providing research, development, and guidance for engineering and services concerns in the areas of readiness, fire protection, facility energy, environmental planning, housing and services, civil and environmental engineering, research and development, and the overall operation and maintenance of Air Force installations.

By providing expertise with its headquarters staff and many traveling teams, the Center helps solve the problems of today while planning for 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.

Last year, AFESC headquarters and its traveling teams:

- Coordinated eighty-three deployments of emergency base engineer and base services teams to worldwide locations in support of training exercises, construction projects, and operational requirements.
- Culminated a two-year wartime manpower study to develop new base engineer mobile emergency force teams to meet fully the potential requirements for beddown construction, damage repair, and operations support.
- Completed a vulnerability assessment to identify shortfalls in energy supply, distribution, and generation for all Air Force installations.
- Finished an analysis to provide fire safety guidance for the C-5, C-141, and C-130; hot integrated combat turnarounds on the F-4, F-15, and F-16; hot refueling and fuel tank entry and cleaning procedures on the E-4; and service station operations on the T-37 and T-38.
- Initiated a program to tune up heating, ventilating, and air-conditioning systems at all Air Force installations—projecting a savings of $100 million.
- Began a project to redefine how civil engineering people complete their tasks to support the mission, aiming at more efficient management and more economical methods.
- Fielded a new testing system for airfield pavements, resulting in a more efficient, quicker method and cutting disruption of airfield operations from as much as three days to about one hour.
- Researched, developed, tested, and awarded contracts for the construction of two firefighting equipment items: a new, lightweight aircraft skin penetrator and agent applicator and a new, lightweight rescue and forcible entry tool that can be used in a flammable environment.
- Researched, developed, and tested a new portable field test kit for detecting PCB soil contamination that can be used by nontechnical people—cutting cost and time for each test from $40 and days or weeks awaiting results from a laboratory to $5 and thirty minutes on the spot.
- Finalized a program to fully automate permanent party quarters assignment records to streamline daily billeting operations on all bases.
- Monitored completion of a la carte systems at Air Force dining halls, bringing the total bases utilizing the new system to 111—with twenty-four more slated to begin a la carte service this year.
- Completed initial surveys in the hazardous waste program, bringing the total completed to seventy-three, with twenty-nine in progress and all 153 listed bases scheduled for completion or procurement by the end of the fiscal year.
- Began update of automated food-service systems to save up to $6 million per year through improved management and subsistence controls.
- Began constructing temporary lodging facilities at eighteen bases, at a cost of $27 million, with $5 million per year in further TLF construction scheduled for FY '84 through FY '88.

AFESC continually develops initiatives to improve the daily operation of the Air Force. ■

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. Gerald D. Larson commands AFISC and is also the Deputy Inspector General for Inspection and Safety, Hq. USAF.

AFISC has an assigned work force of 357 military and 137 civilian personnel, representing 111 Air Force specialties. It is divided into four directorates and three offices.

- The Directorate of Inspection determines operational readiness status within the major commands by monitoring their operational readiness inspection (ORI) reports and by conducting over-the-shoulder inspections of command inspector general teams during ORIs. The Directorate

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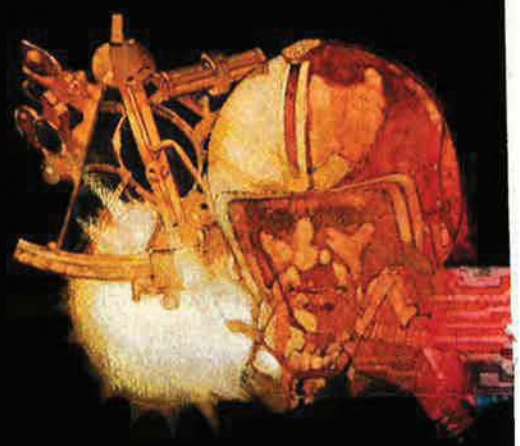

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also evaluates the effectiveness and efficiency of USAF management systems through functional management inspections (FMIs), system acquisition management inspections (SAMIs), and follow-up inspections.

• The Directorate of Aerospace Safety is the Air Force manager for flight, ground, missile, explosives, and system 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 total awareness and responsible actions of all Air Force personnel is reflected in the 1983 aircraft mishap rate. The Class A rate of 1.73 mishaps per 100,000 flying hours was the lowest in USAF history.

• The Directorate of Medical Inspection plans and conducts an Air Force and Air Reserve Forces medical inspection program to ensure efficient and effective management of health-care resources. At the direction of the Inspector General, a new rating system was developed and successfully implemented for both active-duty and reserve medical units.

• The Directorate of Nuclear Surety at Kirtland AFB, N. M., evaluates nuclear safety features and procedures for new or newly modified weapon systems. The Directorate also develops the safety rules that govern all operations with a particular weapon system. In conjunction with the Nuclear Weapon System Safety Group, the Directorate gained nuclear certification and published safety rules for the ground-launched cruise missile during 1983.

• The Office of the Assistant for Inquiries and Complaints processes cases referred to the Air Force Inspector General for resolution and has functional responsibility for operation of the IG Computerized Complaints Data Collection System. This office serves as the focal point within the Air Force for determining the releasability under the Freedom of Information/Privacy Act of Investigations and Inquiries conducted as the result of involvement by the Inspector General. An Inspector for Complaints Training Guide was developed and published during 1983. This pamphlet provides general guidelines on the IG complaint program and is primarily intended as a quick reference guide for newly assigned inspectors for complaints below major command level.

• The Office of Management Support manages manpower, personnel, budget, and administrative services for the Center and monitors major command and Air Force inspection schedules and activities.

• The Office of Data Automation provides the Commander and his staff with automated data processing and data systems support. ■

Air Force Intelligence Service

The mission of the Air Force Intelligence Service is to provide intelligence services and information to Hq. US Air Force and Air Force commanders worldwide.

The National Security Act of 1947, as amended, authorizes the Air Force to collect, evaluate, correlate, and disseminate departmental intelligence. Department of Defense directives call for the Air Force to provide an organization capable of furnishing adequate, timely, and reliable intelligence for Department of Defense use.

In 1971, the Secretary of the Air Force directed the realignment of Air Staff operating and support functions to other organizations. As a means of continuing the original intelligence mission, the Air Force Intelligence Service was established on June 27, 1972, as a separate operating agency headquartered in Washington, D. C., to provide specialized services to Hq. USAF and Air Force commanders.

Air Force Intelligence Service supports US Air Force planning and combat operations, responding to changing Air Force intelligence requirements. Its activities include:

• Operational Intelligence Directorate provides the Air Force with all-source intelligence affecting Air Force policies, resources, force deployment and employment, indications and warning, intelligence analysis of current operations, and special intelligence research. The Directorate provides experts on photo research and SIGINT evaluation and ensures that the Secretary of the Air Force, the Chief of Staff, and key Air Staff officers receive the timely and accurate intelligence necessary to assess critical situations during crises.

• Target Intelligence Directorate plans, coordinates, and exercises managerial control of target intelligence to include weaponeering, target analysis, force application, and missions planning; target materials; mapping, charting, and geodesy (MC&G); and program monitor on service support and MC&G to the Defense Mapping Agency.

• Security and Communications Management Directorate oversees the worldwide Air Force Special Security Office and Special Activities Office and ensures compliance with security policies that cover special intelligence and intelligence telecommunications.

• 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 more than 1,200 assigned and attached mobilization augmentees in support of active forces, peacetime requirements, and contingency mission requirements. The Directorate also develops, reviews, and revises programs, plans, and operations documents affecting the Air Force Intelligence Service's Intelligence Reserve program.

• Soviet Affairs Directorate conducts USAF's Soviet Awareness Program, consisting of the Soviet Military Thought and Studies in Communist Affairs books series, "Soviet Press Selected Translations" periodical, internal publications, the Soviet Military Power Week, Soviet Awareness Team, 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 (PW) matters to include PW archives. The Directorate serves as the action office for the Department of Defense for Code of Con-

duct (COC) training, manages the Code of Conduct library, manages the peacetime Hostage Survival Program, and in addition produces finished intelligence in support of combat survival.

• Special Studies Division provides all-source analysis, reporting, and intelligence production on foreign Concealment, Camouflage and Deception.

• 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.

Air Force Intelligence Service participates in a number of 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

Air Force Legal Services Center (AFLSC), with headquarters in Washington, D. C., provides Air Force-wide legal services in military justice, claims for and against the Air Force, tort litigation, general litigation, labor law, preventive law, and legal aid.

The Center also handles all Air Force patents, copyrights, and other property matters and is responsible for providing the trial officials for general or special courts-martial and for reviewing trial results. The joint-service Federal Legal Information Through Electronics organization is managed by the Legal Services Center.

Maj. Gen. Thomas B. Bruton serves in a dual role as the Commander of AFLSC in addition to his duties as the Judge Advocate General of the Air Force. About 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 AFLSC administer or manage a variety of military justice functions.

• Court of Military Review reviews all courts-martial resulting in dismissal, confinement of one year or more, or dishonorable/bad conduct discharges. Decisions made by the Court of Military Review are appealable to the US Court of Military Appeals. The Court of Military Review is located in Washington, D. C.

• Military Justice Division reviews those records of trial by general court-martial not required to be reviewed by the Court of Military Review. It advises the Judge Advocate General on petitions for new trial or for relief from conviction. The Division prepares regulations, manuals, and policy letters relating to the administration of military justice. A particular service is the preparation of responses to high-level inquiries concerning military justice matters.

• Defense Services Division provides defense services to Air Force members appearing before the Court of Military Review and the US Court of Military Appeals.

• Trial Judiciary Division oversees seven judiciary circuits and other subordinate districts throughout the world. The Chief Judge of each circuit is responsible for supervising the military judges and court administrators of that circuit. All Air Force judges are assigned to Air Force Legal Services Center to ensure independence from local commanders.

• Government Trial and Appellate Counsel Division represents USAF before the Air Force Court of Military Review and the US Court of Military Appeals. This Division also supervises the twenty-two full-time Circuit Trial Counsel who prosecute most general and some special courts-martial.

• Special Assistant for Clemency and Rehabilitation Matters recommends appropriate clemency actions including reduction in sentence, change in place of confinement, or substitution of administrative discharge for selected court-martial convictions. The Assistant responds to all congressional, executive, and individual correspondence dealing with confinement, clemency, and post-trial matters.

• Claims and Tort Litigation Staff performs both operational and management functions over claims and tort litigation arising from Air Force activities worldwide. It settles or recommends settlement of certain claims above the base-level authority and provides litigation support to the Department of Justice in defending Air Force tort suits.

• General Litigation Division protects Air Force interests in all domestic litigation except for copyright and patent cases and cases arising under the Federal Tort Claims Act. These actions are concentrated in five areas: information privacy and personal torts; personal matters (retirement, pay, and allowance rights of Air Force military and civilian personnel including individual or class discrimination); contracts (litigation brought by contractors for money damages, injunctions against award of contracts, bankruptcies, and collections of indebtedness to nonappropriated funds); general litigation (including environmental law litigation and actions under other federal and state laws, public utility matters, rate disputes, and civil rights litigation involving equal opportunity in off-base housing); and administrative labor law (provides attorney representation for management in unfair labor practices cases, discrimination complaints, Merit System Protection Board cases, labor arbitration, negotiability disputes, and other administrative labor law cases).

• Patents Division provides direction, control, and coordination of invention, patent copyright, trademark, trade secret, and rights in technical data matters for the Air Force.

• Preventive Law and Legal Aid Group supervises the worldwide Air Force preventive law and legal assistance program through which installation legal offices assist Air Force members with their legal affairs. In 1983, about 450,000 clients were advised in about 1,000,000 different personal civil matters. ■

The US Court of Military Appeals building, Washington, D. C., is "action central" for the Air Force Legal Services Center (AFLSC).

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Air Force Manpower and Personnel Center

The programs managed by the Air Force Manpower and Personnel Center (AFMPC) affect more than half a million Air Force men and women around the world. As stated in the Center's motto, "Responsive to the Mission—Sensitive to the People," the primary emphasis is on the mission—putting the right people in the right grades and skills at the right locations so that field commanders can accomplish their mission. That objective is primary, but the 2,100 officers, airmen, and civilian employees at the Center try to accommodate individual preferences and career goals while meeting the manpower needs of field commanders.

A separate operating agency located at Randolph AFB, Tex., AFMPC is commanded by Maj. Gen. Robert D. Springer, who also serves as the Assistant Deputy Chief of Staff for Manpower and Personnel for Military Personnel, Hq. USAF.

AFMPC is most often associated with assignments. In Fiscal 1983, more than 230,000 airmen and nearly 35,000 officers were reassigned using a proven concept that matches career goals and personal preferences with Air Force needs. But even before the initial assignment, AFMPC works closely with Air Force Recruiting Service and Air Training Command to acquire, classify, and train the numbers and types of people the Air Force needs.

Promotions are important to all Air Force people. Last year, the Center hosted sixteen selection boards for promotion of officers up to the grade of colonel and for promotions to senior and chief master sergeant. In addition, boards were conducted to select 635 officers for the Air Force Institute of Technology, 135 for Education With Industry, and more than 4,000 to attend professional military education (PME) in residence. Other boards at the Center identified individuals for special recognition, including the Twelve Outstanding Airmen of the Year.

AFMPC also administers the Weighted Airman Promotion System (WAPS) and the Stripes for Exceptional Performers (STEP) programs. In Fiscal 1983, more than 44,000 enlisted members received promotions under WAPS, and 453 were selected by commanders for STEP promotions.

But AFMPC handles more than assignments, promotions, and PME selections. Awards and decorations, physical fitness, dress and personal appearance, and the $127 million-saving Air Force Suggestion Program also fall within AFMPC's responsibility, as do the sensitive tasks of casualty notification, mortuary affairs, and survivor assistance. The Center handles all retirements and serves as the center for ongoing support of Air Force "alumni" through Retiree Activities Offices.

Personnel also means recreation, and AFMPC is the hub of all Air Force morale, welfare, and recreation activities, such as libraries, open messes, aero clubs, arts and crafts and recreation centers, child-care centers and preschools, and entertainment, sports, and youth programs. Major 1983 initiatives included physical fitness, open-mess enhancements, slot-machine installation in overseas locations, and expansion of outdoor recreation activities.

Programs to help those in need also fall under AFMPC's purview. Last year, Air Force members donated more than $5.75 million to help others through the Air Force Assistance Fund. And help they did, as 27,420 active and retired Air Force members received more than $11.6 million in emergency assistance through the Air Force Aid Society.

To help keep quality people, many compensation and retention initiatives were conceived or supported by AFMPC reports, surveys, and field visits. AFMPC conducted fifteen Air Force-wide surveys last year to help measure the needs and concerns of Air Force people. The Center also conducted numerous field visits, including Personnel Management Team visits to five Alaskan and seven CONUS locations, to take the pulse and alleviate the concerns of Air Force people.

During 1983, the Center's Social Actions staff revised and updated all base-level human relations and drug/alcohol education programs.

The entire personnel network is linked together by a worldwide computer system, providing current information on personnel actions twenty-four hours a day. Last year, AFMPC procured several new Honeywell mainframe computers to replace the existing equipment. The upgraded system also provides new computer hardware at major commands and SOAs, as well as more than 600 remote terminals throughout the Air Force personnel community.

AFMPC's mission is personnel with a capital "P." That broad emphasis assures that Air Force readiness and the needs of Air Force people continue to receive capital "P" priority. ■

Air Force Medical Service Center

The Air Force Medical Service Center (AFMSC) is a separate operating agency with headquarters at Brooks AFB, Tex. The Center was established July 1, 1978, and became operational on October 1 of that year. The AFMSC Commander also serves as the Deputy Surgeon General for Operations.

AFMSC assists the Air Force Surgeon General in developing policies and practices concerning routine and emergency health care in peace and war. The Center acts as the Air Force Surgeon General's agent in implementing policies, studies, and management and administrative research.

AFMSC has two directorates. The Health Care Support Directorate develops plans and procedures to ensure that needed medical facilities are available; that required medical supplies and material are provided; that patient affairs, including medical records and statistics, are properly managed; and that information management systems are developed and implemented.

The Professional Services Directorate is involved in programs associated with the practice of medicine in the Air Force including clinical, flight, and preventive medicine and professional specialties associated with these areas.

This Directorate is also responsible

for the USAF Radioisotope Committee, which coordinates all administrative and regulatory aspects of licensing, possession, use, storage, handling, and disposal of all radioactive material in the Air Force. This committee also acts as the Air Force point of contact with the United States Nuclear Regulatory Commission on licensing matters. Another function of this Directorate is to review all Air Force clinical investigations and human-use studies conducted in the medical service to ensure that they meet appropriate Air Force, Department of Defense, and other federal standards.

Within the Professional Service Directorate is the Consumer Health Education Division, which was relocated from Sheppard AFB, Tex., in February 1981. The Division works primarily in three areas of health education: community, outpatient, and inpatient.

AFMSC is directly involved on a daily basis with the Air Force Surgeon General, other Air Staff directorates, major commands, and other federal agencies. A continuing interchange is required as policy and practices for medical support are developed and implemented. ■

Air Force Office of Security Police

The Air Force Office of Security Police (AFOSP) at Kirtland AFB, N. M., was established as a separate operating agency on September 1, 1979. The Commander, Brig. Gen. P. Neal Scheidel, also serves as the Air Force Chief of Security Police and the Assistant Inspector General for Security Police. In these capacities, he is responsible to the Inspector General, USAF. A staff of thirty-six officers, twenty-five enlisted, and eighteen civilians is assigned to Kirtland; five officers and five civilians serve in the Pentagon for policy coordination and an additional forty-five people are part of the Air Force Security Clearance Office, an operating location in Washington, D. C.

AFOSP develops the operational policy, criteria, and standards for security of Air Force resources and classified information and monitors implementation. AFOSP implements Air Force IG-approved programs, including: the security of operational combat resources (aircraft, missiles, and nuclear and nonnuclear munitions); Presidential aircraft security; protection of vital C^3 facilities; air base ground defense; management of security police personnel and training; systems and equipment programs; information, personnel, industrial, and wartime information security programs; maintenance of law and order; prisoner rehabilitation and corrections programs; vehicle traffic management; and the military working dog program.

AFOSP accomplishments during the past year include the following achievements.

AFOSP continued an aggressive approach to the development of a ground defense program that will enhance air base survivability and contribute to sortie generation. Ground defense has been redesigned to implement the distributed-area defense doctrine while specialized equipment has been programmed and is presently being received. AFOSP is also in the process of developing with the US Army a joint doctrine for rear-area protection that will delineate the responsibilities of both services.

A1C Roberto Lopez, a security policeman at Griffiss AFB, N. Y., practices techniques to protect an "operational combat resource"—in this case, a B-52G—at the base. A security police Peacekeeper armored vehicle is at left. (Photo by William A. Ford, Art Director)

Another critical defense mission of the security police is the protection of the dispersed ground-launched cruise missile (GLCM). The first GLCM flight deployments are now under way. In addition, the Stinger missile, the Air Force's first ground-based air defense system manned by security police, is scheduled to be operational in 1984.

AFOSP sponsored the third annual Worldwide Security Police Combat Competition, "Peacekeeper Challenge," designed to test and evaluate security police in their wartime and peacetime tasks. The Royal Air Force Regiment, the US Army Military Police, Air National Guard, Air Force Reserve, and the MAJCOMs participated in the week-long competition.

The Office of Security Police also developed an Air Force Standard Security Police Automation System Functional Description document that lists all security police tasks that will be accomplished through automation. AFOSP also continued with the development of JANUS, the interactive conflict simulation graphics display software that will enable demonstration of combat scenarios at USAF installations worldwide.

AFOSP initiated a needed security education and training program with the publication of Air Force Pamphlet 205-13, "A Guide to Marking Classified Documents." The nondirective, informational publication contains samples of properly marked classified correspondence, illustrations, transparencies and slides, microforms, and other special categories of material. The pamphlet is primarily for use by security managers in their education program and by those persons who develop classified information or prepare the finished product. ■

Air Force Office of Special Investigations

The Air Force Office of Special Investigations (AFOSI), which celebrated its thirty-fifth anniversary on August 1, 1983, has the primary mission of providing major investigative services to Air Force commanders.

More than 2,600 AFOSI special agents, Reservists, and support personnel, stationed at almost every Air Force installation in the world, gather the facts that Air Force commanders need to take judicial or administrative action in cases of fraudulent or criminal activity.

Seasoned AFOSI special agents are specialists in forensic sciences, technical services, polygraph, fraud and criminal investigations, counterintelligence, antiterrorist operations, and personal protective services. AFOSI newcomers are highly qualified volunteers who attend a twelve-week basic course conducted at the US Air Force Special Investigations Academy at Bolling AFB, D. C., where AFOSI is headquartered.

Commanded by Brig. Gen. Richard S. Beyea, Jr., AFOSI aggressively pursues programs to identify potential fraudulent and criminal activity.

More than fifty-five percent of AFOSI efforts are devoted to criminal investigations, with the most frequent involving drug abuse. Others include investigations of crimes against the Air Force, its members, or their property that range from housebreaking to homicide. Agents use a variety of special investigative techniques, including polygraph tests, forensic hypnosis, and forensic science.

About thirty percent of AFOSI's activities deal with fraud. These violations of public trust involve Air Force contracting, appropriated and nonappropriated funds, computer system misuse, pay and allowance matters, acquiring and disposing of Air Force property, and major administrative irregularities.

Because of the potential for computer-related crimes in the Air Force, AFOSI is developing a new Computer Crime Investigative Assistance Program. AFOSI is also expanding methods of using computers as investigative tools.

As a result of AFOSI probes into fraudulent and criminal activities, the Air Force recouped $5.7 million in recoveries and fines during 1983. This included recovering $2.3 million in government supplies, equipment, and restitutions, and $3.4 million in fines resulting from judicial and nonjudicial actions.

The AFOSI counterintelligence mission is concerned with threats to the security of Air Force operations and human and materiel resources posed by foreign intelligence services and terrorist groups. AFOSI carries out this mission through an integrated program designed to detect, assess, and counterbalance the threats. These services include, for example, investigations of espionage and threat awareness briefings of Air Force people and operations to protect critical weapon systems technology from foreign acquisition or to provide personal protection to senior Air Force, DoD, and US officials in high-risk environments.

Terrorism is a primary concern of AFOSI in its counterintelligence mission. This threat has not lessened, nor is it expected to do so in the immediate future. AFOSI is USAF's clearinghouse for analysis and reporting of all terrorist information affecting Air Force interests throughout the world. Through various informational and analytical products, this service keeps Air Force commanders, security officials, and planners abreast of impending threats and the activities of terrorist groups that may be targeting USAF.

AFOSI is increasing its wartime readiness posture by participating in Joint Chiefs of Staff and major command exercises to ensure that its special agents are prepared to support combat commanders. This training paid off for the command during Operation Urgent Fury. Twenty-eight AFOSI members, agents, and administrative personnel provided counterintelligence support for Air Force elements deployed to Grenada.

AFOSI exists solely to serve Air Force commanders and better enable them to accomplish their assigned missions. ■

AFOSI Special Agent Ernie Charles, command marksmanship manager, demonstrates weapons-disarming technique to another AFOSI special agent during a weapons training course. AFOSI special agents are highly skilled with firearms and train extensively in their use.

Air Force Operational Test and Evaluation Center

The Air Force Operational Test and Evaluation Center is the Air Force independent test agency responsible for testing and evaluating, under operationally realistic conditions, new systems being developed for Air Force and multiservice use. The purpose of its testing is to ensure that the new equipment meets the users' requirements, that it will operate satisfactorily, and that it will be supportable under actual field conditions.

The Center is designated as a separate operating agency under Hq. USAF. 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 testing are used at all levels in the Air Force, the Department of Defense, and Congress in making program decisions leading to the production and fielding of the systems. The Center's efforts focus on providing assessments of the operational effectiveness and suitability of the Air Force's future weapons and supporting equipment, as well as identifying deficiencies requiring corrective action.

The Center is responsible for the entire Air Force operational test and evaluation program. It directly manages all major operational tests and monitors those smaller tests conducted by the using command.

Typical testing at the Center ranges from work with the Space Transportation System to testing of the next-generation base computer system. Current and recent tests involve the B-1, Peacekeeper, the F-15 and F-16, dual-role fighters, advanced medium-range air-to-air missile (AMRAAM), Maverick air-to-ground missile, air- and ground-launched cruise missile (ALCM and GLCM), TRI-TAC multiservice communication system, and the Consolidated Space Operations Center (CSOC).

The Center has approximately 450 people assigned to the headquarters at Kirtland AFB, N. M. The total number assigned full-time is 600, including those in the five detachments and two dozen test teams throughout the country and in Europe. Two-thirds are officers, and 100 enlisted and an equal number of civilians are assigned. Prime operating locations are at Eglin AFB, Fla.; Nellis AFB, Nev.; Edwards AFB, Calif.; and Colorado Springs, Colo.

Other commands supplement the test teams at the detachments and operating locations so that about 2,200 people are under the Center's operational control on any given day. Those additional 1,500 people are the ultimate users of a system as well as the maintainers, supporters, and trainers. They augment the test team to enhance realism and, therefore, improve the credibility of the operational test results. ■

Air Force Service Information and News Center

The Air Force Service Information and News Center (AFSINC) manages Air Force information programs, provides communications channels to reach Air Force people, and helps both the Air Force and the Army to communicate with the American public.

AFSINC's headquarters is at Kelly AFB, Tex. The Center also has three overseas broadcast squadrons and numerous operating locations and detachments worldwide. All of these make it possible for AFSINC to help commanders maintain a well-informed, ready, and highly motivated military force. The goal is to create widespread awareness and understanding of military missions, operations, goals, and heritage and the values defended on behalf of the nation.

The Center, responsible to the Department of the Air Force through the Director of Public Affairs for the Office of the Secretary of the Air Force, was activated June 1, 1978. It is commanded by Col. Donald Hilkemeier and has four directorates: Internal Information, Army and Air Force Hometown News, Air Force Broadcasting Service, and Administration and Resources.

- The Directorate of Internal Information produces printed and audiovisual materials to assist commanders

Army Sp4 Charlie A. Hayes edits a TV news spot. He works in AFSINC's Army and Air Force Hometown News Directorate, Kelly AFB, Tex.

in keeping Air Force military and civilian members and their families informed about Air Force, Department of Defense, and national policies, decisions, and actions.

Printed products include *Airman* magazine, the Air Force Policy Letter for Commanders, Air Force News Service for base newspapers, fact sheets on Air Force subjects, biographies of general officers, as well as Aerospace Speeches and Take-Home News for family communication. Audiovisual products include Air Force Now films, the lithograph series, and Air Force Weekly radio programs. The Directorate also monitors the Commander's Call program throughout the Air Force.

- The Army and Air Force Hometown News Directorate provides news of the achievements and activities of individual soldiers and airmen to their hometown newspapers and broadcast media. The Directorate also produces feature articles accompanied by photographs. Army television teams and an Air Force radio team produce broadcast interviews for their respective services. The Directorate was formed when the Air Force Hometown News Center, formerly at Tinker AFB, Okla., and the Army Hometown News Center, formerly at Kansas City, Mo., were merged at AFSINC headquarters in October 1980.
- The Air Force Broadcasting Service Directorate is responsible for directing the Air Force's Armed Forces Radio and Television Service overseas. The Directorate does this through its broadcast squadrons at Ramstein AB, Germany; Elmendorf AFB, Alaska; and Yokota AB, Japan. It provides information and entertainment through radio and television programs to Department of Defense personnel and their families in Turkey, Greece, Norway, Spain, the Middle East, the Azores, Alaska, Greenland, and the Pacific area. The Directorate also coordinates with DoD and other military departments on matters of joint interest and is the point of contact for Air Force activities seeking counsel on Armed Forces Radio and Television Service matters.
- The Directorate of Administration and Resources manages AFSINC's worldwide resources, including personnel, manpower, logistics, and a multimillion-dollar budget. The Directorate provides administrative, information processing, reprographic, and distribution services for AFSINC headquarters and budget and personnel management support for all AFSINC units. Reprographic and distribution services include reproducing the Center's information products through local base and commercial printing. These products, along with the material provided by DoD's American Forces Information Service, are distributed worldwide. In addition, the Directorate provides budgetary and administrative support for Air Force regional public affairs units in Chicago, Los Angeles, and New York City; the Air Force Orientation Group at Gentile AFS, Ohio; and the Air Force Office of Public Affairs-Youth Relations at Kelly AFB, Tex.

As of January 31, 1984, AFSINC was authorized 696 military and 179 civilian personnel for a total authorized strength of 875. ■

Air Reserve Personnel Center

The primary mission of the Air Reserve Personnel Center (ARPC), Denver, Colo., is mobilization—providing resources and maintaining administrative capability to effect call-up of sufficient Air Reserve Forces to assure Air Force combat capability in the event of national emergency. In support of this mission, the Center's 850 military and civilian personnel provide numerous personnel services as well as maintain the master personnel records on Air Force Reserve and Air National Guard members not on extended active duty.

Participation point accounting, reserve retirements, and administration of the reserve components' Survivor Benefit Plan are the basic services provided by ARPC to all of the nearly 250,000 participating Guard and Reserve members, regardless of the program. In addition, ARPC handles officer promotions from captain through lieutenant colonel for the Guard and captain through full colonel for the Reserve. In addition, ARPC also handles assignment assistance for Reservists.

ARPC has an even broader role with those reservists who serve as Individual Mobilization Augmentees, or IMAs. These reservists are individuals who are assigned in positions with the active Air Force or other government agencies.

If a mobilization were ordered, IMAs would report to these positions on a full-time basis. Because IMAs do not have a unit personnel office to handle base-level support, it is provided by ARPC. This operation, which services nearly 13,000 participating reservists, mostly by mail or telephone, is the largest base-level personnel office in the Air Force.

Another special operation within ARPC is the Single Manager program, which serves the special requirements of reserve medical personnel, attorneys and legal specialists, and chaplains.

In addition to the programs supporting the actively participating reservists, ARPC also maintains the master record and address data for nearly a quarter million inactive reservists. These individuals—many of whom have a remaining military service obligation—could, in a mobilization, be called to fill vacancies in active Air Force units.

This level of activity makes ARPC a busy place. More than 700,000 personnel actions are completed annually. To handle this work load, the Center depends heavily on computer, microform, and numerous other sophisticated procedures.

To notify reservists of mobilization rapidly, the Postal Service's E-COM computer-generated mailing system is used. To ensure rapid transfer of data between the active force and the reserves, the computerized personnel system used is the same as that of the active force.

As the role of the Air Reserve Forces grows under the Total Force policy, ARPC is continuing to seek ways to improve the responsiveness and efficiency of reserve personnel administration. One significant recent development was a cost-effective method of purchasing airline tickets for reservist travel for duty through a centrally located Scheduled Airline Ticket Office. This system saved an average of more than $200 per ticket, with total savings for the first year of operation exceeding $1 million.

On March 1, 1984, ARPC completed its third decade of service to the Guard, the Reserve, and the active Air Force. In recognition of this contribution and recent improvements in reserve records administration, the Center received the Air Force Outstanding Unit Award for progress over the years 1982 and 1983. ■

Air Force Reserve

"This past year has been an exciting and challenging one for the Air Force Reserve," according to Chief of Air Force Reserve and Commander of AFRES Maj. Gen. Sloan R. Gill. "We again proved that we can respond in times of national emergency without implementing a widespread call-up, as demonstrated in the Grenada and Lebanon situations.

"We also provided the day-to-day mission support the Air Force has come to expect from us and participated with our active-force counterparts in the many exercises and deployments throughout the world, such as Bright Star and Reforger. We accomplished these important missions and many more with only two basic resources—people and equipment. People, of course, are the key to our success. The dedication of all Reservists to their role of citizen-airman is truly commendable, and our enhanced readiness posture is the direct result of their efforts. On the equipment side, we have also made good progress. Our modernization program is on track and has allowed us to replace our older aircraft with newer models. We are now able to better accomplish our missions in the same aircraft that the active force flies."

The readiness of the command was demonstrated through productive training and "real-world" missions performed by Air Force Reservists.

Airlift capabilities focused on the command's involvement in the evacuation of American citizens from Grenada and support to US forces in Lebanon. An AFRES C-141 crew brought back the first American evacuees from Grenada to Charleston AFB, S. C. Other Reserve aircrews and augmentees flying with MAC crews assisted in completing the airlift of 622 US and eighty-seven foreign students from the troubled island nation. Although they were not given the sites of operations or the expected duration, every member who was contacted volunteered for immediate duty. (Reserve crews flew twenty strategic and four tactical airlift missions as well as eleven tanker sorties, totaling 329 flying hours in the combined effort.) Reservists also helped return US forces "home for the holidays" after hostilities in Grenada subsided. In the Lebanon operation, Reserve strategic airlifters flew six missions in support of the US Marines after the destruction of their Beirut headquarters, transporting supplies into and casualties out of the war-torn Mideast capital.

Overall, AFRES airlift units logged more than 145,000 flying hours in Fiscal Year 1983, air-dropping or air-landing some 528,000 personnel and nearly 147,000 tons of cargo. This included support of Army basic airborne training and rotations shared with the Air National Guard at Howard AFB, Panama, to meet US airlift requirements in Latin America.

Reserve airlift capabilities were also measured through major exercises such as Reforger, the annual deployment of US forces to West Germany; support for Operation Bright Star, US-Egyptian maneuvers; and Volant Rodeo, MAC's annual air-drop competition. And in SAREX, US and Canadian teams again competed to assess the effectiveness of search and rescue procedures.

In recognition of performance, several units received awards. Included was an aircrew from the 709th Military Airlift Squadron at Dover AFB, Del., who received both the Air Force Association's President's Award as AFRES flight crew of the year and the Lt. Gen. William H. Tunner Aircrew Award for the best overall aircrew in MAC. The crew received these awards for landing a C-5 Galaxy transport safely with seventy passengers on board after it was struck by a large flock of geese shortly after takeoff.

In addition, this month, Avco Lycoming Corp. and the Aviation/Space Writers Association presented the Annual Helicopter Heroism Award to a crew from the 302d Special Operations Squadron at Luke AFB, Ariz., for its lifesaving actions following the crash of a light aircraft in western Arizona early last year.

Noteworthy missions during the year included rescue and recovery and range support for the Space Shuttle program by crews from the 301st ARRS, Homestead AFB, Fla., and the 919th Special Operations Group, Eglin AFB, Fla.; the airlift of 220,000 pounds of disaster relief cargo to earthquake victims in Popayán, Colombia, by the 440th TAW, Gen. Billy Mitchell Field, Wis.; the evacuation of forty-eight Maricopa, Ariz., residents from flooded areas by four CH-3 helicopters from the 302d Special Operations Squadron at Luke; and mosquito eradication missions flown by C-123K crews of the 907th TAG, Rickenbacker ANGB, Ohio, who sprayed about one-third of Minnesota to help combat a western equine encephalitis public-health emergency.

The Reserve's four aerospace rescue and recovery squadrons flew 562 hours on eighty-six search missions in FY '83 that saved the lives of more than forty people. Flying WC-130s, the command's 815th Weather Reconnaissance Squadron "Storm Trackers" at Keesler AFB, Miss., spent nearly 680 flying hours in weather surveillance activities during the

The 419th Tactical Fighter Wing at Hill AFB, Utah, was the first AFRES unit to receive the F-16 Fighting Falcon and the last to fly the F-105.

AIR FORCE RESERVE FLYING WINGS AND ASSIGNED UNITS

Air Force	Wing Hq.	Group	Squadron	Type Aircraft	Location	Gaining Command
			302d SOS	CH-3E	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
			305th ARRS	HC-130H/N, HH-3E	Selfridge ANGB, Mich.	MAC
			301st ARRS	HC-130H/N, HH-3E	Homestead AFB, Fla.	MAC
Fourth Air Force			303d ARRS	HC-130H	March AFB, Calif.	MAC
			304th ARRS	UH-1N, HH-1H	Portland IAP, Ore.	MAC
(Hq. McClellan AFB, Calif.)	433d TAW		68th TAS	C-130B	Kelly AFB, Tex.	MAC
		901st TAG	731st TAS	C-130B	Peterson AFB, Colo.	MAC
Brig. Gen. Robert G. Mortensen, Commander		934th TAG	96th TAS	C-130A	Minneapolis-St. Paul IAP, Minn.*	MAC
	440th TAW		95th TAS	C-130A	Gen. Billy Mitchell Field, 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, Calif.	MAC
			313th MAS (Assoc)	C-141B	McChord AFB, Calif.	MAC
	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-16	Hill AFB, Utah	TAC
Tenth Air Force		507th TFG	465th TFS	F-4D	Tinker AFB, Okla.	TAC
(Hq. Bergstrom AFB, Tex.)	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
Maj. Gen. John E. Taylor, Jr., Commander	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
			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-4C	Homestead AFB, Fla.	TAC
		906th TFG	89th TFS	F-4D	Wright-Patterson AFB, Ohio	TAC
		932d AAG (Assoc)	73d AAS (Assoc)	C-9A	Scott AFB, Ill.	MAC
	94th TAW		700th TAS	C-130H	Dobbins AFB, Ga.*	MAC
		908th TAG	357th TAS	C-130E	Maxwell AFB, Ala.	MAC
		907th TAG	356th TAS	C-130A, C-123K[1]	Rickenbacker ANGB, Ohio	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
Fourteenth Air Force	439th TAW		337th TAS	C-130E	Westover AFB, Mass.*	MAC
		914th TAG	328th TAS	C-130A	Niagara Falls IAP, N. Y.*	MAC
(Hq. Dobbins AFB, Ga.)		911th TAG	758th TAS	C-130A	Greater Pittsburgh IAP, Pa.*	MAC
Brig. Gen. Alan G. Sharp, Commander	459th TAW		756th TAS	C-130E	Andrews AFB, Md.	MAC
		913th TAG	327th TAS	C-130E	Willow Grove ARF, Pa.*	MAC
		910th TAG	757th TAS	C-130B	Youngstown MAP, Ohio*	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)	SOG	Special Operations Group
AREFW (H)	Air Refueling Wing (Heavy)	TAW	Tactical Airlift Wing
ARF	Air Reserve Facility	TFW	Tactical Fighter Wing
ARFF	Air Reserve Forces Facility	WRS	Weather Reconnaissance Squadron
MAW (Assoc)	Military Airlift Wing (Associate)	*	Indicates AFRES base
RWRW	Rescue and Weather Reconnaissance Wing	1	AFRES will retain 4 C-123Ks for aerial spray mission

1983–84 storm season—the quietest in more than fifty years.

Reservists were also part of the first US Air Force-Coast Guard interservice cooperation in the war against drug smuggling in 1983. The 433d TAW from Kelly AFB, Tex., and the 927th TAG from Selfridge ANGB, Mich., assisted in two successful missions in support of the National Narcotics Border Interdiction System. In both incidents, unit C-130s operating on scheduled overwater training missions located courier ships that were subsequently seized by the Coast Guard, resulting in confiscation of some sixty-one tons of marijuana.

In training and direct support of SAC's global air refueling mission, AFRES KC-10 Associate and KC-135 crews logged more than 3,000 sorties in FY '83. Support included KC-135 augmentation of the European Tanker Task Force from RAF Mildenhall, UK. Contributing to SAC's deterrent capability, Reservists also stood alert duty alongside their active-force counterparts. With its headquarters at March AFB, Calif., the 452d Air Refueling Wing manages one of the Reserve's two KC-10 Associate squadrons and one KC-135 unit located there, a second KC-10 unit at Barksdale AFB, La., and two KC-135 air refueling groups at Grissom AFB, Ind., and Mather AFB, Calif. This wing was honored by AFA as the outstanding reserve flying wing for 1983. Vying with some fifty active and Air Reserve Forces tanker units, the wing also won the navigation trophy at SAC's 1983 bombing and navigation competition.

AFRES is also an integral partner in the tactical fighter community with seven percent of the USAF's tactical fighter strength. In FY '83, these fighter units flew more than 45,000 hours and some 31,500 sorties on varied training missions.

Under the short-term tactical deployment program, the 917th TFG at Barksdale AFB, La., deployed twelve A-10s to Ahlhorn AB, Germany, in June, and the 926th TFG at New Orleans NAS deployed twelve A-10s to Vandel, Denmark, in September to participate in joint NATO training. Nearly 3,200 hours on more than 2,500 employment sorties were recorded during both operations. An earlier deployment involved AFRES F-4s in joint operations in southern Europe during exercise Display Determination.

Ongoing participation by AFRES units in TAC's "Flag" series of exercises in Nevada provided vital lessons in air tactics, while the Tenth Air Force-sponsored fighter competition last May at Gulfport, Miss., and the Air Force's tactical gunnery and bombing competition last fall tested combat readiness of these AFRES fighter elements.

Reservists from a variety of combat-sustaining units also continued to train at home and abroad. The command's thirty-four Air Force Communications Command-gained units provided vital communications support, while six Air Force Logistics Command-gained combat logistics support squadrons trained in aircraft battle-damage repair, maintenance, supply, and transportation roles. AFRES weapon system security and law-enforcement personnel took part in numerous exercises, additionally furnishing day-to-day security for Air Force assets. To maintain readiness, Air Force Reservists took part in fifty-six joint-forces, gaining-command, and AFRES-sponsored exercises and several competitions during the past year, with various peacetime missions as by-products of this training. This past year also saw a continuing emphasis on providing AFRES crews with the latest available aircraft and equipment. This ongoing process has seen all of our units equipped with newer or more modern equipment since 1968.

The most visible changes were at Hill AFB, Utah, where in February the 419th Tactical Fighter Wing gained dual distinction as the last Air Force unit to fly and retire the F-105 while becoming the first AFRES unit to acquire F-16s.

Another fighter unit change saw the 442d Tactical Fighter Group at Richards-Gebaur AFB, Mo., become the 442d TFW with the 926th TFG at New Orleans, La., as a subordinate unit. Both units are equipped with A-10 Thunderbolt IIs.

And an A-10 training unit, the 46th Tactical Fighter Training Squadron, was activated at Barksdale AFB to train both Air National Guard and Air Force Reserve pilots in this close air support aircraft. A change in the airlift structure saw the 908th Tactical Airlift Group at Maxwell AFB, Ala., convert from C-7 to C-130E transport aircraft.

To match the alignment of special operations forces transferred from Tactical Air Command to the Military Airlift Command, management of AFRES special operations assets was transferred from Tenth Air Force to Fourth Air Force. These units flew more than 2,100 sorties in AC-130 and CH-3 aircraft during the year. Also, the 920th Weather Reconnaissance Group headquarters at Keesler AFB was deactivated and the 403d Rescue and Weather Reconnaissance Wing

Troops and cargo come home from Grenada aboard a C-141 aircraft of the Air Force Reserve's 315th Military Airlift Wing, Charleston AFB, S. C.

Reservist SSgt. Danny Wayne of the 402d Combat Logistics Support Squadron, Robins AFB, Ga., inspects aircraft damage during an exercise. Six Reserve CLSS units specialize in battle-damage repair.

headquarters moved to Keesler from Selfridge ANGB. The action paralleled changes in command and control of counterpart forces within MAC.

Seven new AFRES civil engineering squadrons were activated in calendar year 1983. These included Prime BEEF/RIBS elements at Charleston AFB, S. C.; Dover AFB, Del.; Luke AFB, Ariz.; McClellan AFB, Calif.; McGuire AFB, N. J.; Peterson AFB, Colo.; and Wright-Patterson AFB, Ohio. Also, existing units at McChord AFB, Wash., Selfridge ANGB, and Keesler AFB were expanded. Activation of up to twenty-five additional squadrons is proposed within the next five years.

Pursuing the Air Force goal of doubling Reserve medical manpower by 1986, AFRES activated the 12th USAF Contingency Hospital in October 1983. The 250-bed unit is headquartered at the USAF Medical Center, Travis AFB, Calif.; with detachments at Davis-Monthan AFB, Ariz.; Fairchild AFB, Wash.; and March and Mather AFBs, Calif. A similar unit, the 13th USAF Contingency Hospital, will activate this October. Headquartered at the USAF Medical Center, Scott AFB, Ill., the 13th will have detachments at Langley AFB, Va.; Little Rock AFB, Ark.; and Robins AFB, Ga.

A new role to train nonprior-service personnel was realized with activation of the 8050th Military Training Squadron at Lackland AFB, Tex. Also, the 8078th Electronic Security Squadron was activated at Offutt AFB, Neb., to support Strategic Air Command headquarters as the second AFRES defensive command control and communications countermeasures unit.

Other actions included redesignation of five aerial port flights to squadrons with an additional 350 positions added among these units.

In addition, six AFRES airlift control elements became fully certified and operational.

Several AFRES units will be affected by Air Force initiatives announced in early February. A major change assigns C-5A Galaxy transports to AFRES for the first time in a unit-equipped mode. This action is slated to begin in late 1985 as new C-5Bs are phased into the active Air Force inventory. In acquiring the C-5 mission, the 433d Tactical Airlift Wing, Kelly AFB, Tex., will become the 433d Military Airlift Wing. Some of its C-130Bs will transfer to a new unit, the 943d Tactical Airlift Group at March AFB. The 303d Aerospace Rescue and Recovery Squadron at March will then be deactivated. It will be redesignated the 303d Tactical Airlift Squadron under the 943d TAG. The HC-130Hs from the 303d ARRS will then be transferred to the 304th ARRS at Portland IAP, Ore. The other aircraft from Kelly will go to the 901st TAG at Peterson AFB, Colo., which will then become the 302d TAW. Another action adds two C-130Hs to the 700th TAS at Dobbins AFB, Ga., by late 1985. A new KC-10 Associate unit will be formed along with SAC's third KC-10 squadron at Seymour Johnson AFB, N. C.

People remain, however, the command's strength. All units, with the exception of those undergoing conversion or activating, are combat ready. This can only result from the dedication and competence of those personnel who are assigned to carry out the unit's missions. Additionally, the overwhelming success of Air Force Reserve crews in carrying out their day-to-day missions as well as in exercise participation and deployments attests to unit capabilities and the individual Reservist's competence and high morale.

Reserve recruiters, working from these strengths, again set a new mark for accessions that enabled the command to exceed its personnel end-strength goals for the sixth consecutive year. Projected manning for the end of FY '84 in the selected reserve manning category is an all-time high of 69,800. The day-to-day work force of nearly 7,700 Air Reserve Technicians (ARTs), some 4,000 non-ART civilians, and slightly more than 700 full-time military personnel continues to provide excellent support to the overall program.

AFRES field units continued to be directly managed by three numbered air forces: Fourth Air Force at McClellan AFB, Calif.; Tenth Air Force at Bergstrom AFB, Tex.; and Fourteenth Air Force at Dobbins AFB, Ga. Headquarters Air Force Reserve remains at Robins AFB.

The Air Force Reserve is truly a partner, in every sense of the word, with the active Air Force. At any given time Reservists can be found working side by side with their active-duty counterparts around the world. General Gill cites this sense of mission and responsibility as important keys to the success of the Reserve program.

"This continued strong support of the active force is important to us. Knowing that we have this support conveys a message to our people that their efforts and dedication are appreciated. With this confidence we can meet all the challenging and demanding tasks that lie ahead." ■

Air National Guard

With both a state and a federal mission, the Air National Guard (ANG) is unique among the world's reserve military air forces. This two-fold mission requires the Air Guard to provide trained and equipped units to augment the active force during times of crisis, national emergencies, or war, and also to provide a disciplined force to protect life and property during natural disasters, civil disorders, or other emergencies.

Air Guard units in a nonmobilized status are commanded by the governors of the fifty states, the Commonwealth of Puerto Rico, the Territories of the Virgin Islands and Guam, and the Commanding General for 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.

ANG units may be called to federal service by the President to enforce federal authority, suppress insurrection, or repel invasion. ANG units may also be ordered to active duty by Congress. During peacetime, all Air Guard units are assigned to "gaining" Air Force major commands. The major commands establish unit training standards, provide advisory assistance, and evaluate unit training, safety, and readiness programs.

More than 101,000 Guard people support a force of twenty-four wings, sixty-seven groups, ninety-one flying squadrons, and 241 independent mission support units. ANG flying units operate nineteen different types of aircraft.

ANG is modernizing its units consistent with Air Force requirements. As announced, the Louisiana Guard's 159th Tactical Fighter Group at New Orleans will, in 1985, be the first ANG unit to convert to the F-15 Eagle. In late 1986, the 149th TFG, Kelly AFB, Tex., will be the second Guard unit to convert to the F-16 Fighting Falcon. This year and in 1985 the 109th Tactical Airlift Group, Schenectady, N. Y., and the 166th TAG, Wilmington, Del., will convert to C-130Hs, which will enhance their ability to provide tactical airlift support. Additional KC-135 tankers are being modified with new JT3D-3B engines to provide increased operational and logistical capabilities.

Currently, ANG provides sixty-eight percent of the Air Force's fighter-interceptor force, fifty percent of the tactical reconnaissance force, thirty-three percent of the tactical air support, thirty-two percent of the tactical airlift, twenty-five percent of the tactical fighters, nineteen percent of the electronic combat capability, seventeen percent of the air refueling tankers, and fourteen percent of the rescue and recovery capability.

In addition, two ANG A-7, two RF-4C, ten C-130, and one EC-130 flying units are also members of the USCENTAF forces. Four Guard combat communications units and an air traffic control flight also support this mission.

During 1983, ANG units scored well in various competitions. Competing against active-duty, Guard, and Reserve units, the Kansas Guard's 190th Air Refueling Group at Topeka won the overall tanker award, the Saunders Trophy, during SAC's Bombing and Navigation Competition 83. At Photo Finish 83, a National Guard Bureau-sponsored tactical reconnaissance competition, Idaho's 124th Tactical Reconnaissance Group from Boise was named best overall unit in competition with USAF, ANG, US Navy and Naval Reserve, and US Marine Corps units.

In addition, the Ohio ANG's 121st Tactical Fighter Wing, Rickenbacker ANGB, took first place in the overall maintenance team competition during Gunsmoke 83. Also, the California Guard's 146th Tactical Airlift Wing, Van Nuys, placed first in the maximum-effort landing category during Volant Rodeo 83, MAC's tactical airdrop competition. In the Air Force Communications Command's 1983 E&I "Shootout," the 202d E&I Squadron, Georgia ANG, Macon, took first place over two active Air Force and three other Air Guard teams.

For thirty years, ANG has had an around-the-clock air defense alert mission and has participated in operational missions supporting the European Tanker Task Force in the UK. While continuing to support these missions, ANG also now supports the

Air National Guard will begin receiving F-15 Eagles next year when the 159th Tactical Fighter Group, Louisiana ANG, New Orleans, converts from F-4 Phantoms. ANG units now fly nineteen different aircraft types.

THE AIR NATIONAL GUARD BY MAJOR COMMAND ASSIGNMENT

(As of April 1, 1984)

STRATEGIC AIR COMMAND

KC-135 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	Gen. Billy Mitchell Field, 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.
189th Air Refueling Group	Little Rock AFB, Ark.
190th Air Refueling Group	Forbes Field, Kan.

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 NAS, 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.
172d Tactical Airlift Group	Jackson, Miss.
176th Tactical Airlift Group	Anchorage, Alaska
179th Tactical Airlift Group	Mansfield, Ohio

EC-130E

193d Special Operations Group	Harrisburg, Pa.

HC-130 Hercules/HH-3 Jolly Green Giant

106th Aerospace Rescue & Recovery Group	Suffolk Co. Airport, N. Y.
129th Aerospace Rescue & Recovery Group	Moffett NAS, Calif.

C-19A

105th Military Airlift Group	Stewart IAP, N. Y.

PACIFIC AIR FORCES

F-4C Phantom

154th Composite Group	Hickam AFB, Hawaii

TACTICAL AIR COMMAND

A-7D 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.

A-10 Thunderbolt II

128th Tactical Fighter Wing	Truax Field, Wis.
174th Tactical Fighter Wing	Syracuse, N. Y.
103d Tactical Fighter Group	Windsor Locks, Conn.
104th Tactical Fighter Group	Westfield, Mass.
175th Tactical Fighter Group	Baltimore, Md.

F-16 Fighting Falcon

169th Tactical Fighter Group	McEntire ANG Base, S. C.

OA-37B Dragonfly

110th Tactical Air Support Group	Battle Creek ANG Base, Mich.
111th Tactical Air Support Group	Willow Grove NAS, Pa.
182d Tactical Air Support Group	Peoria, Ill.

F-4C Phantom

122d Tactical Fighter Wing	Fort Wayne, Ind.
131st Tactical Fighter Wing	St. Louis, Mo.
149th Tactical Fighter Group	Kelly AFB, Tex.
159th Tactical Fighter Group	New Orleans NAS, La.
181st Tactical Fighter Group	Terre Haute, Ind.
188th Tactical Fighter Group	Fort Smith, Ark.

F-4D Phantom

108th Tactical Fighter Wing	McGuire AFB, N. J.
113th Tactical Fighter Wing	Andrews AFB, Md.
116th Tactical Fighter Wing	Dobbins AFB, Ga.
158th Tactical Fighter Group	Burlington, Vt.
163d Tactical Fighter Group	March AFB, Calif.
183d Tactical Fighter Group	Springfield, Ill.
184th Tactical Fighter Group**	McConnell AFB, Kan.
187th Tactical Fighter Group	Montgomery, Ala.

RF-4C Phantom

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.

AIR DEFENSE UNITS

F-106 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/D Phantom

144th Fighter Interceptor Wing	Fresno, Calif.
107th Fighter Interceptor Group	Niagara Falls, N. Y.
119th Fighter Interceptor Group	Fargo, N. D.
142d Fighter Interceptor Group	Portland, Ore.
147th Fighter Interceptor Group	Ellington AFB, Tex.*
148th Fighter Interceptor Group	Duluth, Minn.
191st Fighter Interceptor Group	Selfridge ANG Base, Mich.

*No longer a major active Air Force base.
**Replacement Training Unit (RTU).

Leadership trainees at ANG's Professional Military Education Center ponder a field problem requiring a quick, on-the-spot solution.

Alaska Tanker Task Force and the Pacific Tanker Task Force in Guam as well as tanker operations and airlift in CONUS.

ANG C-130s provide airlift support for the US Southern Command in Panama (Volant Oak) on a rotational basis, perform early warning and Arctic ice cap resupply missions, and aid the US Forest Service with modular airborne firefighting capabilities. All Air Guard A-7 units share a continuous rotational commitment in Panama, called Coronet Cove, which provides close air support in joint training programs with the US Army.

Engineering and services personnel continue to provide engineering, firefighting, and services available on short notice in support of wartime requirements. During peacetime training, Prime BEEF, "Red Horse," and Prime RIBS personnel are available to deploy and train in support of Air Force, ANG, and Army National Guard installations as well as to participate in JCS exercises and Rapid Runway Repair (RRR) formal training. A second ANG Red Horse squadron will be established during CY '84 at Camp Blanding, Fla., with a detachment of the squadron at Camp Pendleton, Va., which will provide self-sufficient, deployable engineering personnel for heavy repair and maintenance and beddown of forces worldwide. ANG services people (Prime RIBS) are organized to provide food service, billeting, and mortuary affairs support and are available for worldwide deployment.

There are more than 20,000 Air Guard people in 235 communications, electronic, and meteorological units. ANG E&I units provide fifty-five percent of the Air Force's electronic installation capability. They install, repair, and restore communication, navigational aids, and air traffic control equipment. ANG communications units provide seventy percent of USAF's capability in combat communications and tactical air traffic control services. Guard tactical control units constitute sixty percent of USAF's weapon systems control capability.

Thirty-nine ANG weather flights provide weather support to Army National Guard and Army Reserve divisions and brigades as well as to the USAF Tactical Weather System.

The ANG Medical Service is composed of ninety-one medical and nine tactical aeromedical evacuation units. These units train to provide augmentation to the active Air Force Medical Service during wartime and provide peacetime medical support during state emergencies, such as natural disasters. During FY '83, more than ninety percent of these units performed their annual training in USAF hospitals and clinics. Four units performed training in Europe, participating in medical readiness exercises under field conditions. Individual critical manning assistance, for a total of 1,482 man-days, was also provided to selected Air Force hospitals and clinics in the areas of anesthesiology, surgery, dentistry, optometry, obstetrics, gynecology, and radiology, as well as operating room nurses and enlisted medical specialists. The first four of twenty Mobile Aeromedical Staging Flights (MASF) were organized in FY '83. These ANG MASFs will provide care to patients just prior to their aeromedical evacuation.

Active Air Force, Guard, and Air Force Reserve members can get professional training at the I. G. Brown ANG Professional Military Education Center near Knoxville, Tenn., which is the Guard agency charged with conducting PME. The Center combines into one organization functions that have traditionally been separate activities.

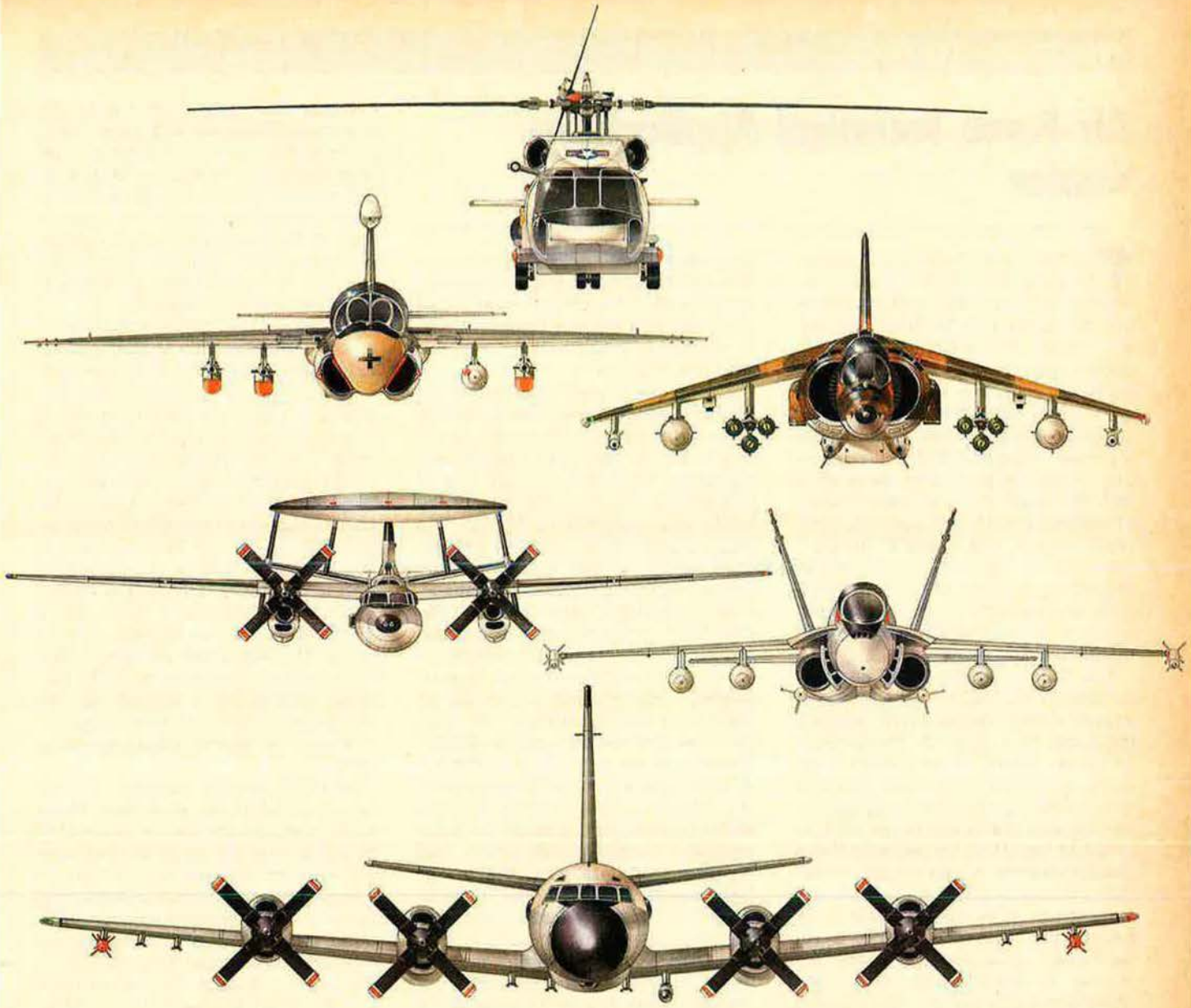
Noncommissioned officers can receive instruction in two special programs. The ANG Leadership School trains NCOs in grades E-4 and E-5. The course expands the individual's capacity in supervisory skills and works to develop confident, competent leadership. The school has graduated 1,337 airmen to date. The Noncommissioned Officers Academy (NCOA) provides a training environment that increases the NCOs' ability to function as a supervisor, communicator, resource manager, and professional leader. Nearly 6,100 men and women in the grades of technical sergeant and master sergeant have graduated from the NCOA thus far.

The Academy of Military Science (AMS) at the Center prepares qualified individuals for commissions in the Air National Guard. More than 3,700 students have become officers through AMS.

ANG is truly a community force of local families. Seventy-one percent of Air Guard men and women are married and have some 200,000 dependents. In concert with active Air Force emphasis on the family, local unit chaplains and other staff agencies are developing family support programs to provide better family stability when the unit is mobilized.

Since 1975, the Air National Guard has participated in overseas deployments, gaining realistic training in locations where the units may be called on to fight. Realistic training is also being accomplished through joint exercises in which the Air Guard has provided a majority of the combat communications and tactical control forces in addition to participation by flying units and their attached medical elements.

Deployments, exercises, and direct support to the Air Force on a day-to-day basis give Air National Guard people the constant training needed to maintain a high level of readiness at minimum expense to the American taxpayer. ■



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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). The AEDS is a worldwide system with operations in more than thirty-five countries. AFTAC efforts involve comprehensive research and development programs designed to increase understanding of the complex technical problems associated with the detection and identification of nuclear events in the atmosphere, underground, and in space. The Center provides inputs to DoD policies regarding nuclear arms-control issues and contributes to the nation's ability to monitor international agreements in these areas.

The concept of the AEDS originated after World War II in the minds of several senior government leaders, including Gen. Hoyt S. Vandenberg and Adm. Lewis Strauss, 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. 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 USAF became a separate service, and it proved its value when an AFTAC sensor aboard a B-29 aircraft flying between Alaska and Japan detected debris from the first Russian atomic test in September 1949. The detection was even more noteworthy taking into consideration that most experts had predicted that the first Russian atomic test would not occur until the 1951–53 time frame.

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 of the treaty was assigned to AFTAC. The treaty prohibited the signatory states from testing nuclear weapons in the atmosphere, underwater, or in space. It also prohibited vented nuclear debris from underground tests from crossing international boundaries.

To accomplish its mission, approximately 1,380 men and women are assigned to AFTAC to operate and maintain the worldwide system. AFTAC Headquarters is located at Patrick AFB in Florida. Personnel assigned to the Headquarters perform normal staff functions and provide for management, technical evaluation, and reporting of data. Located in the Headquarters, the Satellite, Electromagnetic Pulse, Hydroacoustic, and Seismic Data Terminals receive real-time data twenty-four hours per day. These terminals are responsible for the initial detection and identification of nuclear events occurring anywhere in the world. The data terminals have 130 officers and airmen assigned to accomplish the initial-detection and data-collection mission.

Additionally, there is a division located at McClellan AFB, Calif., two squadrons (Wheeler AFB, Hawaii, and Lindsey AS, Germany), nineteen detachments, six operating locations, and more than fifty equipment locations around the globe. The squadrons in Germany and Hawaii provide administrative, logistic, and other support to subordinate activities in their areas of responsibility.

The role of the division in California is more complex. The McClellan AFB unit supports a Central Laboratory, an air-sampling operation, and operates a Logistics Depot providing specialized support for the AEDS network. The Central Laboratory is a scientific analytical facility employing a large variety of modern instrumentation in support of the AEDS mission. Because much of AFTAC's equipment and instrumentation is applicable only to the AEDS mission, the AFTAC depot at McClellan AFB, Calif., fills a distribution function for these unique items. The depot has the responsibility to preposition assets for AEDS systems, provide parts support for the depot-level maintenance program, and provide normal base-level support.

AFTAC's people possess a wide range of technical expertise. Many hold graduate degrees in chemistry, physics, nuclear engineering, and electronics engineering. Complementing this impressive scientific capability is an experienced and talented operational force supported by a skilled, handpicked group of technicians. According to the Commander, Col. Robert A. Meisenheimer, "AFTAC personnel represent the absolute finest and most professional people in the military today. They are completely dedicated to their job; they do that job in a superior manner, and I am extremely proud of them." ■

USAF Historical Research Center

The USAF Historical Research Center (USAFHRC) is the repository for Air Force historical documents. The Center's collection, begun in Washington during World War II, was moved in 1949 to Maxwell AFB, Ala. It consists today of more than 45,000,000 pages of material pertaining to the history of the service and represents the largest and most valuable organized collection of documents on US military aviation anywhere in the world.

Established on July 1, 1979, as a direct reporting unit, the Center is collocated with the Air University 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 microfilm copies deposited at the National Archives and Record Service, Washington, D. C., and at 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 com-

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mand documents, aircraft record cards, and materials from the US Army, British Air Ministry, and the German Air Force. The Center also houses the personal papers of key retired Air Force leaders and a substantial collection of oral history interviews. About 6,000 documents and collections of all types are accessioned annually.

In 1980, the Center adopted automatic data processing as a finding aid and began 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 1986 through remote terminals throughout the Air Force.

Materials at the Center are used for professional military education, research by civilian scholars, and, most importantly, to develop and support Air Force doctrine, plans, programs, policies, and current operations. Information obtained from Center records is used by commanders and staffs throughout the Air Force, as well as for orientation programs, public information releases, unit reunions, Air Force responses to inquiries from Congress and other government agencies, research papers, books, television and movie scripts, and many other products.

The Center is organized into four divisions:

- **Reference** maintains documents and microfilm, answers inquiries about holdings, produces bibliographies, and provides other services to users.
- **Research** writes books and papers, prepares lineage and honors of Air Force units, maintains records of Air Force organizations, determines aerial victory credits, and performs other research and teaching services.
- **Oral History** conducts oral history interviews, monitors the USAF end-of-tour report program, and collects personal papers.
- **Technical Services** accessions, catalogs, and indexes documents; conducts automatic data processing and microfilming for the Center; and coordinates IRIS applications for the Air Force history program.

On December 1, 1983, the Albert F. Simpson Historical Research Center, located at Maxwell AFB, Ala., was redesignated the United States Air Force Historical Research Center. The redesignation occurred because of the Air Force's desire to emphasize the worldwide Air Force commitment of the Center and its staff. The facility name will remain unchanged, honoring the memory of the first Air Force historian, Dr. Albert F. Simpson. ■

United States Air Force Academy

The tightly woven military, academic, and physical training program at the Air Force Academy is designed toward one goal: to develop career officers and leaders.

Some 12,000 young men and women seek entry into the Academy each year, with about 1,500 gaining appointment. These selectees are intelligent, aggressive, and accustomed to winning. Ninety percent rank in the top twenty-five percent of their high school classes, and eighty percent have earned high school athletic letters. They are people who can successfully complete the Academy's programs and who contribute to our effort to make a good Air Force better.

Cadets at the Academy are involved in one of the finest academic programs in the nation. The program allows cadets to acquire a broad education in basic and engineering sciences, social sciences, and humanities. Cadets can select from twenty-four academic majors, and more than half select science and engineering.

Military studies are central to the Academy experience and distinguish it from other institutions of higher learning. Following Cadet Basic Training, new cadets enter the Cadet Wing and receive a four-year balanced program. All cadets graduate with a Bachelor of Science degree. Part of their military training includes parachuting, sailplaning, T-43 navigation training, and T-41 pilot orientation. The Academy's goal is for seventy percent of each graduating class to be pilot-qualified.

The cadet's athletic programs stress physical fitness, intercollegiate excellence, and leadership development in a competitive environment. All cadets participate in intramural or intercollegiate athletics. The Falcon football team, part of the Western Athletic Conference, has given football fans many memorable moments. The Falcons earned the Commander in Chief's trophy in 1982 and 1983 with wins over Army and Navy. Two consecutive wins over Notre Dame and postseason bowl victories in successive years over Vanderbilt and Ol' Miss in 1982–83 added to the team's accomplishments. The Falcons had a season record of ten wins and two losses in 1983, setting a team record with eight straight wins, and finished the season ranked thirteenth in the nation. Academy athletic teams have won more than sixty percent of their contests throughout their history.

The Air Force Academy's Falcons score again. The team beat Army, Navy, Notre Dame, and Ol' Miss last season.

Accolades are common for Academy graduates. Capt. Lance P. Sijan, Class of 1965, received the Medal of Honor posthumously for his heroism during the Vietnam War. Sixteen graduates have received the Air Force Cross, 199 earned the Silver Star, and 123 the Legion of Merit. Several graduates are serving in the Air Force in the rank of brigadier general or higher.

To date, 16,607 cadets have graduated from the Academy—365 of them women. Two graduates are combat aces, four are in the astronaut program, and four others are part of the Space Shuttle program. Col. Karol Bobko, Class of '59, piloted the Space Shuttle *Challenger* during its maiden flight in April 1983. Twenty-six cadets have been selected as Rhodes Scholars, and 208 cadets have received athletic All-American recognition with 437 other individual awards.

A total of 10,333 graduates commissioned in the Air Force through the Academy have entered pilot training, 1,016 entered navigator training, 310 went to medical school, and 326 entered helicopter training.

The Academy is dedicated to producing the highest quality Air Force officers possible—the leaders of tomorrow. They will lead the Air Force toward new horizons within the earth's atmosphere and beyond. ■

SCIENCE/SCOPE

A prototype electronic map developed for the U.S. Air Force makes map reading as simple as pushing a button. The Airborne Electronic Terrain Map System stores digitized terrain data to provide a moving, color-coded computer map of the area over which an aircraft is flying. The map can be projected on standard color or black-and-white cockpit displays or on the head-up display. Like paper charts, the Hughes Aircraft Company map can show the aircraft's actual postion or be "unfolded" electronically to let the pilot look ahead. It can be presented in a shaded relief plan view, much like a standard paper chart, or in a perspective view as though the pilot were looking at terrain ahead of the aircraft. Tactical symbols can be added to reduce clutter and improve display readability.

Technical planning to fit AMRAAM on Britain's top combat aircraft has begun. Hughes is helping British Aerospace PLC integrate the Advanced Medium-Range Air-to-Air Missile with the Royal Air Force's air defense version of the Tornado fighter and the Royal Navy's Sea Harrier jump jet. Work involves physically, aerodynamically, and electronically mating the missile with the aircraft so that all radar, target tracking, and launching systems are compatible. The missile is in full-scale engineering development by Hughes for the U.S. Air Force and Navy.

Heat pictures are screening printed circuit boards for such defects as open or short circuits and failed components. The Automatic Infrared Test & Inspection System (AITIS) uses a cooled, 60-element infrared detector to create a high-resolution thermogram. A computer isolates faults by comparing a tested board with a master thermogram stored in computer memory. Components that appear too warm or too cool are displayed in color-coded temperatures on a video monitor. As a complement to automatic test equipment, AITIS saves considerable time and costs. Hughes developed AITIS under its independent research and development programs and contracts with the U.S. Army Missile Command and U.S. Air Force.

A MIDAS touch will create the factory of the future at Hughes by introducing computer technology throughout one manufacturing division. The new Manufacturing Information Distribution and Acquisition System (MIDAS) is a flexible, high-speed data communication network. It will transmit and gather millions of bits of data per day by linking computer terminals, laser printers, bar code scanners, and other equipment. MIDAS will serve graphic workstations and facilitate paperless planning. Similarly, it will relay numerical-control programs from main computers to machines in the factory, eliminating the need for paper tape.

In its first guided launch, the U.S. Navy's new Maverick missile scored a direct hit on a destroyer target. The imaging infrared Maverick was launched from an A-7E Corsair light attack aircraft from medium altitude. The pilot locked the missile on the 390-foot destroyer at a range that would have been just beyond the ship's air defense perimeter. Hughes is developing the Navy Maverick by making minor modifications to the imaging infrared guidance of the U.S. Air Force version to optimize its antiship capabilities. The Navy Maverick uses the same 300-pound warhead developed for the laser-guided Maverick, in production at Hughes for the U.S. Marine Corps.

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, JANE'S ALL THE WORLD'S AIRCRAFT

Bombers

ATB

USAF's FY '85 Report states: "The Advanced Technology Bomber (ATB) will extend the essential advantages of manned bomber weapons delivery into the twenty-first century. . . . While most details of this program are highly classified, the essential point is that the ATB will be developed using low-observable (Stealth) techniques to negate present and projected Soviet air defenses. The technologies involved are exciting and promising, even though they are still in the early developmental stages and represent a technological advance with extraordinary military significance." The ATB is expected to have a flying-wing configuration. Northrop is prime contractor, and was reported to have received contracts worth $7.3 billion by the latter part of 1981. Boeing and Vought have been named as key members of the development team. Program start-up is stated officially to be progressing smoothly.

B-1B

This long-range high-subsonic derivative of the original B-1 is under development as USAF's next-generation multirole bomber. Three aircraft are being used in the test and evaluation program. The second of the original B-1 prototypes flew for the first time in its current modified form, embodying B-1B features, in March 1983, and is being used to evaluate weapons carriage and separation characteristics and to confirm flight control system modifications and flying qualities. B-1 prototype No. 4 will incorporate the remainder of the B-1B improvements and will be used for verification testing of the defensive and offensive avionics systems; flight testing is scheduled to begin in July. The first production B-1B is expected to fly at the end of this year. While smaller than the B-52, an operational B-1B will carry a considerably greater weapons load because of improved engine performance and advanced aerodynamic technology. Three weapons bays will provide 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 by the assigned mission, giving the B-1B the ability to attack imprecisely located and fixed targets.

The B-1B will be 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 sophisticated enemy defenses, it will have a terrain-following radar system that will allow it to follow "the nap of the earth" at near supersonic speeds. This ability will make it extremely difficult for enemy defensive radar systems to track the B-1B, as hills, mountains, towers, buildings, and even trees will clutter the radar screen. Flying low at high speeds also negates the effectiveness of enemy interceptors because it will be difficult to acquire and track B-1Bs flying close to the ground. This will 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.

Outwardly, the B-1B will be generally similar to the B-1 prototype No. 4, but will have structural strengthening to facilitate an increase in the gross takeoff weight from 395,000 lb to 477,000 lb. The variable-geometry wing of the B-1 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 will be used in supersonic flight and for the primary role of high-subsonic, low-level penetration. Major airframe improvements will include a strengthened landing gear; a movable bulkhead in the forward weapons bay to allow for the carriage of a wide range of different-sized weapons, including the ALCM; optional weapons bay fuel tanks to give extended range; and external stores stations beneath the fuselage to accommodate additional fuel or weapons. The use of radar-absorption materials will reduce further the aircraft's radar cross-section (the radar signature is already significantly less than that of the B-52). Ejection seats, which replaced the former crew ejection capsule in the fourth B-1 prototype, will be retained. The variable engine inlets of the original B-1 will be replaced by fixed inlets, and new engine nacelles and simplified overwing fairings are to be introduced. These modifications are designed to provide optimum performance for the new high-subsonic, low-altitude penetration role.

Rockwell B-1B prototype

Both offensive and defensive electronics systems are much improved over the B-1. 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 being 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. Of the total planned inventory of 100 B-1Bs, seventeen have already been procured and a request for a further 34 is included in the FY '85 budget proposals. The first B-1B is scheduled for delivery in December of this year, and the flight-test program will begin in early FY '85. Emphasis will be given to cruise missile integration activities. The first operational B-1Bs will be based at Dyess AFB, Tex., beginning in FY '85.

Contractor: Rockwell International, North American Aircraft Operations.
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); provisions for two instructors.
Dimensions: span spread 136 ft 8½ in, fully swept 78 ft 2½ in, length 147 ft, height 34 ft.
Weight: max operating weight 477,000 lb.
Performance: max speed at low level high subsonic (Mach 1.25 at altitude); range, unrefueled, approx 7,455 miles.
Armament: nuclear/non-nuclear, 125,000 lb.

Boeing B-52G Stratofortress

B-52 Stratofortress

Although nearing the end of its third decade of operational service, the B-52 Stratofortress still constitutes the

major piloted element of SAC. Retirement of the B-52D in FY '83 left 265 aircraft operational and capable of delivering a wide range of weapons, including conventional and nuclear bombs, air-launched cruise missiles, and nuclear-tipped air-to-surface short-range attack missiles. Apart from its primary strategic mission, the B-52 can be deployed in four conventional roles: show of force, area denial, precision strikes, and defense suppression. Other missions in recent years have included sea-surveillance flights in cooperation with the US Navy and support for NATO exercises.

The two versions still in service are the **B-52G,** which introduced important changes including a redesigned wing containing integral fuel tankage, fixed underwing tanks, a new tail fin of reduced height and broader chord, and a remotely controlled tail turret which allowed the gunner to be repositioned with the rest of the crew; deliveries began in February 1959 and 193 were built; and the **B-52H,** the final version, which switched to TF33 turbofan engines, giving an increased range of more than 10,000 miles, and which has improved defensive armament, including a Vulcan multibarrel tail gun; 102 were built, with deliveries starting in May 1961.

Since 1971, 281 B-52Gs and Hs have been modified to carry 20 AGM-69A Short-Range Attack Missiles (SRAM), six under each wing and eight in the bomb bay. Additionally, all Gs and Hs have been equipped with an AN/ASQ-151 Electro-optical Viewing System (EVS), using forward-looking infrared (FLIR) and low-light-level TV sensors to improve low-level flight capability. Under USAF improvement programs, begun in 1974, about 270 Gs and Hs are being progressively updated with Phase VI avionics. This includes ALQ-122 SNOE (Smart Noise Operation Equipment) countermeasures and AN/ALQ-155(V) advanced ECM; an AFSATCOM kit permitting worldwide communication via satellite; a Dalmo Victor ALR-46 digital radar warning receiver; Westinghouse ALQ-153 pulse-Doppler tail warning radar; and ITT Avionics ALQ-172 jammers. Boeing is also producing an Offensive Avionics System (OAS) to upgrade the navigation and weapons delivery of the B-52G/H during low-level penetration missions. This is a digital-based, solid-state system, and includes Tercom (terrain comparison) guidance. The first use of the OAS to launch a live SRAM occurred in June 1981; the program is scheduled for completion by FY '89.

Because of the long range and updated penetration capabilities of their aircraft, two B-52H wings of the 57th Air Division at Minot and Grand Forks AFBs, N. D., have been assigned to the Strategic Projection Force to support the Rapid Deployment Joint Task Force by employing airpower over great distances on short notice. However, with the continued improvement of Soviet defenses and the development of USAF's next-generation bombers, the future primary role of the B-52 will be as an ALCM (AGM-86) carrier. Full-scale development of the relevant equipment, as an integral part of the cruise-missile program, began in 1978. By the end of FY '84, USAF will have deployed AGM-86s on 90 on-line B-52Gs, each with 12 external cruise missiles. Starting in 1985, as B-1Bs enter service, USAF will modify its B-52Hs also to carry ALCMs, for service well into the 1990s. Requests for the modification of 27 aircraft feature in the FY '85 budget proposals, together with a request to further modify six B-52Hs to permit internal carriage of eight AGM-86s on a rotary launcher. Those B-52Gs not scheduled for use as cruise-missile carriers will replace the now-retired B-52Ds in conventional roles. The B-52G achieved a limited operational capability in October last year in support of naval antisurface warfare operations. Thirty B-52s are to be equipped for this role. At present, modified aircraft are based at Loring AFB, Me., for Atlantic operations; a number of Harpoon-capable B-52Gs will also be based at Andersen AFB, Guam, for Pacific operations. (Data for B-52G, except where noted.)

Contractor: Boeing Military Airplane Company.

Power Plant: eight Pratt & Whitney J57-P-43WB turbojet engines, each 13,750 lb thrust.

Accommodation: two pilots, side by side, plus navigator, radar-navigator, ECM operator, and tail gunner.

Dimensions: span 185 ft 0 in, length 160 ft 11 in, height 40 ft 8 in.

Weights: G/H models gross more than 488,000 lb.

Performance (approx): max level speed at high altitude 595 mph, service ceiling 55,000 ft, range more than 7,500 miles.

Armament: G model has four 0.50 caliber guns in tail turret; H model has 20-mm gun; up to 20 SRAM missiles can be carried on G/H models, plus nuclear free-fall bombs. G/H models are being adapted to carry 12 AGM-86B ALCMs externally, with internal provision for eight more on H model.

FB-111A

Capable of providing accurate, low-altitude weapons delivery at night and in poor weather, the **FB-111A** is a two-seat, medium-range, strategic bomber version of the swingwing F-111, developed originally to provide SAC with a replacement for early versions of the Stratofortress and supersonic B-58A Hustlers. The first of 76 production aircraft flew in July 1968, and the initial delivery was made in October 1969 to the 340th Bomb Group. Although the FB-111A is currently assigned to the nuclear mission, its conventional weapons capability could suit it to a tactical role when deployment of the ATB occurs. Consideration is being given to this possibility; but whichever role is selected, it is planned to operate FB-111s throughout the 1990s, and the FY '85 budget proposals include requests for several Class IV modifications including avionics modernization, engine work, and escape capsule modifications. Operational units equipped with a total of 56 FB-111As are the 380th and 509th Bomb Wings.

Contractor: General Dynamics Corporation.

Power Plant: two Pratt & Whitney TF30-P-7 turbofan engines; each 20,350 lb thrust with afterburning.

Accommodation: two, side-by-side.

Dimensions: span spread 70 ft 0 in, fully swept 33 ft 11 in, length 73 ft 6 in, height 17 ft 1.4 in.

Weight (approx): gross 100,000 lb.

Performance: max speed at 36,000 ft Mach 2.5, service ceiling more than 60,000 ft, range 4,100 miles with external fuel.

Armament: up to four AGM-69A SRAM air-to-surface missiles on external pylons, plus two in the weapons bay, or six nuclear bombs, or combinations of these weapons; provision for up to 31,500 lb of conventional bombs.

General Dynamics FB-111A

Fighters

F-4 Phantom II

Although the F-4 is being replaced by the F-15 and F-16 in active USAF units, many hundreds are still operational and are replacing older aircraft in reserve units. Designed in the mid-1950s, continuous updating has maintained the effectiveness of the F-4s, some of which are scheduled to receive a low-smoke engine modification and radar warning receiver update during the FY '85–89 tactical aircraft modification program. First version supplied to USAF was the **F-4C,** a two-seat twin-engine all-weather tactical fighter with J79-GE-15 turbojet engines, dual controls, an inertial navigation system, and boom flight refueling. F-4Cs still equip Air National Guard and Air Force Reserve units. The **F-4D** introduced major systems changes, including new weapon ranging and release computers to increase accuracy in air-to-air and air-to-surface weapon delivery. The **F-4E** is a multirole fighter capable of performing counterair, close-support, and interdiction missions. A 20-mm Vulcan multibarrel gun is fitted, together with an improved fire-control system and an additional fuselage fuel tank. Leading-edge slats, to improve maneuverability, were retrofitted to all USAF F-4Es. In addition, from early 1973, some were fitted with Northrop's target-identification system electro-optical (TISEO) as an aid to positive long-range visual identification of airborne or ground targets. System improvements include the Pave Tack system, which provides a day/night adverse weather capability to acquire, track, and designate ground targets for laser, infrared, and electro-optically guided weapons; the Pave Spike day tracking/laser ordnance designator pod, for use with "smart" weapons; and a digital intercept computer that includes launch computations for USAF AIM-9 and AIM-7 missiles. As this version is replaced by F-15s and F-16s in the active force, it will transfer to the ANG, replacing earlier C and D models. The **F-4G** "Advanced Wild Weasel" is a modified F-4E with electronic warfare equipment that enables it to detect, identify, and locate enemy radars and to direct against them weapons for their destruction or suppression. Primary armament includes Shrike (AGM-45) and Standard ARM (AGM-78), with optional availability of the CBU Rockeye area weapon for suppression purposes, and the AGM-65 Maverick. First F-4Gs entered service with 35th TFW at George AFB, Calif., in October 1978; and modification of 96 aircraft was completed by the beginning of 1981. Introduction of the AGM-88 HARM antiradiation missile in 1985 will increase the F-4G's lethality; accuracy will be enhanced when the precision location strike system (PLSS) is deployed. (Data for F-4E.)

Contractor: McDonnell Aircraft Company, Division of McDonnell Douglas Corporation.

Power Plant: two General Electric J79-GE-17A turbojets, each 17,900 lb thrust with afterburning.

Accommodation: pilot and weapon systems operator in tandem.

Dimensions: span 38 ft 7½ in, length 63 ft 0 in, height 16 ft 5½ in.

Weights: empty 30,328 lb, gross 61,795 lb.

McDonnell Douglas F-4G "Advanced Wild Weasel"

Performance: max speed at 40,000 ft Mach 2.0 class, range with typical tactical load 1,300 miles.

Armament: one 20-mm M-61A1 multibarrel gun; provision for up to four AIM-7E Sparrow, AGM-45A Shrike, or AIM-9 Sidewinder missiles on four underfuselage and four underwing mountings, or up to 16,000 lb external stores.

F-5E/F Tiger II

Developed as the successor to Northrop's F-5A export fighter, the Tiger II is intended primarily to provide America's allies with an uncomplicated air-superiority tactical fighter, which can be operated and maintained relatively inexpensively. The single-seat **F-5E,** first flown in August 1972, is basically a VFR day/night fighter with limited all-weather capability. Design emphasis is on maneuverability rather than high speed, notably through the use of maneuvering flaps. Well over a thousand F-5Es and two-seat **F-5Fs** have been delivered. TAC, assisted by ATC, trains pilots and technicians of user air forces. For this purpose, 20 F-5Es were supplied to USAF, beginning in April 1973, before deliveries to foreign governments began late that year. TAC also operates two "aggressor squadrons" of camouflaged F-5Es, simulating late-model MiG threat aircraft, in "Red Flag" exercises at Nellis AFB, Nev. Similar training is provided by F-5Es of the 527th Tactical Fighter Training Aggressor Squadron, USAFE, at RAF Alconbury, England; and by PACAF's 26th Tactical Fighter Training Squadron, located at Clark AB, Philippines. (Data for F-5E.)

Contractor: Northrop Corporation, Aircraft Division.

Power Plant: two General Electric J85-GE-21B turbojet engines; each 5,000 lb thrust with afterburning.

Accommodation: pilot only.

Dimensions: span 26 ft 8 in, length 47 ft 4¾ in, height 13 ft 4 in.

Weights: empty 9,723 lb, gross 24,722 lb.

Performance (at 13,350 lb): max level speed at 36,000 ft Mach 1.64, service ceiling 51,800 ft, range with max fuel, with reserve fuel for 20 min max endurance at S/L (with external tanks retained) 1,543 miles.

Armament: two AIM-9 Sidewinder missiles on wingtip launchers; two M-39A2 20-mm cannon in nose, with 280 rounds per gun (one 20-mm in F-5F); up to 7,000 lb of mixed ordnance on four underwing attachments and one underfuselage station. Optional armament and equipment includes AGM-65 Maverick, laser-guided bombs, centerline multiple ejector rack, and centerline-mounted 30-mm gun pod.

F-15 Eagle

Since the mid-1970s, the Eagle has replaced the F-4 progressively as USAF's primary air-superiority aircraft. The original single-seat **F-15A** and two-seat **F-15B** were followed from June 1979 by the **F-15C** and **F-15D** respectively, with 2,000 lb of additional internal fuel and provision for carrying conformal fuel tanks (CFTs). The CFTs can accommodate reconnaissance sensors, radar detection and jamming equipment, a laser designator, low-light-level TV and cameras, as well as fuel; 325 sets have been ordered to ensure optimum effectiveness of F-15s assigned to the Rapid Deployment Force. These aircraft can also be equipped with BRU-26A/A six-station bomb racks, permitting multiple bomb drops at supersonic speed. Standard F-15 equipment includes a Hughes Aircraft APG-63 lightweight X-band pulse-Doppler radar for long-range detection and tracking of small high-speed objects down to treetop level.

On February 24 of this year, USAF Chief of Staff Gen. Charles A. Gabriel announced his selection of the derivative **F-15E** as the service's new dual-role fighter for all-weather air-to-air and deep interdiction missions. It will be a two-seater with ability to carry up to 24,500 lb of ordnance, a weapon load comparable to that of the F-111. Internal fuel capacity will be unchanged, and equipment will include CFTs modified to carry ordnance tangentially to reduce drag. Some of the F-15E's new systems have already been funded as part of a $361 million multi-staged improvement program (MSIP) for all F-15s delivered from June 1985. These include a much improved APG-70 radar, a central computer and programmable armament control system, uprated EW system, and provisions for AMRAAM missiles. The current pilot's armament control panel will be replaced by a single multipurpose color video screen. For low-altitude, high-speed penetration and precision attack on tactical targets at night and in adverse weather, the F-15E will carry a LANTIRN (Low-Aititude Navigation and Targeting Infrared for Night) pod.

Planned production of all models of the F-15 (unchanged as a result of the F-15E selection) totals 1,356 aircraft for USAF, plus the original 20 R&D models, by the early 1990s. Orders to date total 792 for operational use by USAF, with 48 more requested in FY '85 and 60 proposed for FY '86. Units already equipped with Eagles include TAC's 57th FWW, 405th TTW, and 1st, 33d and 49th TFWs; USAFE's 32d TFS and 36th TFW; and PACAF's 18th TFW. First US air defense squadron to receive Eagles was the 48th FIS at Langley AFB, Va., followed by the 318th FIS at McChord AFB, Wash.; AAC's base at Elmendorf became operational in 1982 in support of air defense. Part of the F-15 FIS role at Langley and McChord will be an antisatellite mission, using the ALMV weapon described briefly on page 171.

Eight world time-to-height records were set by the specially prepared F-15 **Streak Eagle** in early 1975, of which six remain unbeaten, including climb to 20,000 m (65,616 ft) in 2 min 2.94 sec. (Data for F-15C.)

Contractor: McDonnell Aircraft Company, Division of McDonnell Douglas Corporation.

Power Plant: two Pratt & Whitney F100-PW-100 turbofan engines; each approx 23,930 lb thrust. Improved F100-PW-220 expected to be fitted in FY '85.

Accommodation: pilot only.

Dimensions: span 42 ft 9¾ in, length 63 ft 9 in, height 18 ft 5½ in.

Weights: empty 27,300 lb; gross 68,000 lb.

Performance: max speed Mach 2.5, combat ceiling 65,000 ft, ferry range, without external fuel tanks, more than 2,878 miles; with CFTs, more than 3,450 miles.

Armament: one internally mounted M-61A1 20-mm multibarrel cannon; four AIM-9L Sidewinder and four AIM-7F Sparrow air-to-air missiles, or eight AMRAAMS, carried externally. Provision for carrying up to 16,000 lb of ordnance on weapon stations.

F-16 Fighting Falcon

Advanced technologies incorporated in the F-16 Fighting Falcon make it one of the most maneuverable fighters ever built. The advances include: decreased structural weight through the use of composites; decreased drag resulting from reduced static stability margin; fly-by-wire flight controls with side stick force controller; high *g* tolerance/high visibility cockpit with a 30-degree reclined seat and single-piece bubble canopy; blended wing-body aerodynamics with forebody strakes; and automatically variable wing leading-edge flaps. The F-16 is powered by a single afterburning turbofan engine. All digital avionics are integrated through a digital multiplex system to reduce permanent wiring as well as to take advantage of the versatility of modern high-speed computers. Other equipment includes a multimode radar with clutter-free look-down capability, advanced radar warning receiver, a head-up display, internal chaff or flare dispensers, and a 500-round 20-mm internal gun. The aircraft also has provisions for ECM. To date, USAF has initiated procurement of 989 F-16s and advance buy of 150 additional F-16s under a multiyear contract for 120 aircraft per year through 1985. The total planned purchase of F-16s has been increased from the initial 1,388 to 2,651 to support USAF efforts to build toward a force structure that increases the number of tactical wings.

Northrop F-5E Tiger IIs

McDonnell Douglas F-15 Eagle

General Dynamics F-16 Fighting Falcon

The F-16 was developed to replace F-4 aircraft in the active force and to modernize the Air Reserve Forces. It entered operational service initially with TAC's 388th TFW at Hill AFB, Utah, in January 1979. By early 1984, USAF had a total of 827 F-16s in its inventory. Units then equipped were TAC's 56th and 58th TTWs, and 363d, 388th, and 474th TFWs; USAFE's 50th TFW at Hahn in West Germany, and 401st TFW at Torrejon, Spain; PACAF's 8th TFW at Kunsan AB, Korea; the 169th TFG at McEntire ANGB, S. C., the first ANG squadron with F-16s; and the 419th TFW at Hill AFB, the first AFRES unit to convert to F-16s, replacing F-105s. F-16s also equip USAF's Thunderbirds Air Demonstration Squadron. Nearly 1,000 more have been delivered to, and ordered for, the air forces of Belgium, Denmark, Egypt, Israel, South Korea, Netherlands, Norway, Pakistan, Turkey, and Venezuela.

A forward-looking plan for the F-16, known as the Multinational Staged Improvement Program (MSIP), was implemented by USAF in February 1980. This assures the aircraft's capability to accept future systems now under

development, thereby minimizing retrofit costs. As a first stage, all F-16s delivered since November 1981 have built-in structural and wiring provisions and systems architecture that will expand the single-seater's multirole flexibility to perform precision strike, night attack, and beyond-visual-range interception missions. Future systems improvements will include installation of AMRAAM air-to-air missiles, LANTIRN nav/attack system, and the airborne self-protection jammer (ASPJ) now under development. Initial operational capability is scheduled for December of this year under the designations **F-16C** (single-seat) and **F-16D** (two-seat). A sophisticated research version, **AFTI F-16,** is being used to test and evaluate advanced flight control systems at Edwards AFB.

In late 1980, General Dynamics initiated company-sponsored development of a new version of the F-16, designated **F-16XL,** to enhance its air-to-surface capabilities while still maintaining air-superiority characteristics. The major difference between the F-16XL and the basic F-16 is its significantly enhanced aerodynamic configuration, with a unique "cranked arrow" wing planform, which allows improved range, military load, penetration speed, and maneuverability. Flight demonstration testing of the first (single-seat) prototype started in July 1982, followed by the first flight of a second (two-seat) prototype in October 1982. Although the F-15E was selected to meet USAF's dual-role fighter requirement, Air Force evaluation of the F-16XL will continue as a future advanced version of the Fighting Falcon. (Data for F-16A.)

Contractor: General Dynamics Corporation.

Power Plant: one Pratt & Whitney F100-PW-200(3) turbofan engine; approximately 25,000 lb thrust with afterburning. General Electric F110 augmented turbofan expected to be fitted to F-16s built for USAF in FY '85.

Accommodation: pilot only.

Dimensions: span over missiles 32 ft 10 in, length overall 49 ft 5.9 in, height 16 ft 8½ in.

Weights: empty 15,586 lb; gross with external loads 35,400 lb.

Performance: max speed Mach 2 class, service ceiling more than 50,000 ft, ferry range more than 2,000 miles.

Armament: one M-61A1 20-mm multibarrel cannon, with 500 rounds, mounted in fuselage; externally mounted infrared missiles; seven other external stores stations for fuel tanks and air-to-air and air-to-surface munitions.

Convair F-106A Delta Dart

General Dynamics F-111

ATF

Seven aerospace companies (Boeing, General Dynamics, Grumman, Lockheed-California, McDonnell Douglas, Northrop, and Rockwell) have been awarded contracts for conceptual designs of the Advanced Tactical Fighter (ATF) to be presented to AFSC's Aeronautical Systems Division in the first half of this year. The ATF will be primarily an air-superiority aircraft but will also have an air-to-surface capability. Technologies of special importance include use of composites and advanced metallic materials, advanced cockpit automation, integrated fire and flight controls, advanced radars and sensors, vectored thrust, built-in test and support equipment, and low observability. Requested FY '85 funding of $94.3 million will support efforts leading to full-scale engineering development in FY '89 and ATF initial operational capability by FY '95.

F-106 Delta Dart

The F-106 all-weather fighter was developed in the mid-1950s. Constant updating enabled USAF to maintain its effectiveness, but of the nine squadrons still serving with active Air Force and ANG units, two will have converted to F-15s and F-4s by the end of FY '84. The two production versions are the **F-106A** single-seat interceptor and the **F-106B,** a tandem two-seat dual-purpose combat trainer. (Data for F-106A.)

Contractor: Convair Division of General Dynamics.

Power Plant: one Pratt & Whitney J75-P-17 turbojet engine; 24,500 lb thrust with afterburning.

Accommodation: pilot only.

Dimensions: span 38 ft 3½ in, length 70 ft 8¾ in, height 20 ft 3⅓ in.

Weights (approx): empty 25,300 lb, gross 42,400 lb.

Performance (approx): max speed at 40,000 ft Mach 2.0, service ceiling 65,000 ft, range 1,200 miles.

Armament: one AIR-2A Genie unguided nuclear-warhead rocket; four AIM-4F/G Falcon air-to-air missiles carried internally; and a 20-mm cannon on most F-106As.

F-111

Four versions of this pioneer variable-geometry tactical fighter are currently in service with USAF. Initial **F-111A** aircraft, delivered to a training unit in July 1967, were development models. Deliveries of production aircraft to the first operational wing began in October 1967. A total of 141 production F-111As was built; this version served with distinction in SEA in 1972–73 and currently equips the 366th TFW. The A was superseded in production by the **F-111E,** a version with modified air intakes that improved engine performance above Mach 2.2. Ninety-four were built, and most of these serve with the 20th TFW, based at RAF Upper Heyford in the UK, in support of NATO. The replacement of current analog bombing and navigation systems with digital equipment is planned for 1987. This will enable F-111A/E aircraft to handle modern guided munitions and advanced sensors as well as future systems, such as Global Positioning System (GPS) and JTIDS. The **F-111D** was designed with advanced avionics, offering improvements in navigation and air-to-air weapon delivery. Ninety-six were built and equip the 27th TFW at Cannon AFB, N. M. The **F-111F,** of which 106 were built, has uprated turbofans. Equipping the 48th TFW at RAF Lakenheath, this version is now modified to carry in its weapons bay the Pave Tack system, which provides a day/night capability to acquire, track, and designate ground targets for laser, infrared, and electro-optically guided weapons.

Production of the F-111 was completed in 1976. Its EW capabilities are being updated with the ALQ-131 ECM pod system. In addition, French Durandal parachute-retarded, rocket-boosted, runway attack bombs are being introduced into TAC's inventory during 1984 to equip F-111s, which are each capable of carrying up to twelve bombs and delivering them at low altitudes and high speed. The **EF-111A** is an ECM conversion of the F-111A *(see page 162);* SAC has a strategic bomber version, designated **FB-111A** *(see page 158).* The Royal Australian Air Force acquired 24 **F-111Cs** for strike duties, four of which have since been modified for tactical reconnaissance.

Contractor: General Dynamics Corporation.

Power Plant: F-111A/E: two Pratt & Whitney TF30-P-3 turbofan engines; each 18,500 lb thrust with afterburning. F-111D: two TF30-P-9 turbofan engines; each 19,600 lb thrust with afterburning. F-111F: two TF30-P-100 turbofan engines; each approx 25,100 lb thrust with afterburning.

Accommodation: crew of two side-by-side in escape module.

Dimensions: span spread 63 ft 0 in, fully swept 31 ft 11.4 in, length 73 ft 6 in, height 17 ft 1.4 in.

Weights (F-111F): empty 47,481 lb, gross 100,000 lb.

Performance (F-111F): max speed at S/L Mach 1.2, max speed at altitude Mach 2.5, service ceiling more than 59,000 ft, range with max internal fuel more than 2,925 miles.

Armament: one 20-mm M-61A1 multibarrel cannon and two nuclear bombs in internal weapon bay; four swiveling wing pylons carrying total external load of up to 25,000 lb of bombs, rockets, missiles, or fuel tanks.

Attack and Observation Aircraft

Vought A-7D Corsair II

A-7D/K Corsair II

The **A-7D** Corsair II is a single-seat, subsonic tactical fighter, 459 of which were delivered to USAF between 1968 and 1976. Since 1973, all A-7Ds, including those operated formerly by the active Air Force, have been delivered to ANG units in eleven states and Puerto Rico.

The aircraft's outstanding target kill capability, first demonstrated in Southeast Asia, is achieved with the aid of a continuous-solution navigation and weapon-delivery system, including all-weather radar bomb delivery. Additionally, 383 A-7Ds were modified to carry a Pave Penny laser target-designation pod.

A combat-capable two-seat training version, the **A-7K,** was funded to facilitate transition training. Thirty-one were ordered, comprising one for each of ANG's 13 A-7D units, and 18 for the 162d Tactical Fighter Training Group in Tucson, Ariz. First production A-7K entered service in April 1981. (Data for A-7D.)

Contractor: Vought Corporation, subsidiary of the LTV Corporation.

Power Plant: one Allison TF41-A-1 non-afterburning turbofan engine; 14,500 lb thrust.

Accommodation: pilot only.

Dimensions: span 38 ft 9 in, length 46 ft 1½ in, height 16 ft 0¾ in.

Weights: empty 19,781 lb, gross 42,000 lb.

Performance: max speed at S/L 698 mph, ferry range with external tanks 2,871 miles.

Armament: one M-61A1 20-mm multibarrel gun; up to 15,000 lb of air-to-air or air-to-surface missiles, bombs, rockets, or gun pods on six underwing and two fuselage attachments; Pave Penny AN/AAS-35 laser target designation pod installed on 383 aircraft.

A-10 Thunderbolt II

Designed specifically for the close air support (CAS) mission, the A-10 offers a combination of large military load, long loiter, and wide combat radius. In a typical antiarmor close air support mission, the A-10 could fly 150 miles and remain on station for an hour. It can carry up to 16,000 lb of mixed ordnance with partial fuel or 12,086 lb with full internal fuel. The 30-mm GAU-8/A gun can fire 2,100 or 4,200 rds/min and provides a cost-effective weapon with which to defeat the whole array of ground targets encountered in the CAG role, including tanks. The A-10 achieves its survivability through a combination of high maneuverability and design features that make it a "hard" aircraft. Equipment includes a head-up display, laser seeker, target penetration aids, and associated equipment for Maverick missiles. An inertial navigation system (INS) is being added by retrofit.

Funding was terminated in 1982, after 707 A-10s had been ordered. The first operational squadron was activated at Myrtle Beach AFB, S. C., in June 1977, and achieved operational capability in October. Pave Penny laser target designation pods, introduced in 1978, are now standard equipment for the aircraft. Future A-10 enhancements are expected to include installation of the Martin Marietta LANTIRN fire control pod to improve night/adverse weather capability.

Six squadrons of A-10s have been deployed at RAF Bentwaters and Woodbridge in the UK; TAC A-10 units include the 23d and 354th TFWs, 355th TTW, and 66th FWS; the 18th TFS is located at Eielson AFB, Alaska, and the 25th TFS at Suwon AB, Korea. A-10 equipment of the 128th and 174th TFWs and the 103d, 104th, and 175th TFGs of the ANG has been completed—the A-10 being the first first-line aircraft to be assigned to ANG units. A-10s also equip the 434th TFW and the 442d, 917th, and 926th TFGs of the AFRES.

Contractor: Fairchild Republic Company, Division of Fairchild Industries.
Power Plant: two General Electric TF34-GE-100 turbofan engines; each approx 9,065 lb thrust.
Accommodation: pilot only.
Dimensions: span 57 ft 6 in, length 53 ft 4 in, height 14 ft 8 in.
Weights: empty 24,959 lb, max gross 50,000 lb.
Performance: combat speed at S/L, clean 439 mph; range with 9,500 lb of weapons and 1.7 hr loiter, 20 min reserve, 288 miles.
Armament: one 30-mm GAU-8/A gun; eight underwing hard points and three under fuselage for up to 16,000 lb of ordnance, including various types of free-fall or guided bombs, gun pods, or 6 AGM-65 Maverick missiles, and jammer pods. Chaff and flares carried internally to counter radar or infrared directed threats. The centerline pylon and the two flanking fuselage pylons cannot be occupied simultaneously.

AC-130A/H

During the Grenada rescue operations in October–November last year, these gunships provided vital support for US Army ground operations. **AC-130As** serve with the Air Force Reserve's 711th SOS at Eglin AFB, Fla. **AC-130Hs** continue in active service with MAC's 1st Special Operations Wing. AC-130As are equipped with two 40-mm cannon, two 20-mm Vulcan cannon, and two 7.62-mm Miniguns. AC-130Hs are similar, except that one 40-mm cannon is replaced with a 105-mm howitzer. Both models are equipped with sensors and target acquisition systems, including forward-looking infrared and low-light-level TV. AC-130Hs are equipped for in-flight refueling.

Contractor: Greenville (Texas) Division of E-Systems, Inc. Other data basically as for C-130 *(page 164)*.

O-2A

A total of 346 specially equipped variants of the "push-and-pull" Cessna 337 Skymaster entered USAF service in 1966, originally to replace the Cessna O-1 in the forward air controller role in Vietnam. Though OA-37s and OV-10s are replacing O-2s, a few of these aircraft are still in use in active and ANG units. Specialized equipment and electronics installed in the O-2A permit control of air strikes, visual reconnaissance, target identification and marking, ground-air coordination, and damage assessment.

Contractor: Cessna Aircraft Company.
Power Plant: two Continental IO-360-C/D piston engines; each 210 hp.
Accommodation: pilot and observer side-by-side; one passenger optional.
Dimensions: span 38 ft 2 in, length 29 ft 9 in, height 9 ft 2 in.
Weights: empty 2,848 lb, gross 5,400 lb.
Performance: max speed at S/L 199 mph, service ceiling 19,300 ft, range 1,060 miles.
Armament: four underwing pylons can carry light ordnance, including a 7.62-mm Minigun pack.

OA-37B Dragonfly

A-37B Dragonfly ground support aircraft withdrawn from operational service with AFRES have been adapted for forward air control duty, replacing O-2As in some ANG Tactical Air Support Groups and the 16 OV-10s of PACAF's 19th Tactical Air Support Squadron, Osan AB, South Korea. There are some OA-37Bs in the TAC inventory.

Contractor: Cessna Aircraft Company.
Power Plant: two General Electric J85-GE-17A turbojet engines; each 2,850 lb thrust.
Accommodation: two, side-by-side.
Dimensions: span over tip-tanks 35 ft 10½ in, length excluding fuel probe 28 ft 3¼ in, height 8 ft 10½ in.
Weights: empty 6,211 lb, gross 14,000 lb.
Performance: max level speed at 16,000 ft 507 mph, service ceiling 41,765 ft, range with max payload, including 4,100 lb ordnance, 460 miles.
Armament: one GAU-2B/A 7.62-mm Minigun installed in forward fuselage, four pylons under each wing able to carry various combinations of rockets and bombs.

OV-10A Bronco

This counterinsurgency combat aircraft, first flown in August 1967, was acquired by USAF for use in the forward air control role, and for limited quick-response ground support pending the arrival of tactical fighters. One hundred and fifty-seven were delivered to USAF before production of the OV-10A for the US services ended in April 1969. Some have replaced older O-2As in such units as the 22d Tactical Air Support Squadron at Wheeler AFB, Hawaii. Versions are also in service with USN, US Marine Corps, and foreign air forces.

Contractor: Rockwell International Corporation, Aircraft Operations.
Power Plant: two Garrett T76-G-416/417 turboprop engines; each 715 hp.
Accommodation: two, in tandem.
Dimensions: span 40 ft 0 in, length 41 ft 7 in, height 15 ft 2 in.
Weights: empty 6,893 lb, overload gross weight 14,444 lb.
Performance: max speed at S/L, without weapons, 281 mph; service ceiling 24,000 ft; combat radius with max weapon load, no loiter, 228 miles.
Armament: four fixed forward-firing M-60C 7.62-mm machine-guns; four external weapon attachment points under short sponsons, for up to 2,400 lb of rockets, bombs, etc; fifth point, capacity 1,200 lb, under center fuselage. Provision for carrying one Sidewinder missile on each wing and, by use of a wing pylon kit, various stores, including rocket and flare pods, and free-fall ordnance. Max weapon load 3,600 lb.

Fairchild Republic A-10 Thunderbolt II

AC-130A

Cessna O-2A

Cessna OA-37B Dragonfly

Rockwell OV-10A Bronco

Reconnaissance and Special-Duty Aircraft

SR-71A/B Blackbird

Fastest, highest-flying production aircraft yet built, the multisensored **SR-71A** Blackbird is deployed at the 9th Strategic Reconnaissance Wing, Beale AFB, Calif.; its mission is to support national or strategic requirements and to support theater commanders in peacetime and during limited conflict. Equipment carried ranges from simple battlefield surveillance systems to systems capable of specialized coverage of up to 100,000 sq miles of territory in one hour. In July 1976, flown by three USAF crews, SR-71As set an absolute world speed record of 2,193.167 mph over a 15/25 km straight course, a speed of 2,092.294 mph around a 1,000-km closed circuit; and a sustained altitude of 85,069 ft in horizontal flight. Another SR-71A flew from New York to London, England, in 1 hr 54 min 56.4 sec in September 1974, at an average speed of 1,806.987 mph. The prototype flew for the first time in December 1964, and delivery of production aircraft began in January 1966. The **SR-71B** is a two-seat training version, with elevated rear cockpit.

Contractor: Lockheed Corporation.
Power Plant: two Pratt & Whitney JT11D-20B(J58) turbojet engines; each 34,000 lb thrust with afterburning.
Accommodation: crew of two in tandem.
Dimensions: span 55 ft 7 in, length 107 ft 5 in, height 18 ft 6 in.
Weights (estimated): empty 60,000 lb, gross 170,000 lb.

Lockheed SR-71A Blackbird

Lockheed TR-1A

McDonnell Douglas RF-4C

Boeing RC-135

Grumman EF-111A Raven

Performance (estimated): max speed at 78,750 ft more than Mach 3, operational ceiling above 80,000 ft, range at Mach 3.0 (1,980 mph) at 78,750 ft 2,982 miles.
Armament: none.

U-2 and TR-1

Production of the basic U-2 began in the late 1950s. It is essentially a powered glider, with high aspect ratio wing and lightweight structure, evolved to carry out clandestine strategic reconnaissance for long periods at very high altitudes over non-allied nations. Fifty-five are believed to have been built, including 2 prototypes, 48 single-seat **U-2A** versions, and 5 two-seat **U-2Ds.** The J57-P-37A turbojet of the U-2A was replaced by a more powerful J75-P-13, adapted to run on low-volatility fuel, in the **U-2B.** Versions such as the **U-2CT** tandem-cockpit trainer, **U-2EPX** (electronics patrol experimental), **WU-2** weather reconnaissance model, and **HASPU-2** (high-altitude sampling program) were conversions of basic models. All have similar dimensions except for the **U-2R,** which has much increased span and length. This is now the primary version, with eight remaining in first-line service. Air Force U-2s have performed important nonmilitary missions, including flights for the Department of Agriculture land management and crop estimate programs; photographic work in connection with flood, hurricane, and tornado damage; data gathering for a geothermal energy program; and search missions for missing boats and aircraft.

A derivative of the U-2R, the **TR-1A,** is a single-seat tactical reconnaissance aircraft designed for high-altitude standoff surveillance missions, primarily in Europe. Initial funding was provided in the FY '79 budget. A total of 18 was requested through FY '84, and 4 more in FY '85, completing the planned inventory for USAF, including two two-seat **TR-1Bs.** Each is equipped with electronic sensors to provide continuously available, day or night, all-weather surveillance of the battle area, or potential battle area, in direct support of US and allied ground and air forces during peace, crises, and war situations. Planned equipment includes communications intelligence sensors and modern ECM. An advanced synthetic aperture radar system (ASARS) for standoff imagery is to be fitted in FY '85. Under development is the Precision Location Strike System, by which TR-1As could pinpoint enemy radars and direct a strike against them by aircraft or standoff missiles. The first TR-1A flew on August 1, 1981, and pilot training at Beale AFB began later that year. The first of 12 TR-1s to be stationed at RAF Alconbury in the UK arrived in February 1983. These TR-1As are operated by SAC for USAFE. (Data for TR-1A.)
Contractor: Lockheed Corporation.
Power Plant: one Pratt & Whitney J75-P-13B turbojet engine; 17,000 lb thrust.
Dimensions: span 103 ft 0 in, length 63 ft 0 in, height 16 ft 0 in.
Weight: gross 40,000 lb.
Performance: max cruising speed at over 70,000 ft more than 430 mph, operational ceiling 90,000 ft, range more than 3,000 miles.
Armament: none.

RF-4C

Developed to replace the day-only RF-101, the **RF-4C** is an unarmed multisensor version of the F-4C Phantom II, designed for day/night, all-weather reconnaissance operations. The first production model flew in May 1964, and 509 were built before manufacture ended in December 1973. They are operated by six TAC, USAFE, and PACAF tactical reconnaissance squadrons; and by six squadrons of the ANG. The RF-4 was the first tactical aircraft equipped with a forward-looking radar capable of simultaneous terrain-following and low-altitude navigation. The basic aircraft is configured with conventional optical cameras for day operations, and infrared (IR) sensors for night. Both the radar and the camera systems are housed in a modified nose, which increases the length of the aircraft by 33 in compared with the fighter version. Seventeen RF-4Cs are being equipped with side-looking airborne radar (SLAR) for all-weather standoff battlefield surveillance, and 24 with a tactical electronic reconnaissance (TEREC) sensor for locating electronic emitters. Other new equipment includes the ARN-101 digital avionics system for improved navigation accuracy and greater reconnaissance capability; the Pave Tack IR pod for improved target locating by day, night, or in marginal weather; and data link transmission of SLAR and TEREC intelligence in near real-time to enhance timeliness of information to tactical decision-makers. (Data similar to F-4.)

EC-135, etc.

Several aircraft in the KC-135 Stratotanker series were modified for specialized missions during production or at a later date. Thirty-nine are modified for strategic airborne command and control missions. Five KC-135A tankers were converted for Airborne Command Post use by SAC in 1960. Additional aircraft were modified in 1962, and 17 new production KC-135B turbofan aircraft entered the system in 1965. Currently, **EC-135A/C/G/L/H/P** aircraft are assigned to SAC, TAC, PACAF, and USAFE. They are fitted with extensive communications equipment to support strategic command and control missions of their respective CINCs. At least one SAC EC-135C is airborne at all times, accommodating a flight crew of 5, a general officer, and a staff of 18. EC-135Cs can be refueled by SAC tankers. Fourteen were built and have been adapted to provide control of Minuteman ICBMs. TAC provides overseas deployment control of tactical fighters with the **EC-135K.** Versions of the C-135 Stratolifter series used for reconnaissance include turbofan **RC-135Vs** and **RC-135Ws,** equipped also for electronic reconnaissance with SAC; **RC-135Ss** and **RC-135Us. WC-135Bs,** converted C-135Bs, are used by MAC for long-range weather reconnaissance missions. In addition, a highly instrumented version, designated **NKC-135** ALL (Airborne Laser Laboratory), has been utilized by USAF as a test-bed in support of the HEL (High Energy Laser) research program. The primary objective has been to acquire technology data on laser operations that might have combat potential in the airborne environment.

In order to minimize the cost of retrofitting the special-purpose -135s with more efficient turbofan engines, USAF is installing refurbished Pratt & Whitney JT3D-3Bs taken from Boeing 707-100B aircraft, purchased as surplus from commercial air carriers. The first reengined aircraft was redelivered in January 1981. The program is continuing. (Data basically as C-135, page 165.)

EF-111A Raven

The EF-111A Raven is a conversion of the basic General Dynamics F-111A airframe fitted with mainly off-the-shelf components that enable it to accomplish important defense suppression missions in worldwide support of US tactical strike forces. Its ALQ-99E primary jammer is a modification of the Navy ALQ-99, and is carried internally. This extremely powerful system's frequency coverage, reliability, and effective use of available jamming power enables the EF-111A to penetrate the densest known electronic defenses. Other equipment includes self-protection systems from the F/FB-111 (ALQ-137/ALR-62), and USAF is investigating a modular addition to the ALQ-131 jammer pod that would enable it to be carried underwing to provide additional radar surveillance and complementary support jamming. The crew capsule is revised, and a new vertical stabilizer houses ALQ-99E receivers. In addition, developmental studies are under way at TAWC to evaluate the upgrade capabilities of the EF-111A for the 1990s. Possible improvements include increased ERP, state-of-the-art hardware, and improved power management.

Forty-two EF-111As are being produced for missions that include barrier surveillance jamming, suppression of surface-to-air missile threats during close air support operations, and escort jamming for deep strike missions. Flight testing began in March 1977, and the first "production" EF-111s were delivered in late 1981 to the 366th TFW, at Mountain Home AFB, Idaho, where they achieved initial operational capability with the 390th Electronic Combat Squadron in December 1983. Second operational location is at RAF Upper Heyford in the UK, where the first EF-111 arrived in February this year for the 42d ECS.
Contractor: Grumman Aerospace Corporation.
Power Plant: two Pratt & Whitney TF30-P-3 turbofan engines, each 18,500 lb thrust with afterburning.
Accommodation: crew of two, side-by-side in escape module.
Dimensions: span spread 63 ft 0 in, fully swept 31 ft 11.4 in, length 76 ft 0 in, height 20 ft 0 in.
Weights: empty 55,275 lb, gross 89,000 lb.
Performance: max combat speed 1,377 mph, service ceiling with afterburning at combat weight 45,000 ft, combat radius with reserves 230–929 miles, according to mission.
Armament: none.

E-3 Sentry (AWACS)

AWACS is a mobile, flexible, survivable, and jamming-resistant surveillance and command control and communications (C^3) system, capable of all-weather, long-range, high- or low-level surveillance of all air vehicles, manned or unmanned, above all kinds of terrain. A modified Boeing 707-320B carries an extensive complement of mission avionics, including computer, radar, IFF, communications, display, and navigation systems. The capability of AWACS is provided by its Westinghouse Electric Corporation look-down radar, which makes possible all-altitude surveillance over land or water, thus correcting a serious deficiency in earlier surveillance systems.

USAF indicated an initial requirement for 34 AWACS aircraft. Deliveries of the basic version, designated **E-3A** Sentry, began in March 1977, when the first aircraft was handed over to TAC's 552d Airborne Warning and Control Division at Tinker AFB, Okla. Thirty-one aircraft have been delivered to date, and the 34th is expected to be completed by 1985. Eighteen further E-3As are being acquired by NATO to upgrade the command and control of its air defense forces.

In December 1976, Westinghouse was contracted to develop a maritime surveillance capability that could be incorporated retrospectively in the radar of all operational E-3As. Aircraft from production system 22 embody this maritime mission capability, including the NATO models. A new US/NATO standard configuration was introduced from the 25th USAF Sentry, delivered in December 1981, in which the data processing capability is improved. The first 24 E-3As will be retrofitted from September this year and will become **E-3Bs.** NATO Sentrys will continue to be designated E-3A. All versions of AWACS can support a variety of tactical and/or air defense missions with no change in configuration. The US standard aircraft are being upgraded with additional command and control capability, beginning in 1984, and will be redesignated **E-3C.**

E-3s have had a role in US continental air defense since January 1979, when NORAD personnel began augmenting TAC E-3A flight crews on all operational NORAD missions by the 552d AWACD from Tinker AFB. Overseas detachments of the 552d include the 960th and 961st AWAC Support Squadrons based respectively at Keflavik, Iceland, and Kadena AB, Okinawa. Deployments have been made to the Middle East, the Mediterranean area, and Europe.

Contractor: Boeing Aerospace Company.
Power Plant: four Pratt & Whitney TF33-PW-100/100A turbofan engines; each 21,000 lb thrust.
Accommodation: operational crew of 17, including 13 AWACS specialists.
Dimensions: span 145 ft 9 in, length 152 ft 11 in, height 41 ft 9 in.
Weight: gross 325,000 lb.
Performance: max speed 530 mph, service ceiling above 29,000 ft, endurance 6 hr on station 1,000 miles from base.

E-4B

SAC is the Air Force single resource manager for the E-4 airborne command post aircraft, the main operating base for which is Offutt AFB, Neb. Three **E-4As,** modified Boeing 747 aircraft, were built initially to support the National Emergency Airborne Command Post (NEACP) and provided an interim capability by utilizing existing EC-135 command control and communications (C^3) equipment. Four fully-developed **E-4B** Airborne Command Post aircraft (three of them converted from E-4A) will eventually support the NEACP mission. They are hardened against the effects of nuclear explosions, including electromagnetic pulse, equipped for in-flight refueling, contain a new 1,200kVA electrical system designed to support advanced electronics, and have a wide variety of new communications equipment. This includes a more powerful LF/VLF system, improved satellite communications system, and communications processing equipment. These systems have antijam features and will support operations in a nuclear environment over extended ranges. The E-4B system is capable of tying in to commercial telephone and radio networks and could, potentially, be used for radio broadcasts to the general population. Additional improvements, to include a data processing capability and more survivable C^3, are programmed. The first E-4B entered service with SAC in January 1980, and the first operational mission was flown in March that year. In mid-1980, Boeing Aerospace, together with E-Systems, Inc, was contracted to modify one E-4A to B standard, with options to modify the other two; these options have been exercised; the first converted E-4B was redelivered in July 1983; redelivery of the remaining two will be completed by January 1985.

Contractor: Boeing Aerospace Company.
Power Plant: four General Electric CF6-50E2 turbofan engines, each 52,500 lb thrust.
Dimensions: span 195 ft 8 in, length 231 ft 4 in, height 63 ft 5 in.
Weight: max ramp weight 803,000 lb.
Performance: unrefueled endurance in excess of 12 hours.

WC-130E/H

Modified C-130 Hercules transports, designated WC-130E and H, are equipped for weather reconnaissance duties, including penetration of tropical storms to obtain data for forecasting of storm movements. They are assigned to the 41st Rescue and Weather Reconnaissance Wing of MAC's Aerospace Rescue and Recovery Service and the 403d Rescue and Weather Reconnaissance Wing of the Air Force Reserve. (Data similar to C-130.)

Boeing E-3A Sentry (AWACS)

Boeing E-4B

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 204,900 lb, such as two M-60 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-5As' 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. Installation of production kits began in 1982 and all 77 aircraft now in the inventory should be modified by FY '87.

To meet an urgent need for additional heavy airlift capacity, USAF will acquire 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 to be replaced by the more advanced MADAR II. Funding for one aircraft was provided in FY '83, with a further four planned for FY '84, ten in FY '85, and 16 in FY '86. Delivery will begin in 1986. (Data for C-5B.)

Contractor: Lockheed-Georgia Company.
Power Plant: four General Electric TF39-GE-1C turbofan engines; each 43,000 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 1 in.
Weights: empty 370,300 lb, max payload 264,700 lb, gross (for 2.25*g*) 800,000 lb.
Performance: max speed at 25,000 ft 571 mph, service ceiling (at 615,000 lb) 35,750 ft, range with max payload 2,729 miles.

Lockheed C-5A Galaxy

C-9A Nightingale and VC-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. The Nightingale also performs overseas theater aeromedical evacuation missions in Europe. Three specially configured

McDonnell Douglas C-9A Nightingale

Beech C-12A

McDonnell Douglas C-17s (artist's concept)

Gulfstream Aerospace C-20A

Gates Learjet C-21A

Lockheed C-130 Hercules

VC-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 two; 30 to 40 litter patients, more than 40 ambulatory patients, or a combination of both, plus five medical staff.
Dimensions: span 93 ft 5 in, length 119 ft 3½ 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

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. The ANG has six passenger/cargo **UC-12Ds,** with added freight door, ordered under FY '84 funding. Also, under a contract awarded in September 1983, USAF is leasing 40 Super King Air B200Cs to replace (with C-21As) the current fuel-inefficient CT-39s used on operational support missions. Deliveries were scheduled to begin in March, as **C-12Fs.** A purchase option may be exercised at the end of the lease period. (Data for C-12A.)
Contractor: Beech Aircraft Corporation.
Power Plant: two Pratt & Whitney Aircraft of Canada PT6A-38 turboprop engines; each 750 shp. (C-12F: 850 shp PT6A-42s.)
Accommodation: crew of two; up to 8 passengers or 4,764 lb of cargo.
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 299 mph, service ceiling 31,000 ft, range at max cruising speed 1,824 miles.

C-17

The C-17 was conceived to meet USAF's CX requirement for a long-range, heavy-lift, air-refuelable cargo transport able to provide intertheater and intratheater airlift of outsize loads, including the M1 tank, directly into airfields in potential combat areas. Operation was intended to be possible from runways only 3,000 ft long and 90 ft wide. On the ground, the C-17 would be able to make a 180° turn in only 82 ft. A fully loaded aircraft, using thrust reversal, would be able to back up a one-in-50 gradient.

McDonnell Douglas was announced as winner of the CX competition 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 work on the C-17. Technologies being investigated include a blown flap system on a swept supercritical wing with winglets, and an engine fan and redirected flow thrust reverser. Development is continuing under a $26.6 million appropriation in the FY '84 budget. The FY '85 budget includes a proposed $129.3 million for progress to full-scale engineering, with a further $364.2 million proposed for FY '86. This would permit production deliveries of the C-17 to begin in the early 1990s.
Contractor: McDonnell Douglas Corporation.
Power Plant: four Pratt & Whitney PW2037 turbofan engines; each 37,000 lb thrust.
Accommodation: normal flight crew of two, plus loadmaster. Provision for a variety of military airlift roles.
Dimensions: span 165 ft 0 in, length 172 ft 6 in, height 55 ft 3 in.
Performance (estimated): cruising speed at high altitude Mach 0.775, typical range with 172,200 lb payload 2,765 miles.

C-18A

The designation C-18A has been given to eight former American Airlines Boeing 707-323C transports acquired for service with USAF. (Data similar to C-137.)

C-20A

Selected to replace the aging, fuel-inefficient C-140B, the C-20A is a Gulfstream III executive transport acquired by USAF for VIP duties. The first of three aircraft to be delivered to the 89th Military Airlift Wing under a lease/purchase agreement was accepted in September last year, with two more being delivered in FY '84. These aircraft will be purchased in FY '85, with three more planned for FY '86 and FY '87 and two more in FY '88. Eight will eventually be assigned to Andrews AFB, Md., and three to Ramstein AB, West Germany.
Contractor: Gulfstream Aerospace Corporation.
Power Plant: two Rolls-Royce RB163-25 turbofan engines; each 11,400 lb thrust.
Accommodation: crew of five; 14 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 509 mph, service ceiling 45,000 ft, range 4,718 miles.

C-21A

In a program designed to replace aging, fuel-inefficient CT-39s, USAF is acquiring 80 Learjet 35As (together with 40 C-12Fs) under a lease contract in which the contractor will provide maintenance and logistics support for the aircraft at various USAF bases. A purchase option may be exercised later. The first aircraft, designated C-21A, was scheduled for delivery in March. The C-21As will be operated by MAC as part of its Operational Support Aircraft fleet, delivering high-priority, time-sensitive cargo, seasoning newly rated pilots, and providing passenger airlift. They will also be capable of quick and easy conversion to such missions as medical evacuation and long-range ferry flights. (Data for Learjet 35A.)
Contractor: Gates Learjet Corporation.
Power Plant: two Garrett TFE731-2-2B turbofan engines; each 3,500 lb thrust.
Accommodation: crew of two; cargo or eight passengers.
Dimensions: wing span over tip-tanks 39 ft 6 in, length 48 ft 8 in, height 12 ft 3 in.
Weight: gross 17,000 lb.
Performance: max level speed at 25,000 ft 542 mph, service ceiling 45,000 ft, range with four passengers, max fuel and 45 min reserves 2,634 miles.

C-130 Hercules

Although it was first ordered for USAF 30 years ago, the C-130 remains in production, with basic and specialized versions continuing to perform a diversity of roles worldwide, including airlift support, as exemplified during the Grenada rescue mission at the end of last year, DEW Line and Arctic icecap resupply, aeromedical missions, and firefighting 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 air-snatch 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 modifications to correct fatigue and corrosion on C-130B/Es, already under way, will extend the life of the aircraft well into the next century. Fifteen C-130Es were modified to **MC-130E** standard and equipped for use in low-level deep-penetration Combat Talon tactical missions by the 1st, 7th, and 8th Special Operations Squadrons based in the Philippines, West Germany, and Florida, respectively. Funds for further modifications are sought in the FY '85 budget proposals. This version is being supplemented by the **MC-130H (Combat Talon II)** from FY '83. Two were funded in the FY '84 budget and a further two feature in the FY '85 budget proposals. By 1991, the inventory is expected to include 35 of these aircraft, equipped with terrain-following radar, precision navigation/airdrop, in-flight refueling, and self-protection systems. Basically similar to the E, the basic **C-130H** has uprated T56-A-15 turboprop engines, a redesigned outer wing, and other, minor, improvements; delivery began in April 1975. Eight C-130Hs (four ski-equipped for deployment with the

ANG) were funded in the FY '83 budget, with a further ten in FY '84. The **EC-130H (Compass Call)** is an enemy communications jammer. 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 or 6 standard freight pallets, etc.

Dimensions: span 132 ft 7 in, length 97 ft 9 in, height 38 ft 3 in.

Weights: empty 76,469 lb, gross 175,000 lb.

Performance: max speed 386 mph, service ceiling at 130,000 lb AUW 33,000 ft, range with max payload 2,356 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. Crew complement is ten to twelve. A total of 43 was delivered. 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 also are capable of refueling helicopters in flight. (Other data similar to C-130.)

C-131

Thirty-three C-131 twin-engine transports, with an average age of more than 28 years, remain in service with the ANG for support airlift.

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. By 1966, a total of 732 had been built. Today, 615 KC-135s are in operational service, including those currently assigned to three Air Force Reserve units and to thirteen Air National Guard units. There are three ongoing programs designed specifically to enhance KC-135 capability and extend its operational utility beyond the year 2000. First, the selection of the 22,000 lb thrust General Electric/SNECMA CFM56 modern technology engines for retrofit of the KC-135 fleet was announced in 1980. The first reengined aircraft, redesignated **KC-135R,** made its first flight in August 1982. The KC-135R program includes modification of 34 major systems/subsystems. The Air Force expects to modify 392 aircraft through FY '89. SAC will take delivery of the first KC-135R in June this year. Second, the Air National Guard JT3D reengining program will reengine 96 of the ANG fleet of 104 KC-135As by the end of 1984. These aircraft, redesignated **KC-135E,** use JT3D turbofan engines removed from surplus commercial 707s. 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. (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'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.** Data similar to KC-135, except:

Dimensions: length 134 ft 6 in.

Weights (C-135B): operating weight empty 102,300 lb, gross 275,500 lb.

Accommodation: 126 troops; 44 litters and 54 sitting casualties; or 87,100 lb of cargo.

Performance (C-135B): max speed 600 mph, range with 54,000 lb payload 4,625 miles.

C-137

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 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.

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 about 7,000 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 eleven **C-140B** transport versions; six serve with the 89th Military Airlift Wing, operating from Andrews AFB, Md., and five 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 three and 8 passengers.

Dimensions: span 54 ft 5 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 2,260 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 modified to carry Minuteman ICBMs, with local structural strengthening to accommodate this 86,207 lb load. Operational experience showed that the cargo compartment was often fully packed without the aircraft's maximum payload capability being reached. In order to realize the C-141's full potential, USAF funded modification of the entire force of 270 (now 268) aircraft to **C-141B** standard, with the fuselage lengthened by 23 ft 4 in, and with added in-flight refueling capability. The first production C-141B was delivered to USAF in December 1979, and the final modified StarLifter was redelivered in June 1982, ahead of schedule and below projected cost. This provides the equivalent of 90 additional C-141A aircraft. Current C-141 modifications include the installation of new digital flight data recorders. In addition, one C-141B of 437th MAW has had electroluminescent (EL) light panels installed on the flight deck to evaluate their usefulness in that Wing's SOLL (Special Operations Low Level) missions. (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, vehicle, or passenger payloads.

Dimensions: span 159 ft 11 in, length 168 ft 3½ in, height 39 ft 3 in.

Weights: operating 148,800 lb, max payload 90,200 lb, gross 343,000 lb.

Performance: max cruising speed 566 mph, range with max payload 1,970 miles.

KC-10A Extender

Requested funding in the FY '85 budget proposals will purchase eight more **KC-10As,** providing USAF with 40 of its planned force of 60. 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

Lockheed HC-130P refueling HH-3E

Boeing KC-135 Stratotanker

Boeing C-137

Lockheed C-140 JetStar

Lockheed C-141B StarLifter

McDonnell Douglas KC-10 Extender refueling F-15

Shorts C-23 Sherpa European Distribution System Aircraft (EDSA)

Lockheed T-33A Shooting Star

Cessna T-37B

Northrop T-38 Talon

Rockwell CT-39 Sabreliner

Cessna T-41 Mescalero

Boeing T-43A

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 most situations, dispense with the need for forward bases, while also leaving vital fuel supplies in the theater of operations untouched, as recent events in Grenada demonstrated. 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., and 32d ARS at Barksdale AFB, La.; AFRES's 78th ARS (Associate) at Barksdale and 79th ARS (Associate) at March AFBs share the aircraft with the active-duty squadrons at their respective bases.

Contractor: McDonnell Douglas Corporation.
Power Plant: three General Electric CF6-50C2 turbofan engines; each 52,500 lb st. 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 169,370 lb.
Dimensions: span 165 ft 4.4 in, length 181 ft 7 in, height 58 ft 1 in.
Weight: gross 590,000 lb.
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.

C-23 Sherpa

It was announced in March of this year that, as the result of an international competition, Shorts of the UK had been awarded an initial $165 million contract to supply 18 Sherpas to USAF. They will be delivered over the next two years for operation by MAC, under the operational control of the 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 will be 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 in Spain. In peacetime, the Sherpas will service at least 20 USAF bases, in a system analogous with the civil air freight operation carried out by Federal Express in the US.

Contractor: Short Brothers Ltd.
Power Plant: two Pratt & Whitney Aircraft of Canada PT6A-45R turboprop engines; each 1,198 shp.
Accommodation: crew of two; up to 7,500 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 865 miles with 4,500 lb payload.

Trainers

T-33A Shooting Star

A few of these Shooting Star jet fighter derivatives remain in service for combat support missions and for proficiency and radar target evaluation training. Combat armament is replaced by an all-weather "navigational nose."

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 11,965 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.

T-37B

This aircraft is Air Training Command's standard two-seat primary trainer. The original T-37A was USAF's first purpose-built jet trainer. It was superseded in November 1959 by the T-37B, and all A models were converted subsequently to B standard. Well over a thousand T-37s were built, and versions are used by many foreign countries for their pilot training programs, as well as for military surveillance and low-level attack duties. (Data for T-37B.)

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, standard tankage 870 miles.

T-38 Talon

Almost identical in structure to the F-5A tactical fighter, the T-38 is a lightweight twin-jet advanced trainer, which was in continuous production from 1956 to 1972. The first T-38 flew in April 1959, and production models entered operational service in March 1961. Of the total 1,187 T-38s built, more than 1,100 were delivered to USAF and about 900 remain in service throughout the Air Force. Most are used by ATC; others fly with the 479th Tactical Training Wing at Holloman AFB, N. M., and with SAC.

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.
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.

CT-39 Sabreliner

Acquired in the late 1950s and early 1960s, the CT-39 Sabreliner has become increasingly less cost-effective and is to be replaced by the C-12F and C-21A. Versions utilized by USAF are **CT-39A/B** basic utility and training aircraft, of which 143 were delivered. Of those still in the inventory, more than 100 are assigned to MAC for airlift support. Others are in service with PACAF, USAFE, and 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.

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; 4 to 7 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.

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.
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 is equipped with the same on-board

avionics as the most advanced USAF operational aircraft, including celestial, radar, and inertial navigation systems, LORAN, and other radio systems. Deliveries of the 19 aircraft ordered for ATC were completed in July 1974 and 15 remain in the ATC inventory; the other 4 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, 4 advanced students, and 3 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

Under a contract awarded in 1982, Fairchild Republic Company is developing USAF's next-generation trainer (NGT), designated T-46A. The initial contract covers design, development, construction, and testing of two prototypes, and the supply of two static test airframes, plus an option for the first 54 production T-46As out of a planned procurement of 650 aircraft for delivery into 1992. Funding for the first ten aircraft is requested in the FY '85 budget proposals.

Intended as a primary trainer to replace the T-37, the T-46A retains the twin-engine and side-by-side seating features of its predecessor, but adds pressurization, increased range, and greatly improved adverse weather capability, which will decrease significantly the number of training flights lost through weather factors. The combination of pressurization and the greater thrust of the engines will also enable the aircraft to utilize training airspace up to 35,000 ft, thereby reducing problems caused by growing commercial and private air activity. Operational cost savings will result from the use of more fuel-efficient engines, and from technological improvements to be incorporated in the airframe, avionics, and power plant. First flight is scheduled for Spring 1985, and student training in the T-46A is scheduled to begin in late 1987.
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 36 ft 11¾ in, length 29 ft 6 in, height 9 ft 11¾ in.
Weights: empty 4,850 lb, gross 6,460 lb.
Performance: max level speed at 35,000 ft 460 mph, service ceiling 46,500 ft, range with max fuel 1,370 miles.

UV-18B

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. A third was acquired later.
Contractor: The de Havilland Aircraft of Canada Ltd.
Power Plant: two Pratt & Whitney Aircraft of Canada PT6A-27 turboprop engines; each 652 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.

Fairchild Republic T-46A mockup


de Havilland UV-18B

Helicopters

TH/UH-1F, UH-1P, and HH-1H

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.

Electroluminescent lighting has been installed in a UH-1, and an HH-53 (described later), used for low-level night rescue missions, under a program to develop improved pilot night vision aids. (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.
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

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, including those used for special operations 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 15,000 ft, max range, no reserves, 248 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 which 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).*
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 ARRS units of the Reserve and ANG. (Data basically similar to CH-3E above.)

HH-53B

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 Jolly Green Giant, including the in-flight refueling probe and all-weather avionics and armament, but is faster and larger. The first of eight flew in March 1967. Delivery began in June the same year, and after extensive use for rescue operations in Southeast Asia HH-53Bs continue in first-line service.
Contractor: Sikorsky Aircraft, Division of United Technologies Corporation.
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 4 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.

HH-53H Pave Low III

Under USAF's Pave Low III program, nine HH-53Cs were modified for night and adverse weather operations, with the designation HH-53H. Equipment includes a sta-


Bell UH-1N


Sikorsky CH-3E


Sikorsky HH-53

bilized 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 Pave Low aircraft was delivered to Pensacola in March 1979, and the last in 1980. These helicopters are part of USAF's Special Operations Forces.

Sikorsky HH-60D Night Hawk

UH-60A Black Hawk and HH-60D/E Night Hawk

Under a $36.6 million contract, Sikorsky Aircraft is modifying two standard US Army UH-60A Black Hawks into prototypes of a combat helicopter designated **HH-60D/E** Night Hawk. Changes include uprated engines, extended range capability, and improved avionics. If the modified aircraft satisfy USAF's HX requirement for a new-generation helicopter able to conduct aircrew rescues and special operations missions deep behind enemy lines, in darkness or bad weather, and at treetop level to avoid radar detection, 155 production Night Hawks will be ordered: 45 HH-60Ds and 86 HH-60Es for combat rescue, and 24 HH- 60Ds for Special Operations, to equip active units and the AFRES and ANG. Funding requested in FY '85 includes $81.3 million for R&D and $22.5 million for advance procurement. Although the cabin of the basic UH-60A is large enough to make possible a variety of missions without modification, the airframe is so compact that the helicopter can be airlifted over long ranges. Equipment specified for the HH-60D includes terrain-following/terrain-avoidance radar, an air-to-air refueling system, auxiliary internal and external fuel tanks, FLIR, and a rescue hoist. The **HH-60E** will be similarly configured but will not be equipped for adverse weather operations. Avionics integration will be by IBM's Federal Systems Division.

Delivery of HH-60Ds, to replace MAC's HH-3s and HH-53s, could begin in mid-1988. Meanwhile, USAF has received nine **UH-60A** Black Hawks to initiate aircrew training and familiarization. These helicopters are in standard US Army configuration, including a rescue hoist, de-icing system, and winterization and air transportability kits. (Data, except where indicated, for standard UH-60A.)

Contractor: Sikorsky Aircraft, Division of United Technologies Corporation.

Power Plant: two General Electric T700-GE-700 turboshaft engines; each 1,560 shp. (HH-60D: two T700-GE-401s; each 1,690 shp.)

Accommodation: crew of two or three; 11 troops, or four litters, or internal or external cargo.

Dimensions: rotor diameter 53 ft 8 in, length of fuselage 50 ft 0¾ in (HH-60D, incl retracted refueling probe 57 ft 0¼ in), height 16 ft 10 in.

Weights: empty 10,624 lb, gross 16,260–20,250 lb. (HH-60D: empty 12,642 lb, gross 20,413–22,000 lb.)

Performance: max speed 184 mph (HH-60D: 167 mph), service ceiling 19,000 ft, max range, with reserves, 373 miles (internal fuel), 1,380 miles (four external tanks).

Armament (HH-60D): 7.62-mm Miniguns and Stinger air-to-air missiles for self-defense.

Strategic and Tactical Nuclear Missiles

LGM-25C Titan II

LGM-30 Minuteman III

LGM-118A Peacekeeper (MX)

LGM-25C Titan II

More than 20 years old, this two-stage liquid-fueled ICBM is expensive to maintain and of decreasing value to the overall US strategic posture. Phaseout has begun, leaving 38 Titan IIs deployed in the five squadrons at Davis-Monthan AFB, Ariz., McConnell AFB, Kan., and Little Rock AFB, Ark., in mid-February 1983. Deactivation is scheduled for completion by 1987.

Titan II has a thermonuclear warhead with the largest yield of any carried by a US missile, and a launch reaction time of one minute from its fully hardened underground silo.

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.

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

Although operational for more than twenty years, Minuteman is to remain a key element of the US strategic deterrent posture for the foreseeable future. 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. 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.

LGM-30G Minuteman III: new 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. Minuteman III also increases the possibility of penetrating enemy defense systems. 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 is made up of 450 Minuteman IIs and 550 Minuteman IIIs. Recent R&D has been aimed at providing improved command control and communications, at development of the Mk 12A reentry vehicle, which increases the yield of the Minuteman III warhead, and at refinements to improve accuracy. Deployment of the 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; 34,400 lb thrust.

Guidance: Autonetics Division of Rockwell International inertial guidance system.

Dimensions: length 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 (MX)

In response to the improved hardness of Soviet strategic forces and C^3 and leadership facilities, the US is producing 100 Peacekeeper missiles to be deployed in existing Minuteman silos near F. E. Warren AFB, Wyo. Initial operational capability for the first 10 Peacekeeper missiles is planned for late 1986, with full operational capability scheduled for 1989.

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 will be more accurate, carry more warheads, and have greater range and target flexibility than the Minuteman ICBMs. Together with these advantages, its greater resistance to nuclear effects and its more capable guidance system provide the 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. It is expected also to provide the Soviets with incentive to negotiate reduced force levels in the Strategic Arms Reduction Talks (START). The first flight test of the Peacekeeper missile took place on June 17, 1983, from Vandenberg AFB, Calif., to an ocean target near Kwajalein atoll in the Pacific. The missile has met or exceeded all performance expectations during launch and flight.

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 70 ft, diameter 7 ft 8 in.

Weight: approx 192,000 lb.

Small ICBM

Research is under way for a small single-warhead ICBM. Several competitive design concepts, both for the missile itself and for basing vehicles and structures, are

being evaluated, with full-scale development scheduled for FY '87. Current basing mode preference is for the "Hard" Mobile Launcher (HML); but other basing options, including the hardened silo, are being considered, with relevant funding requested in the FY '85 budget proposals. Consideration is also being given to the requirements of the system as a whole, including its operational concept, C^3 support requirements, and its potential environmental impact. The missile is expected to be in the 30,000 lb class.

AGM-69 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 20 AGM-69A SRAMs, twelve in three-round underwing clusters and eight on a rotary dispenser in the aft bomb-bay, together with up to four Mk 28 thermonuclear weapons. 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 lbs.
Performance: speed up to Mach 2.5, range 100 miles at high altitude, 35 miles at low altitude.

AASM

The FY '85 budget includes a request for $55 million to develop an advanced air-to-surface missile (AASM) to supplement and eventually replace SRAM. As well as more modern warhead safety and improved performance, AASM will incorporate advances in low-observable technology, navigation systems, propulsion efficiency, and system accuracy. Greater compactness will enable carrier aircraft to be equipped with more AASMs than SRAMs, and the new weapons will offer improved capability against imprecisely located targets.

AGM-86 ALCM

The AGM-86 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 would be improved. Small radar signature and low-level flight capability enhance the missile's effectiveness. Production is expected to total 1,739 missiles, with deliveries to be completed in FY '87. Funding for 225 **AGM-86B** ALCMs was provided in FY '80; 480 more were approved in FY '81, 440 in FY '82, 330 in FY '83, and the final 240 in FY '84. 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. It has been followed by the 379th Wing at Wurtsmith AFB, Mich., and Grand Forks AFB, N. D. Other units to receive ALCMs are at Fairchild AFB, Wash., and Blytheville AFB, Ark. B-52Hs will begin similar conversion in 1986; the new B-1B will also carry ALCMs. Ultimately, each B-52H is intended to be modified further to have a bomb-bay rotary launcher for eight more ALCMs, eight SRAMs, or a mix of both.

Contractor: Boeing Aerospace Company.
Power Plant: Williams International Corporation F107-WR-100 turbofan engine; 600 lb thrust.
Guidance: inertial plus Tercom, by McDonnell Douglas.
Warhead: W-80-1 nuclear.
Dimensions: length 20 ft 9 in, body diameter 2 ft 0½ in, wing span 12 ft.
Weight: 2,825 lb.
Performance (approx): speed 500 mph, range 1,550 miles.

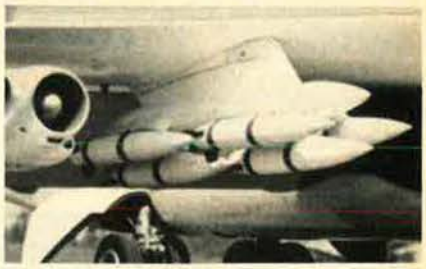
ACM

Convair Division of General Dynamics was selected in April 1983 to develop and manufacture an air-launched advanced cruise missile (ACM) to supersede the AGM-86 in production in the later 1980s. The ACM will have improved range, accuracy, survivability, and targeting flexibility.

BGM-109G GLCM

This small, mobile, ground-to-ground cruise missile is one of the weapons being deployed 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. First test was conducted in May 1980 at the Utah Test and Training Range. The GLCM weapon system became operational at RAF Greenham Common, UK, in late 1983, and subsequent deployments to the European continent remain on schedule. 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. The total missile buy is 560, with 11 authorized in FY '81, 54 in FY '82, 84 in FY '83, 120 in FY '84, and plans for 120 in FY '85, 120 in FY '86, and 51 in FY '87.

Contractor: General Dynamics (Convair).
Power Plant: Williams International Corporation F107-WR-400 turbofan engine; 600 lb thrust Atlantic Research Corporation solid-propellant booster.
Guidance: inertial plus Tercom, by McDonnell Douglas.
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 1,550 miles.



AGM-69 SRAMs

AGM-86B ALCM

BGM-109G GLCM

Airborne Tactical and Defense Missiles

AIR-2A Genie

Produced in many thousands before production ended in 1962, the AIR-2A Genie continues in first-line service with the F-106 squadrons of USAF, as well as the F-101Bs of the Canadian Armed Forces. A Genie was the first nuclear-tipped air-to-air rocket ever tested in a live firing when, in July 1957, it was launched from an F-89J Scorpion. Unguided in flight, Genie is normally fired automatically by the Hughes fire control system fitted in the launching aircraft. As one of many safety precautions, the missile remains inert in a nuclear sense until it is armed in the air, a few moments before firing. A training version, without nuclear warhead, is also in service.

Contractor: McDonnell Douglas Astronautics Company.
Power Plant: Thiokol SR49-TC-1 solid-propellant rocket motor; 36,000 lb thrust.
Guidance: no guidance system.
Warhead: nuclear, with reported yield of 1.5 KT.
Dimensions: length 9 ft 7 in, body diameter 1 ft 5.35 in, fin span 3 ft 3½ in.
Weight: launch weight 820 lb.
Performance: max speed Mach 3, max range 6 miles.

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.

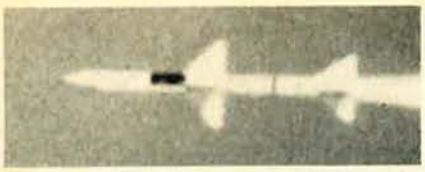
Contractor: Hughes Aircraft Company.
Power Plant: Thiokol M46 two-stage solid-propellant motor; first-stage rating of 6,000 lb thrust.
Guidance: AIM-4F: Hughes semiactive radar homing guidance; AIM-4G: infrared homing system.
Warhead: high-explosive, weighing 40 lb.
Dimensions: length AIM-4F 7 ft 2 in; 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

One of the most important air combat weapons in service with NATO and allied air forces, the 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-2A Genie

AIM-4F Super Falcon



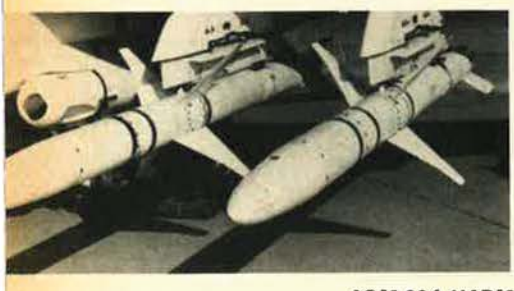
AIM-7 Sparrow

AIM-9 Sidewinder

AGM-45A Shrike

AGM-65D Maverick

AGM-78A Standard ARM



AGM-88A HARM

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-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. Total USAF procurement was expected to be 4,300 missiles, with the final 1,005 requested in last year's budget. Procurement will switch to the AMRAAM in FY '85. (Data for AIM-7F/M.)

Contractors: Raytheon Company/General Dynamics Pomona Division.
Power Plant: Hercules Mk 58 Mod 0 boost-sustained rocket motor.
Guidance: Raytheon semiactive Doppler radar homing system.
Warhead: high-explosive, blast fragmentation.
Dimensions: length 12 ft 0 in, body diameter 8 in, wing span 3 ft 4 in.
Weight: launch weight 500 lb.
Performance (estimated): max speed more than Mach 3.5; range AIM-7E 14 miles, AIM-7F/M 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-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: modification 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-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.

AIM-9M: improved version of AIM-9L with increased ECCM capability, improved background discrimination, and reduced-smoke rocket motor. Full production began in FY '81 with an order for approximately 1,850 missiles. (Data for AIM-9L.)

Contractor: Raytheon Company/Ford Aerospace and Communications Corporation.
Power Plant: Rocketdyne/Bermite Mk 36 Mod 7/8 solid-propellant motor.
Guidance: solid-state infrared homing guidance.
Warhead: high-explosive, weighing 21 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 Mach 2.5, range more than 10 miles.

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. 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, F-5E/F, F-111F, and F-16, normally in three-round underwing clusters, for use against pinpoint targets such as tanks and columns of vehicles. Orders totaled 19,000 before production was terminated in favor of the **AGM-65B** with a "scene magnification" TV seeker that enables the pilot to identify and lock on to smaller or more distant targets.

To overcome limitations of the TV Maverick, which can be used only in daylight clear-weather conditions, a new version has been developed:

AGM-65D: with imaging infrared seeker (IIR). Developmental and operational flight testing ended in August 1982. USAF is considering procurement of 60,664 AGM-65D Mavericks: 200 were authorized in FY '82, 900 in FY '83, and 1,980 in FY '84. A further 4,500 have been requested in the FY '85 budget proposals. (Data for AGM-65A.)

Contractor: Hughes Aircraft Company.
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: classified.

AGM-78 Standard ARM

Although no longer in production, this air-launched, antiradar missile remains an important item in the USAF and USN inventories. The original **AGM-78A** version of Standard ARM (Anti-Radiation Missile) was designed to provide a significant increase in capability over earlier weapons in countering the threat of radar-controlled antiaircraft guided missiles and guns. It used the passive homing target-seeking head of the Shrike missile. Later models have improved seeker heads and avionics for better target selection, increased effectiveness against target countermeasures, and still greater attack range. Standard ARM is deployed on USAF's F-4G, and by USN. Equipment carried by the launch aircraft includes a target identification and acquisition system (TIAS), which is able to determine and pass to the missile specific target parameters. Final production version was **AGM-78D.**

Contractor: General Dynamics Corporation, Pomona Division.
Power Plant: Aerojet-General Mk 27 Mod 4 dual-thrust solid-propellant rocket motor.
Guidance: passive homing guidance system, using seeker head that homes on enemy radar emissions.
Warhead: high-explosive.
Dimensions: length 15 ft 0 in, body diameter 1 ft 1½ in, wing span 3 ft 6 in.
Weight: launch weight, basic version 1,356 lb.
Performance: max speed Mach 2, max range 15.5 miles.

AGM-88A HARM

Development of a high-speed antiradiation missile (HARM) reflected 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. USAF intention to equip the F-4G "Wild Weasel" with the AGM-88A will greatly enhance that aircraft's lethality. The missile is also suitable for adaptation to the F-4E, B-52, and F-15 and F-16. Procurement of 118 AGM-88As was authorized in FY '82, 129 in FY '83, and 285 in FY '84. Funding for 871 is requested in the FY '85 budget proposals.

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 is more than ten miles.

GBU-15

The GBU-15 is an air-launched cruciform-wing glide bomb fitted with a guidance system designed to give it pinpoint accuracy from low altitudes, or over medium standoff ranges greater than 5.75 miles. Development began in 1974, based on experience gained in Vietnam with the earlier Pave Strike/GBU-8 HOBOS 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 attach to the rear.

The weapon offers two basic trajectories. For direct trajectory, the weapon is locked on target before launch and flies a near line-of-sight profile to impact. The indirect profile includes a midcourse glide phase which extends standoff capability. In this profile, 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. Successful launches have been achieved from F-4s and F-111s. Full-scale production of the TV-guided GBU-15(V)/B began in September 1980.

Contractor: Rockwell International Corporation.
Guidance: TV. An imaging infrared seeker is under development.
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: approx 2,617 lb.

ALMV (ASAT)

Under USAF contract, Vought Corporation and the Boeing Company are developing and flight testing a small high-technology air-launched antisatellite (ASAT) weapon capable of destroying enemy satellites at 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 air-launched miniature vehicle (ALMV) with Hughes infrared terminal seeker and conventional warhead mounted forward of the second stage. The guidance system is by Singer-Kearfott.

ASAT will be carried by two squadrons of designated air defense F-15s, based at Langley AFB, Va., and McChord AFB, Wash., from about 1987. The operational ASAT will be released from the F-15 in a zoom climb. Immediately before separation from the Altair, the miniature homing vehicle will be spun up to 20 rps for stabilization. Small solid-propellant rocket motors will then provide course corrections as a laser gyro and the infrared seeker guide it to target impact at heights up to 620 miles.

tinuing. FY '85 budget requests include $143.3 million for R&D and $83 million for procurement.

AIM-120A (AMRAAM)

Full-scale development of this new radar-guided advanced medium-range air-to-air missile (AMRAAM) has been under way since 1981. Intended as a replacement for the AIM-7 Sparrow, AMRAAM will provide an all-environment capability for USAF's F-15 and F-16 and the Navy's F-14 and F/A-18 fighters. The second guided launch of a prototype missile, on November 23, 1981, involved a look-down/shoot-down tail attack on a QF-102 target over a range of six miles. The F-15 launch aircraft was flying at Mach 0.75 at 6,000 ft; the QF-102, cruising at Mach 0.7 only 1,000 ft above the ground, received a direct hit.

The AIM-120A has inertial midcourse guidance and active radar terminal homing that provides launch-and-maneuver, launch-and-leave, and autonomous modes. 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.

First production buy of 174 missiles is planned for FY '85, followed by 1,042 in 1986, and rising to a dual-source production rate of 250 per month. Total planned USN and USAF buy is anticipated at 20,000 missiles.

Contractor: Hughes Aircraft Company.
Guidance: inertial midcourse, with active radar terminal homing.
Dimensions: length 11 ft 9 in, body diameter 0 ft 7 in, span of tail control fins 2 ft 1 in.
Weight: 326 lb.
Performance: cruising speed approx Mach 4.

AGM-84 Harpoon

USAF plans to procure 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 limited operational capability was achieved in October. FY '85 budget requests include a first batch of 85 Harpoons for this program. Currently, modified aircraft are located at Loring AFB, Me., for Atlantic operations. As others are modified, Harpoon-compatible B-52Gs will also be based at Andersen AFB, Guam, for Pacific operations. About four E-3C AWACS aircraft will be modified under the Outlaw Shark program to support the B-52Gs by over-the-horizon target location and tracking. Each B-52G will carry up 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 500 lb.
Dimensions: length 12 ft 7 in, body diameter 1 ft 1½ in, wing span 3 ft.
Weight: 1,160 lb.
Performance: speed high subsonic, range over 57 miles.

GBU-15

ALMV (ASAT) on an F-15

HVM

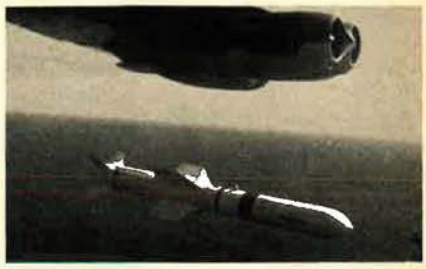
Under a USAF contract awarded in late 1981, Vought Missiles and Advanced Programs Division of LTV is developing a guided air-to-surface hypervelocity missile (HVM) system capable of defeating all types of vehicles in an armored assault force. The system will consist of pods containing launch tubes for up to 40 HVMs per aircraft and a laser radar guidance system. 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 have 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 3,355 mph and have a max range of about 3.7 miles. Its weight is expected to be less than 48 lb.

Rapier

Rapier is unique 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 being deployed at seven USAF bases in the UK to protect Air Force installations. Funding continues with the purchase of 12 Rapier systems in FY '84 and eight in FY '85. 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. In normal use, the four-round fire unit is towed by a Land-Rover that also carries the Blindfire radar and optical trackers and four missiles in sealed containers. A second Land-Rover tows a trailer with nine reload missiles.

Contractor: British Aerospace Dynamics Group.
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 3 in, body diameter 5 in, wing span 1 ft 3 in.
Weight: approx 92 lb.
Performance: max speed more than Mach 2, range 4 miles.

AIM-120A (AMRAAM)



AGM-84 Harpoon launch from a B-52

Rapier SAM

Launch Vehicles

Agena

Atlas-Centaur

Scout

Titan III(34)D

Agena

Offering a wide range of applications, Agenas have, since 1959, served as satellite or booster on more missions than any other spacecraft in the world. This inherent versatility derives basically from a payload section (nosecone) able to accommodate a variety of earth-orbiting and space probes weighing up to several hundred pounds. Agena has been utilized as the upper stage of such launchers as Atlas and Titan III, but is no longer used with Atlas. With its attached payload, it has functioned for longer than six months on some USAF missions. An Agena spacecraft was the first to accomplish a rendezvous and docking by spacecraft in orbit and to provide propulsion power in space for another spacecraft. The current **Agena D** version was first tested successfully in June 1962, and is able to accept a variety of payloads, unlike the earlier A and B, which had integrated payloads. The restartable engine permits the satellite to change its orbit in space.

Prime Contractor: Lockheed Missiles and Space Company, Inc.

Power Plant: Bell Aerosystems YLR81-BA-11 liquid-propellant rocket engine, 16,000 lb thrust.

Dimensions (Agena D): length (typical) 23 ft 3 in, diameter 5 ft 0 in.

Launch Weight (typical Agena D): 15,037 lb.

Atlas Launchers

Atlas is a "stage-and-a-half" vehicle, consisting of side booster and central sustainer sections. Current launch versions are as follows:

Atlas SLV-3A: An upgraded version of the earlier SLV-3 for USAF and NASA, with lengthened propellant tanks. No longer used with the Agena upper stage, but able to serve as a direct-ascent vehicle or in conjunction with other upper stages.

Atlas SLV-3D: Although intended for use primarily with the Centaur D-1A upper stage, the SLV-3D is standardized like the SLV-3A and can be used on other missions. In 1972, Pioneer-10 was launched on its flight path to Jupiter with the highest velocity ever imparted to a spacecraft, the launch vehicle being an Atlas/Centaur with an additional TE-M-364-4 solid-propellant rocket motor.

Atlas-E/F: ICBMs modified to space launch configuration, used to launch various USAF and NASA/NOAA satellites.

Prime Contractor: General Dynamics Corporation, Convair Division.

Power Plant: uprated Rocketdyne MA-5 propulsion system, comprising central sustainer motor and two boosters; total S/L thrust approx 431,040 lb (60,000 lb from the central sustainer motor, 370,000 lb total from the boosters, 1,040 lb from two verniers).

Dimensions: length SLV-3A 78 ft 11 in; SLV-3D/Centaur 131 ft; max body diameter 10 ft 0 in.

Launch Weight (SLV-3A): 314,000 lb.

Performance (SLV-3A/Centaur): capable of putting payload of 11,300 lb into a 100 nm circular orbit, of launching 4,150 lb into synchronous transfer orbit, or of sending 1,250 lb to nearest planet.

Centaur

First US high-energy upper stage and first to utilize liquid hydrogen as a propellant. The latest version, Centaur D-1, is used currently with the Atlas SLV-3D, but was used previously with the Titan IIIE and has demonstrated widely ranging applications and capabilities. The nose section of Atlas is modified to a constant 10 ft diameter to accommodate the Centaur D-1A (A for Atlas), 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, for which launch missions have been assigned into 1984. Centaur's multiburn and extended coast capability were first used operationally during the 1977 Mariner Jupiter/Saturn missions.

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 only): length 30 ft 0 in, diameter 10 ft 0 in.

Launch Weight (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: Vought Corporation (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.

Titan III

Titan III can be modified to launch a wide variety of payloads, both manned and unmanned, ranging from 35,000 lb in earth orbit to 7,000 lb for planetary missions. The basic core section consists of two booster stages based on the Titan II ICBM. An upper stage, known as Transtage, capable of functioning both in the boost phase of flight and as a restartable space propulsion vehicle, is used on the Titan IIIC version. Current configurations are:

Titan IIIB: the two-stage core vehicle, able to accommodate various upper stages. First launched in July 1966 and used subsequently with Agena upper stages to launch USAF payloads.

Titan IIIC: consists of the core section, and the Transtage upper stage, with two five-segment strap-on motors functioning as a booster before ignition of the main engines. First launched in June 1965.

Titan IIID: basically similar to IIIC but using only the first two stages (the core section) and able to accept a variety of upper stages. Current vehicles use radio guidance. Production contract for original IIID placed by USAF in 1967.

Titan III(34)D: instead of Transtage, future Titan IIIs were intended to use the Boeing Inertial Upper Stage developed for the Space Shuttle. Designated Titan III(34)D, these vehicles were to be used for some primary launches, as well as for backup of the Space Shuttle during the transition period. The first Titan III(34)D was completed in February 1981. First flight, from Cape Canaveral in October 1982, orbited a military payload. Fourteen vehicles were ordered by USAF, with eight scheduled to fly from Cape Canaveral, the remainder from Vandenberg AFB, beginning last summer.

FY '85 budget requests include $45.7 million for procurement and R&D associated with Titan III boosters.

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; Titan IIIC/Ds also have two CSD five-segment solid-propellant booster rocket motors; each more than 1,150,000 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 Weights (approx): Titan IIIB, 375,000 lb; Titan IIIC, 1,400,000 lb.

Performance (Titan IIIC): 3,550 lb to geosynchronous orbit.

Space Shuttle Transportation System

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, extendable up to 30 days. On completion of a mission, the Orbiter flies back into the atmosphere and, once through the reentry phase, is able to glide up to 1,100 miles to its base, steered by aerodynamic controls.

Accommodation is provided in a two-level cabin for up to seven 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. Three 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,* have been funded to date. 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, by *Columbia* and *Challenger,* further satellites have been deployed; 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 the IUS booster, is scheduled for late 1984. To ensure adequate security, new Shuttle facilities are scheduled for completion at Vandenberg AFB West Coast launch and landing site by October 1985.

Prime Contractors: Rockwell International (Orbiter), Martin Marietta (propellant tank), Thiokol (boosters).
Power Plant: three Rocketdyne main engines, each 393,800 lb thrust at liftoff. Two Thiokol solid-propellant rocket boosters, each 3,239,600 lb thrust at liftoff.
Guidance: automatic and manual control.
Dimensions: Orbiter: length 122 ft 2½ in, wing span 78 ft 0.7 in, height 56 ft 8 in.
Launch Weights: Shuttle complete approx 4,500,000 lb, Orbiter (empty) 150,000 lb, external tank (full) 1,628,565 lb, boosters (2) each 1,289,004 lb.

***Space Shuttle Orbiter* Challenger**

Inertial Upper Stage (IUS)

The IUS is intended to serve as an upper stage for both the Titan III(34)D 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 will have the capability of boosting 5,000 lb into geosynchronous orbit for Shuttle missions, and 4,000 lb into geosynchronous orbit when used with the Titan III(34)D. It is anticipated that the majority of IUS missions will be to such orbits, but the IUS will also be capable of delivering heavy payloads to intermediate orbits, such as a nominal 12-hour, 350 × 21,450 nm elliptical orbit.

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.

Remotely Piloted Vehicles (RPVs)

YCGM-121A Pave Tiger

A direct result of a QRC (quick reaction capability) program known as Pave Tiger, the YCGM-121A is a ground-launched expendable mini-RPV, derived from a private, company-funded mini-RPV which had begun flight testing in 1980–82. It is intended to attack specific, high-priority ground targets, such as C^3 terminals, in nonnuclear war zones, the aim being to enhance the effectiveness of the tactical fighter force. The vehicle flies a preprogrammed mission, controlled by a Boeing autopilot; onboard sensors permit microprocessors to guide it along its flight path to its destination. Mission payloads can include ECM packages, warheads, and sensors.

Contractor: Boeing Military Airplane Company.
Power Plant: one Cuyuna two-stroke engine; 28 hp.
Dimensions (approx): length 7 ft 0 in, body diameter (max) 2 ft 0 in, span 8 ft 6 in.
Weight: max launching weight, excl booster 250 lb.
Performance: max level speed 115 mph.

MQM-107B

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, used principally for towing a variety of targets for missile practice and evaluation. Improvements already tested and proven on the A version are incorporated on the B version. MQM-107Bs assigned to Tyndall AFB, Fla., and Wallace Air Station in the Philippines are used to test and evaluate air-to-air missiles. An initial order for ten each for the USAF and US Army was supplemented in April 1983, with the USAF to receive an additional 25, and the Army 39. Deliveries are scheduled between August this year and May 1985.

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. Terrain-following capability; 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 5,000 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 Air Station 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. In order to reduce the target's vulnerability, and increase its cost-effectiveness, a "non-kill" environment has been created and extensive use made of infrared and/or radar-augmented towed targets ("Towbees") or cloth banners, towed behind on cables. (Data for BQM-34A.)

Contractor: Teledyne Ryan Aeronautical.
Power Plant: one Teledyne CAE J69-T-29 turbojet engine; 1,700 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 50 to more than 60,000 ft, max range 796 miles. ■

MQM-107B

BQM-34A Firebee

BQM-34F Firebee II

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Serving The Air Force By Doing What We Do Best

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. 14, 1927	Dec. 19, 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 20, 1941
Army Air Forces (AAF)	June 20, 1941	Sept. 18, 1947	Gen. H. H. Arnold	Chief of the AAF	June 20, 1941	Mar. 8, 1942
			Gen. H. H. Arnold	Commanding General, AAF	Mar. 9, 1942	Feb. 28, 1946
			Gen. Carl A. Spaatz	Commanding General, AAF	Mar. 1, 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 p. 186.

UNITED STATES AIR FORCE PERSONNEL STRENGTH—1907 THROUGH 1985

YEAR	STRENGTH	YEAR	STRENGTH
1907	3	1946	455,515
1908	13	1947	305,827
1909	27	1948	387,730
1910	11	1949	419,347
1911	23	1950	411,277
1912	51	1951	788,381
1913	114	1952	973,474
1914	122	1953	977,593
1915	208	1954	947,918
1916	311	1955	959,946
1917	1,218	1956	909,958
1918	195,023	1957	919,835
1919	25,603	1958	871,156
1920	9,050	1959	840,028
1921	11,649	1960	814,213
1922	9,642	1961	820,490
1923	9,441	1962	883,330
1924	10,547	1963	868,644
1925	9,670	1964	855,802
1926	9,674	1965	823,633
1927	10,078	1966	886,350
1928	10,549	1967	897,426
1929	12,131	1968	904,759
1930	13,531	1969	862,062
1931	14,780	1970	791,078
1932	15,028	1971	755,107
1933	15,099	1972	725,635
1934	15,861	1973	690,999
1935	16,247	1974	643,795
1936	17,233	1975	612,551
1937	19,147	1976	585,207
1938	21,089	1977	570,479
1939	23,455	1978	569,491
1940	51,165	1979	559,450
1941	152,125	1980	557,969
1942	764,415	1981	570,302
1943	2,197,114	1982	582,845
1944	2,372,292	1983	592,044
1945	2,282,259	1984	594,500*
		1985	610,200*

*Programmed

USAF TOTAL ACTIVE-DUTY STRENGTH BY GRADE

(As of September 30, 1983)

AIRMEN

GRADE	NUMBER
CHIEF MASTER SERGEANT	4,831
SENIOR MASTER SERGEANT	9,667
MASTER SERGEANT	35,216
TECHNICAL SERGEANT	54,537
STAFF SERGEANT	105,533
SERGEANT/SENIOR AIRMAN	104,643
AIRMAN FIRST CLASS	124,570
AIRMAN	23,068
AIRMAN BASIC	20,957
TOTAL	**483,022**

OFFICERS

GRADE	NUMBER
GENERAL	12
LIEUTENANT GENERAL	39
MAJOR GENERAL	120
BRIGADIER GENERAL	172
COLONEL	5,420
LIEUTENANT COLONEL	12,519
MAJOR	19,153
CAPTAIN	38,493
FIRST LIEUTENANT	15,224
SECOND LIEUTENANT	13,409
TOTAL	**104,558**
CADETS	4,466
AIRMEN	483,022
TOTAL STRENGTH	**592,046**

USAF AND AIR RESERVE FORCES PERSONNEL BY CATEGORIES

CATEGORY	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85[1]
AIR FORCE MILITARY						
Officers	98,000	99,000	102,000	104,600	106,600	108,700
Airmen	456,000	467,000	476,000	483,000	483,500	497,100
Cadets	4,000	4,000	4,000	4,500	4,400	4,400
TOTAL, AIR FORCE MILITARY	**558,000**	**570,000**	**582,000**	**592,100**	**594,500**	**610,200**
Career Reenlistments	38,000	43,000	44,400	43,500	44,700	52,600
Rate	82%	86%	90%	92%	92%	92%
First-Term Reenlistments	15,000	19,000	27,100	31,100	24,400	26,400
Rate	36%	43%	57%	66%	63%	60%
CIVILIAN PERSONNEL						
Direct Hire (Including Technicians)	231,000	233,000	235,500	230,000	236,200	240,060
Indirect Hire—Foreign Nationals	13,000	13,000	13,000	13,000	13,300	13,578
TOTAL, CIVILIAN PERSONNEL	**244,000**	**246,000**	**248,500**	**243,000**	**249,500**	**253,638**
TOTAL, MILITARY AND CIVILIAN[2]	**802,000**	**816,000**	**830,500**	**844,500**	**861,600**	**863,838**
Technicians (included above as Direct Hire Civilians)						
AFRES Technicians	6,736	7,600	7,748	7,984	8,169	8,484
ANG Technicians	21,815	21,829	21,834	21,949	21,846	21,846
AIR RESERVE FORCES						
Air National Guard, Selected Reserve	96,000	98,000	100,700	102,200	104,104	107,890
Air Force Reserve, Paid	60,000	62,000	64,500	67,227	69,880	74,829
Air Force Reserve, Nonpaid	45,000	44,000	43,000	42,864	31,204	29,099
TOTAL, READY RESERVE	**201,000**	**202,000**	**208,200**	**212,291**	**205,188**	**211,818**
Standby	44,000	37,000	33,000	28,939	27,844	29,099
TOTAL, AIR RESERVE FORCES[3]	**245,000**	**239,000**	**241,200**	**241,230**	**233,032**	**239,362**

[1]President's Budget Request.
[2]FY '80–83 are actual figures; FY '84–85 are estimates; excludes nonchargeable personnel.
[3]Excludes Retired Air Force Reserve.

NOTE: Totals may not add due to rounding.

USAF PERSONNEL STRENGTH BY COMMANDS, SOAs, AND DRUs

(Assigned Strengths as of September 30, 1983)

MAJOR COMMANDS	MILITARY	CIVILIAN	TOTAL
Air Force Communications Command (AFCC)	44,566	7,226	51,792
Air Force Logistics Command (AFLC)	10,951	83,962	94,913
Air Force Systems Command (AFSC)	27,408	27,274	54,682
Air Training Command (ATC)	71,375	14,025	85,400
Air University (AU)	7,473	1,695	9,168
Alaskan Air Command (AAC)	7,604	1,171	8,775
Electronic Security Command (ESC)	11,900	981	12,881
Military Airlift Command (MAC)	78,055	16,245	94,300
Pacific Air Forces (PACAF)	27,048	9,363	36,411
Space Command (SPACECOM)	5,018	1,231	6,249
Strategic Air Command (SAC)	107,019	12,537	119,556
Tactical Air Command (TAC)	104,412	11,783	116,195
United States Air Forces in Europe (USAFE)	60,002	9,829	69,831
TOTALS	**562,831**	**197,322**	**760,153**
SEPARATE OPERATING AGENCIES (SOAs)	**MILITARY**	**CIVILIAN**	**TOTAL**
Air Force Accounting and Finance Center (AFAFC)	240	2,043	2,333
Air Force Audit Agency (AFAA)	234	743	977
Air Force Commissary Service (AFCOMS)	707	9,301	10,008
Air Force Engineering and Services Center (AFESC)	403	450	853
Air Force Inspection and Safety Center (AFISC)	367	138	505
Air Force Intelligence Service (AFIS)	562	195	757
Air Force Legal Services Center (AFLSC)	393	146	539
Air Force Manpower and Personnel Center (AFMPC)	1,773	856	2,629
Air Force Medical Service Center (AFMSC)	97	62	159
Air Force Office of Security Police (AFOSP)	66	59	125
Air Force Office of Special Investigations (AFOSI)	1,842	398	2,240
Air Force Operational Test and Evaluation Center (AFOTEC)	484	131	615
Air Force Service Information and News Center (AFSINC)	681	168	849
Air Reserve Personnel Center (ARPC)	545	11,598	12,143
DIRECT REPORTING UNITS (DRUs)			
USAF Historical Research Center (USAFHRC)	22	68	90
National Guard Bureau (NGB)	2,429	1,705	4,374
United States Air Force Academy (USAFA)*	2,669	1,694	4,363
Other	9,961	25,207	34,868
TOTALS, SOAs and DRUs	**23,175**	**54,992**	**78,167**
TOTALS, COMMANDS, SOAs, and DRUs	**586,006**	**252,314**	**838,320**

*4,415 cadets not included.

AIR FORCE MILITARY PERSONNEL DISTRIBUTION BY GEOGRAPHIC AREA

(As of September 30, 1983)

TOTAL MILITARY PERSONNEL	**592,044**		
US TERRITORY AND SPECIAL LOCATIONS	**468,344**		
TOTAL IN FOREIGN COUNTRIES	**123,695**	Africa, Near East, S. Asia (Major concentrations in Egypt—94, Saudi Arabia—309)	525
Western and Southern Europe (Major concentrations in Germany—39,244, UK—25,211, Spain—5,265, Italy—4,645, Turkey—3,981)	86,198	Western Hemisphere (Major concentrations in Canada—249, Panama [Republic]—2,043)	2,379
East Asia and Pacific (Major concentrations in Japan/Okinawa—14,409, Philippines—9,102, South Korea—10,707)	34,560	Eastern Europe	18
		Undistributed	15

NUMBER OF OFFICERS IN EACH MAJOR CAREER FIELD*

CODE	UTILIZATION FIELD TITLE	ASSIGNED
00**	Commanders and Directors	3,602
02	International-Politico-Military Affairs	256
05	Disaster Preparedness	37
09	Special Duty	1,842
10–14	Pilot	20,665
15 & 22	Navigator	9,110
16	Air Traffic Control	468
17	Air Weapons Director	2,149
18	Missile Operations	3,198
20	Space Systems	1,031
23	Audiovisual	101
25	Weather	1,326
26	Scientific	1,491
27	Acquisition Program Management	2,218
28	Development Engineer	5,702
29	Program Management	222
30	Communications-Electronics	3,530
31	Missile Maintenance	515
40	Aircraft Maintenance & Munitions	3,824
51	Computer Technology	3,171
55	Civil Engineering	2,382
57	Cartography/Geodesy	80
60	Transportation	1,012
62	Supply Service	408
64	Supply Management	1,360
65	Procurement/Manufacturing Management	1,499
66	Logistics Plans & Programs	1,089
67	Financial	1,184
69	Management Analysis	259
70	Administration	2,467
73	Personnel	1,962
74	Manpower Management	615
75	Education & Training	705
79	Public Affairs	579
80	Intelligence	2,911
81	Security Police	1,048
82	Special Investigations & Counterintelligence	549
87	Band	34
88	Legal	1,254
89	Chaplain	843
90	Health Services Management	1,133
91 & 92	Biomedical Sciences	2,099
93–95	Physician	3,741
97	Nurse	4,497
98	Dental	1,611
99	Veterinary	146

*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	1,597
11	Aircrew Operations	7,971
12	Aircrew Protection	2,592
20	Intelligence	13,019
22	Photomapping	121
23	Audiovisual	3,146
24	Safety	1,316
25	Weather	2,931
27	Command Control Systems Operations	16,967
29	Communications Operations	9,781
30	Communications-Electronics Systems	28,097
31	Missile Electronic Maintenance	3,844
32	Avionics Systems	31,755
34	Training Devices	2,680
36	Wire Communications Systems Maintenance	4,252
39	Maintenance Management Systems	2,997
40	Intricate Equipment Maintenance	861
42	Aircraft Systems Maintenance	43,585
43	Aircraft Maintenance	43,923
44	Missile Maintenance	3,807
46	Munitions & Weapons Maintenance	23,739
47	Vehicle Maintenance	5,276
51	Computer Systems	6,929
54	Mechanical/Electrical	10,041
55	Structural/Pavements	13,146
56	Sanitation	1,596
57	Fire Protection	5,999
59	Marine	115
60	Transportation	13,920
61	Supply Services	2,500
62	Food Services	5,042
63	Fuels	6,579
64	Supply	25,433
65	Procurement	1,534
66	Logistics Plans	954
67	Accounting & Finance, and Auditing	5,411
69	Management Analysis	461
70	Administration	28,618
73	Personnel	11,422
74	Morale, Welfare & Recreation	1,681
75	Education & Training	3,483
79	Public Affairs	1,220
81	Security Police	40,010
82	Special Investigations & Counterintelligence	901
87	Band	1,089
90–92	Medical	22,639
98	Dental	3,320
99	Miscellaneous (Special Duty, Patients, Unclassified, etc.)	14,717

USAF PERSONNEL BY GRADE, RACE, AND SEX

(As of September 30, 1983)

OFFICERS

GRADE	FORCE	BLACK*	OTHER**	WOMEN***
GENERAL	338	6	2	3
COLONEL	5,420	106	56	77
LIEUTENANT COLONEL	12,519	293	197	334
MAJOR	19,153	454	322	930
CAPTAIN	38,493	2,534	633	4,616
FIRST LIEUTENANT	15,224	1,207	347	2,627
SECOND LIEUTENANT	13,409	960	320	1,973
TOTALS	**104,556**	**5,560**	**1,877**	**10,560**

AIRMEN

GRADE	FORCE	BLACK*	OTHER**	WOMEN***
CHIEF MASTER SERGEANT	4,831	519	65	13
SENIOR MASTER SERGEANT	9,667	1,401	140	29
MASTER SERGEANT	35,216	5,212	596	259
TECHNICAL SERGEANT	54,537	9,437	1,231	1,815
STAFF SERGEANT	105,533	20,156	3,349	11,996
SERGEANT/SENIOR AIRMAN	104,643	20,156	3,828	18,877
AIRMAN FIRST CLASS	124,570	19,523	4,260	15,815
AIRMAN	23,068	3,647	721	3,336
AIRMAN BASIC	20,957	2,619	736	2,637
TOTALS	**483,022**	**82,629**	**14,926**	**54,777**
TOTALS, INCLUDING OFFICERS	**587,578**	**88,189**	**16,803**	**65,337**

*Includes 12,605 women.
**Includes 1,993 women.
***Includes women from black and other categories.

AVERAGE AGES OF MILITARY PERSONNEL

(As of September 30, 1983)

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

MONTHLY MILITARY BASIC RATES OF PAY

(Effective January 1, 1984)

PAY GRADE	YEARS OF SERVICE: UNDER 2	2	3	4	6	8	10	12	14	16	18	20	22	26
COMMISSIONED OFFICERS														
O-10	$4,874	$5,046	$5,046	$5,046	$5,046	$5,239	$5,239	$5,640*	$5,640*	$6,044*	$6,044*	$6,448*	$6,448*	$6,850*
O-9	4,320	4,433	4,527	4,527	4,527	4,642	4,642	4,836	4,836	5,239	5,239	5,640*	5,640*	6,044*
O-8	3,912	4,030	4,125	4,125	4,125	4,433	4,433	4,642	4,642	4,836	5,046	5,239	5,449	5,449
O-7	3,251	3,472	3,472	3,472	3,627	3,627	3,838	3,838	4,030	4,433	4,737	4,737	4,737	4,737
O-6	2,409	2,647	2,821	2,821	2,821	2,821	2,821	2,821	2,916	3,378	3,551	3,627	3,838	4,163
O-5	1,927	2,263	2,419	2,419	2,419	2,419	2,493	2,627	2,802	3,012	3,185	3,282	3,396	3,396
O-4	1,624	1,978	2,110	2,110	2,149	2,244	2,397	2,532	2,647	2,763	2,840	2,840	2,840	2,840
O-3	1,509	1,687	1,804	1,996	2,091	2,167	2,284	2,397	2,456	2,456	2,456	2,456	2,456	2,456
O-2	1,316	1,437	1,727	1,785	1,822	1,822	1,822	1,822	1,822	1,822	1,822	1,822	1,822	1,822
O-1	1,143	1,189	1,437	1,437	1,437	1,437	1,437	1,437	1,437	1,437	1,437	1,437	1,437	1,437
COMMISSIONED OFFICERS WITH MORE THAN 4 YEARS OF ACTIVE ENLISTED OR WARRANT OFFICER SERVICE														
O-3E	—	—	—	1,996	2,091	2,167	2,284	2,397	2,493	2,493	2,493	2,493	2,493	2,493
O-2E	—	—	—	1,785	1,822	1,880	2,053	2,110	2,110	2,110	2,110	2,110	2,110	2,110
O-1E	—	—	—	1,437	1,535	1,592	1,650	1,707	1,785	1,785	1,785	1,785	1,785	1,785
ENLISTED MEMBERS														
E-9	—	—	—	—	—	—	1,788	1,829	1,871	1,914	1,956	1,994	2,099	2,303
E-8	—	—	—	—	—	1,500	1,543	1,583	1,625	1,668	1,706	1,748	1,851	2,057
E-7	1,047	1,130	1,173	1,213	1,255	1,295	1,336	1,378	1,440	1,481	1,523	1,542	1,646	1,851
E-6	901	982	1,023	1,067	1,106	1,146	1,188	1,250	1,289	1,331	1,351	1,351	1,351	1,351
E-5	791	861	902	942	1,003	1,044	1,086	1,126	1,146	1,146	1,146	1,146	1,146	1,146
E-4	738	779	824	888	924	924	924	924	924	924	924	924	924	924
E-3	695	732	762	792	792	792	792	792	792	792	792	792	792	792
E-2	668	668	668	668	668	668	668	668	668	668	668	668	668	668
E-1**	596	596	596	596	596	596	596	596	596	596	596	596	596	596

NOTE: Amounts less than $1 have been omitted.
*Basic pay is limited to $5,499.90, or Level V of the Executive Schedule.
**Basic pay for E-1s with less than four months of service is $573.60.
Basic pay while serving as Chairman of the Joint Chiefs of Staff or as Chief of Staff of the Air Force is $7,558.80, regardless of cumulative years of service.
Basic pay while serving as Chief Master Sergeant of the Air Force is $2,800.20, regardless of cumulative years of service.

MONTHLY BASIC ALLOWANCE FOR QUARTERS (BAQ)

(Effective January 1, 1984)

Pay Grade	Without Dependents		With Dependents
	Full*	Partial**	
C/S and O-10	$528.90	$50.70	$661.80
O-9	528.90	50.70	661.80
O-8	528.90	50.70	661.80
O-7	528.90	50.70	661.80
O-6	474.90	39.60	579.00
O-5	437.70	33.00	527.10
O-4	389.70	26.70	470.10
O-3	342.60	22.20	422.70
O-2	297.60	17.70	376.20
O-1	232.50	13.20	302.40
CMSAF and E-9	283.20	18.60	398.70
E-8	261.00	15.30	368.10
E-7	222.00	12.00	342.60
E-6	201.90	9.90	315.30
E-5	194.10	8.70	289.80
E-4	171.00	8.10	254.70
E-3	153.00	7.80	222.00
E-2	135.00	7.20	222.00
E-1	127.50	6.90	222.00
E-1***	122.70	6.90	213.60

*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.

**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(d) and Part IV of Executive Order 11157, as amended.

***BAQ for E-1s with less than four months of active-duty service.

MONTHLY INCENTIVE PAY RATES*

(Effective September 1, 1982)

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 as Computed under 37 U.S.C. 205
$370	more than 18
$340	more than 20
$310	more than 22
$280	more than 24
$250	more than 25 (O-6 and below)

Non-Crew Member Flying Pay

	Monthly Rate
Officer	$110
Enlisted Non-Crew Member	$ 83

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

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
$102.10	$4.87 $4.68*	$5.50 $5.29*	$7.28 $7.00*

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

EDUCATIONAL LEVELS—USAF LINE OFFICERS

Level	End of September 1983 Number	Percent
Below baccalaureate/unknown	276	0.31
Baccalaureate, no master's degree	53,099	59.56
Master's degree, no doctorate	34,408	38.60
Doctoral and professional degrees	1,362	1.53
TOTALS	**89,145**	**100.00**

EDUCATIONAL LEVELS—USAF ENLISTED FORCE

Level	End of September 1983 Number	Percent
Below high school	3,629	0.75
High school	330,444	68.70
Some college (less than two years)	90,901	18.90
AA/AS degree	13,458	2.80
Two to three years of college	30,631	6.37
Baccalaureate, no master's	10,890	2.26
Master's or higher	1,067	0.22
TOTALS	**481,020**	**100.00**

FEDERAL CIVILIAN PAY SCALE

General Schedule

(Effective January 1, 1984)

GRADE	1	2	3	4	5	6	7	8	9	10
GS-1	$8,980	$9,279	$9,876	$9,876	$10,175	$10,350	$10,646	$10,942	$10,955	$11,232
GS-2	10,097	10,337	10,671	10,955	11,078	11,404	11,730	12,056	12,382	12,708
GS-3	11,017	11,384	11,751	12,485	12,485	12,852	13,219	13,586	13,953	14,320
GS-4	12,367	12,779	13,191	13,603	14,015	14,427	14,839	15,251	15,663	16,075
GS-5	13,837	14,298	14,759	15,220	15,681	16,142	16,603	17,064	17,525	17,986
GS-6	15,423	15,937	16,451	16,965	17,479	17,993	18,507	19,021	19,535	20,049
GS-7	17,138	17,709	18,280	18,851	19,422	19,993	20,564	21,135	21,706	22,277
GS-8	18,981	19,614	20,247	20,880	21,513	22,146	22,779	23,412	24,045	24,678
GS-9	20,965	21,664	22,363	23,062	23,761	24,460	25,159	25,858	26,557	27,256
GS-10	23,088	23,858	24,628	25,398	26,168	26,938	27,708	28,478	29,248	30,018
GS-11	25,366	26,212	27,058	27,904	28,750	29,596	30,442	31,288	32,134	32,980
GS-12	30,402	31,415	32,428	33,441	34,454	35,467	36,480	37,493	38,506	39,519
GS-13	36,152	37,357	38,562	39,767	40,972	42,177	43,382	44,587	45,792	46,997
GS-14	42,722	44,146	45,570	46,994	48,418	49,842	51,266	52,690	54,114	55,538
GS-15	50,252	51,927	53,602	55,277	56,952	58,627	60,302	61,977	63,652	65,327
GS-16	58,938	60,903	62,868	64,833	66,798*	68,763*	70,728*	72,693*	74,658*	
GS-17	69,042*	71,343*	73,644*	75,945*	78,246*					
GS-18	78,184*									

Senior Executive Service**

LEVEL	1	2	3	4	5	6
	$58,938	$61,292	$63,646	$66,000	$67,800	$69,600

*Pay limited to Level V of the Executive Schedule, $66,000.
**Basic pay for employees at these rates is limited to $69,600, in accordance with Public Law 97-377.

AIR FORCE FULL-TIME CIVILIAN EMPLOYMENT BY GRADE

(As of September 30, 1983)

GS/OTHER		WG		WL		WS	
GR	POP	GR	POP	GR	POP	GR	POP
1	77	1	218	1	0	1	31
2	741	2	1,123	2	28	2	53
3	6,943	3	844	3	1	3	133
4	17,026	4	1,496	4	46	4	224
5	23,060	5	3,947	5	59	5	392
6	9,504	6	4,415	6	46	6	514
7	14,075	7	5,513	7	50	7	1,054
8	3,120	8	7,012	8	152	8	915
9	18,521	9	6,715	9	246	9	1,412
10	1,195	10	20,229	10	947	10	1,700
11	16,982	11	5,600	11	131	11	683
12	17,244	12	2,165	12	16	12	398
13	8,970	13	352	13	0	13	338
14	3,169	14	116	14	0	14	224
15	1,012	15	3	15	0	15	120
16	2					16	40
17	0					17	14
18	1					18	2
ST	6					19	1
SES	225						
TOTALS	**141,873**		**59,748**		**1,722**		**8,248**

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.

AIR FORCE CIVILIAN PERSONNEL AVERAGE AGE AND LENGTH OF SERVICE

(As of December 31, 1983)

Average age	42.12 years
Average length of service	14.17 years

DoD FINANCIAL SUMMARY BY COMPONENT FOR FY 1983–85

(TOA in Billions of Dollars)

Component	FY '83	FY '84	FY '85
Army	$ 57.65	$ 62.56	$ 77.92
Navy	81.53	82.00	101.30
Air Force	73.78	86.34	108.73
Defense Agencies/OSD	9.28	10.77	13.90
Defense-wide	16.50	17.40	3.83
TOTALS	**$238.74**	**$259.07**	**$305.68**

NOTE: Totals may not add due to rounding.

DoD BUDGETS BY MISSION CATEGORIES FOR FY 1983–87

(Billions of Dollars)

	Total Budget Authority in Current Dollars (1983 figures actual; 1984–87 estimates)					
Military Program	**1983**	**1984**	**1985**	**1986**	**1987**	**Change FY 1984–85**
Strategic Forces[1]	$ 19.7	$ 26.3	$ 31.6	$ 33.9	$ 32.7	+ 5.3
General-Purpose Forces	98.8	99.7	128.2	151.0	168.7	+28.5
Intelligence and Communications	17.3	20.1	25.8	28.7	30.9	+ 5.7
Airlift and Sealift	4.3	5.6	7.5	9.6	9.6	+ 1.9
Guard and Reserve Forces	12.1	12.9	16.5	19.0	21.8	+ 3.6
Research and Development[2]	18.7	21.4	27.0	30.5	32.0	+ 5.6
Central Supply and Maintenance	21.6	22.5	26.5	29.3	32.1	+ 4.0
Training, Medical, and Other General Personnel Activities[3]	42.2	44.2	35.6	40.1	43.4	− 8.6
Administrative and Associated Activities	4.1	4.8	5.6	6.6	7.1	+ 0.8
Support of Other Nations	0.7	0.7	0.7	0.9	0.9	+ 0.0
TOTAL BUDGET AUTHORITY	**$239.5**	**$258.2**	**$305.0**	**$349.6**	**$379.2**	**+46.8**

NOTE: Totals may not add due to 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.
[3]Military retired pay is included in training, medical, and other general personnel activities through 1984. In 1985 and later years, military retired pay is funded on an accrual basis with costs distributed to all mission categories.

INSTALLATIONS OF THE US AIR FORCE

MAJOR INSTALLATIONS	FY '76	FY '77	FY '78	FY '79	FY '80	FY '81	FY '82	FY '83	FY '84
US and Possessions*	111	107	107	107	107	107	106	105	104
Foreign	29	27	27	27	27	27	28	30	31
Worldwide	**140**	**134**	**134**	**134**	**134**	**134**	**134**	**135**	**135**
OTHER INSTALLATIONS									
US and Possessions	2,372	2,305	2,202	2,169	2,168	2,069	2,061	2,087	2,038
Foreign	658	664	661	645	645	626	625	640	644
Worldwide	**3,030**	**2,969**	**2,863**	**2,814**	**2,813**	**2,695**	**2,686**	**2,727**	**2,682**
"Other Installations" includes:									
Ballistic Missile	1,157	1,157	1,157	1,157	1,157	1,157	1,158	1,158	1,159
Air National Guard	127	128	127	128	128	134	134	136	137
Electronics Station or Site	579	569	545	530	530	464	461	484	459
General Support Annex	1,146	1,095	1,016	981	980	924	917	933	911
Auxiliary Airfield	21	20	18	18	18	16	16	16	16

*Includes Air Reserve Forces (AFRES and ANG).

AIR FORCE BUDGET AND FINANCE—FISCAL YEARS 1980–85

(Figures in millions of dollars)

	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85
Gross National Product	$2,575,800	$2,882,000	$3,057,300	$3,228,800	$3,558,700	$3,890,100
Federal Budget, Outlays (Current $)	576,675	657,204	728,375	795,969	853,760	925,492
DoD Budget, Outlays (Current $)	132,840	156,096	182,850	205,012	231,000	264,400
DoD Percent of: GNP	5.2%	5.4%	6.0%	6.3%	6.5%	6.8%
Federal Budget	23.0%	23.8%	25.1%	25.8%	27.1%	28.6%
Air Force Budget Outlays						
Current Dollars	38,976	46,748	55,104	62,530	73,555	91,153
Constant FY '85 Dollars	54,209	57,642	62,530	68,417	77,176	91,153
AF Percent of: GNP	1.5%	1.6%	1.8%	1.9%	2.1%	2.3%
Federal Budget	6.8%	7.1%	7.6%	7.9%	8.6%	9.8%
DoD Budget	29.4%	30.0%	30.1%	30.7%	31.8%	34.5%
Total Obligational Authority						
DoD—Current Dollars	142,161	176,032	211,385	238,747	259,073	305,677
Constant FY '85 Dollars	191,487	213,288	239,501	259,564	270,839	305,677
AF—Current Dollars	41,565	52,438	64,918	73,785	86,343	108,728
Constant FY '85 Dollars	55,492	63,305	70,539	78,282	92,887	108,728
(With anticipated supplementals)						
Current Dollars						
Aircraft Procurement (3010)	7,903	10,315	13,646	17,298	21,388	28,677
Missile Procurement (3020)	2,149	3,329	4,497	4,807	7,812	9,821
Other Procurement (3080)	2,652	3,148	5,381	5,512	6,896	9,562
Procurement Subtotal	12,704	16,792	23,524	27,616	36,095	48,059
Military Construction—AF (3300)	575	937	1,558	1,460	1,557	2,165
Military Construction—AFRES (3730)	12	22	37	36	41	68
Military Construction—ANG (3830)	36	90	105	128	109	103
Military Construction Subtotal	623	1,049	1,700	1,624	1,707	2,336
RDT&E (3600)	5,001	7,133	8,866	10,621	12,221	14,402
TOTAL, INVESTMENT	**18,328**	**24,974**	**34,090**	**39,862**	**50,023**	**64,797**
Military Personnel—AF (3500)	8,496	9,913	11,467	12,216	12,905	17,800
Reserve Personnel—AF (3700)	226	277	327	361	389	566
National Guard Personnel—AF (3850)	299	386	478	534	604	889
Military Personnel Subtotal	9,021	10,576	12,272	13,111	13,898	19,255
Operation & Maintenance—AF (3400)	12,421	14,742	16,133	17,179	17,731	19,255
Operation & Maintenance—AFRES (3740)	511	599	676	762	791	883
Operation & Maintenance—ANG (3840)	1,283	1,519	1,669	1,815	1,807	1,862
Stock Fund (4921)	—	28	79	162	1,289	666
Operation & Maintenance Subtotal	14,215	16,888	18,557	19,918	21,618	23,646
Family Housing* (0704)	—	—	—	895	805	1,031
TOTAL, OPERATING	**23,236**	**27,464**	**30,829**	**33,923**	**36,320**	**43,931**
Programs, TOA (Current $)						
I Strategic Forces	6,620	7,950	11,524	14,180	19,906	24,680
II General-Purpose Forces	11,692	15,245	19,370	19,359	21,712	28,890
III Intelligence & Communications	4,734	6,039	7,250	9,231	10,741	14,458
IV Airlift & Sealift Forces	2,073	2,911	3,885	4,273	5,222	6,837
V Reserve & Guard Forces	3,073	3,528	3,619	4,206	4,498	5,001
VI Research & Development	4,174	5,729	7,074	8,387	9,244	10,560
VII Central Supply & Maintenance	4,508	5,204	5,550	6,251	7,256	8,230
VIII Training, Medical, & Other General Activities	3,882	4,610	5,480	6,747	6,736	8,584
IX Administration & Associated Activities	529	792	763	903	853	1,401
X Support of Other Nations	281	430	403	247	177	88

NOTE: Totals may not add due to rounding. FY '84 column is a revised estimate. FY '85 is President's budget request.
*OSD appropriation prior to FY '83.

USAF AIRCRAFT PROCUREMENT—FY '77–85

CATEGORY	FY '77	FY '78	FY '79	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85
Fixed-Wing Aircraft									
Total Units Budgeted	216	357	392	408	313	200	199	241	271
Accepted/Scheduled Acceptances	197	190	288	354	399	356	295	167	175
Helicopters									
Total Units Budgeted	0	0	0	0	5	6	0	0	0
Accepted/Scheduled Acceptances	0	0	0	0	0	0	11	0	0

NOTE: FY '77–83 columns are actual. FY '84–85 data are planned.

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

(Current as of September 30, 1983)

	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	1	—	—	5	16	2	—	—	—	24	12.5 years
A-10	273	129	55	—	—	—	—	—	—	457	3.1 years
A-37	—	—	18	10	19	1	—	—	—	48	10.7 years
B-1	—	1	2	—	—	—	—	—	—	3	6.1 years
B-52	—	—	—	—	—	—	4	188	81	273	23.1 years
FB-111	—	—	—	—	61	1	—	—	—	62	12.9 years
C-5	—	—	1	34	42	—	—	—	—	77	12.0 years
C-6	—	—	—	—	—	1	—	—	—	1	17.8 years
C-9	—	—	3	9	8	3	—	—	—	23	12.5 years
C-10	18	—	—	—	—	—	—	—	—	18	1.1 years
C-12	—	—	11	—	—	—	—	—	—	11	7.4 years
C-18	8	—	—	—	—	—	—	—	—	8	1.4 years
C-130	—	2	52	24	57	27	179	12	9	362	16.0 years
C-131	—	—	—	—	—	—	—	—	1	1	28.5 years
C-135	—	—	—	—	—	2	209	221	183	615	22.2 years
C-137	—	—	—	1	—	—	1	—	3	5	20.9 years
C-140	—	—	—	—	—	—	7	8	—	15	20.9 years
C-141	—	—	—	—	—	226	46	—	—	272	17.1 years
E-3	8	14	9	—	—	—	—	—	—	31	4.3 years
E-4	—	—	2	2	—	—	—	—	—	4	9.3 years
F-4	—	—	103	78	403	272	29	—	—	885	13.6 years
F-5	6	2	70	25	—	—	1	—	—	104	7.8 years
F-15	169	279	209	6	—	—	—	—	—	633	4.6 years
F-16	450	123	3	—	—	—	—	—	—	576	1.9 years
F-100	—	—	—	—	—	—	—	—	33	33	26.2 years
F-102	—	—	—	—	—	—	—	—	2	2	25.9 years
F-106	—	—	—	—	—	—	—	77	25	102	23.7 years
F-111	—	—	13	151	140	36	—	—	—	340	12.5 years
H-1	—	—	—	24	68	33	2	—	—	127	13.4 years
H-3	—	—	—	—	9	33	12	—	—	54	16.5 years
H-53	—	—	2	7	29	8	—	—	—	46	13.1 years
H-60	9	—	—	—	—	—	—	—	—	9	0.7 years
O-2	—	—	—	—	73	2	—	—	—	75	13.7 years
OV-10	—	—	—	—	39	38	—	—	—	77	14.9 years
TR-1	7	—	—	—	—	—	—	—	—	7	0.9 years
T-33	—	—	—	—	—	—	—	—	118	118	25.5 years
T-37	—	—	—	—	88	72	40	190	229	822	21.2 years
T-38	—	—	—	14	169	236	325	78	—	826	17.5 years
T-39	—	—	—	—	—	—	57	74	—	131	21.1 years
T-41	—	—	—	—	6	44	—	—	—	50	15.4 years
T-43	—	—	—	15	—	—	—	—	—	15	9.6 years
U-6	—	1	—	—	—	—	—	—	—	1	3.0 years
UV-18	—	—	2	—	—	—	—	—	—	2	6.0 years
U-26	1	—	—	—	—	—	—	—	—	1	0.0 years
X-29	2	—	—	—	—	—	—	—	—	2	1.3 years
OTHER*								1	15	16	—
TOTALS	**952**	**551**	**555**	**405**	**1,227**	**1,037**	**912**	**848**	**684**	**7,171**	**13.9 years**
PERCENT	**13%**	**8%**	**8%**	**5%**	**17%**	**14%**	**13%**	**12%**	**10%**		

Less than 9 years old: 2,058 aircraft (28.6%).
More than 9 years old: 5,113 aircraft (71.4%).
*Inventory only.

AIR NATIONAL GUARD AIRCRAFT—HOW MANY, HOW OLD?

(Current as of September 30, 1983)

	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	28	—	50	184	98	—	—	—	—	360	10.1 years
A-10	1	106	—	—	—	—	—	—	—	107	4.0 years
OA-37	—	—	25	10	35	—	—	—	—	70	11.2 years
C-7	—	—	—	—	—	1	—	1	—	2	19.7 years
C-130	14	16	—	—	—	8	38	43	71	190	19.9 years
C-131	—	—	—	—	—	—	—	—	33	33	28.1 years
KC-135	—	—	—	—	—	—	—	20	83	103	24.6 years
F-4	—	—	—	—	13	371	265	—	—	649	17.6 years
F-16	—	16	—	—	—	—	—	—	—	16	3.2 years
F-106	—	—	—	—	—	—	—	44	47	91	23.8 years
H-3	—	—	—	—	4	6	1	—	—	11	16.1 years
O-2	—	—	—	—	10	10	—	—	—	20	14.8 years
T-33	—	—	—	—	—	—	—	—	43	43	27.9 years
T-39	—	—	—	—	—	—	2	2	—	4	21.3 years
T-43	—	—	—	4	—	—	—	—	—	4	9.5 years
TOTALS	**43**	**138**	**75**	**198**	**160**	**396**	**306**	**110**	**277**	**1,703**	**16.2 years**
PERCENT	**3%**	**8%**	**5%**	**12%**	**9%**	**22%**	**18%**	**7%**	**16%**		

Less than 9 years old: 256 aircraft (15%).
More than 9 years old: 1,447 aircraft (85%).

AIR FORCE RESERVE AIRCRAFT—HOW MANY, HOW OLD?

(Current as of September 30, 1983)

	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	14	82	1	—	—	—	—	—	—	97	4.1 years
C-7	—	—	—	—	—	9	—	—	—	9	16.7 years
C-123	—	—	—	—	—	—	—	—	4	4	27.1 years
C-130A	—	—	—	—	—	—	—	1	60	61	25.9 years
AC-130A	—	—	—	—	—	—	—	—	10	10	27.0 years
C-130B	—	—	—	—	—	—	1	32	1	34	22.3 years
C-130E	—	—	—	—	—	—	39	—	—	39	20.0 years
C-130H	6	—	—	—	—	—	—	—	—	6	0.8 years
HC-130H	—	—	—	—	—	2	9	—	—	11	18.1 years
WC-130H	—	—	—	—	—	6	1	—	—	7	17.7 years
HC-130N	—	—	—	—	4	—	—	—	—	4	13.3 years
KC-135	—	—	—	—	—	—	—	4	20	24	24.5 years
F-4	—	—	—	—	—	111	2	—	—	113	16.2 years
F-16	—	1	—	—	—	—	—	—	—	1	3.4 years
F-105	—	—	—	—	—	—	13	1	—	14	20.0 years
H-1	—	—	—	5	5	—	—	—	—	10	11.5 years
H-3	—	—	—	—	2	10	2	—	—	14	16.1 years
TOTALS	**20**	**83**	**1**	**5**	**11**	**138**	**67**	**38**	**95**	**458**	**16.3 years**
PERCENT	**4%**	**18%**	**0%**	**1%**	**3%**	**30%**	**15%**	**8%**	**21%**		

Less than 9 years old: 104 aircraft (23%).
More than 9 years old: 354 aircraft (77%).

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

(Figures in thousands)

	FY '79	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85
Active-Duty Military							
Army	758	777	781	784	780	780	781
Navy	522	527	540	553	558	565	575
Marine Corps	185	188	191	192	194	197	200
Air Force	559	558	570	581	592	595	610
Total	**2,024**	**2,050**	**2,082**	**2,110**	**2,123**	**2,136**	**2,166**
Reserve Components (Selected Reserve)							
Army National Guard	346	367	389	408	417	433	447
Army Reserve	190	207	225	257	266	278	298
Naval Reserve	88	87	88	94	109	122	129
Marine Corps Reserve	33	35	37	40	43	44	46
Air National Guard	93	96	98	101	102	104	108
Air Force Reserve	57	59	62	64	67	70	75
Total	**807**	**851**	**899**	**964**	**1,005**	**1,051**	**1,104**
Direct Hire Civilian							
Army*	309	312	318	322	334	342	342
Navy	299	298	310	309	329	329	329
Air Force*	232	231	233	235	239	236	240
Defense Agencies	75	75	79	81	82	87	88
Total*	**915**	**916**	**940**	**947**	**984**	**994**	**999**

NOTE: Totals may not add due to 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 '64	FY '74	FY '82	FY '83	FY '84*	FY '85*
Strategic Bomber	42	28	23	21	21	21
Air Refueling	41	38	33	34	34	34
Strategic Command and Control	13	8	7	6	6	6
Intelligence	—	—	—	3	3	3
Strategic Reconnaissance	—	—	—	1	1	1
Strategic Interceptor	28	7	5	5	5	5
Fighter	92	74	79	78	78	79
Tactical Reconnaissance	21	13	6	8	8	8
Tactical Electronic Warfare	—	—	2	2	3	2
Special Operations Forces	22	5	5	5	5	5
Tactical Air Command Control Systems[2]	—	2	3	3	3	3
Tactical Air Control Systems[2]	9	9	9	9	7	7
Weather	6	3	3	3	3	3
Rescue	14	12	8	8	8	8
Tactical Airlift	31	17	14	14	14	14
Strategic Airlift	32	17	17	17	17	17
Special Mission	2	2	1	1	1	1
Aeromedical Airlift	6	3	3	3	3	3
ICBM	26	26	26	25	24	24
TOTAL	**386**	**264**	**244**	**246**	**244**	**244**
RESERVE FORCES						
ANG Selected Reserve	78	91	91	91	91	91
Air Force Reserve[3]	37	53	54[4]	56[4]	56[4]	56[4]
TOTAL	**115**	**144**	**145**	**147**	**147**	**147**
GRAND TOTAL	**511**	**409**	**389**	**393**	**391**	**391**

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

NUMBER OF AIRCRAFT PER ACTIVE-DUTY USAF SQUADRON

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

*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.

THE NUMBER OF ACTIVE AIRCRAFT AND FLYING HOURS

TYPE OF AIRCRAFT	FY '79	FY '80	FY '81	FY '82	FY '83	FY '84	FY '85
Bomber, Strategic	417	414	412	391	338	327	327
Tanker	525	529	534	542	546	550	560
Fighter/Interceptor/Attack	2,622	2,769	2,850	2,900	2,997	3,005	3,063
Reconnaissance/Electronic Warfare	366	354	344	363	385	427	424
Cargo/Transport	841	836	835	825	827	844	847
Search & Rescue (Fixed Wing)	35	35	36	36	35	36	36
Helicopter (includes Rescue)	230	230	230	227	236	240	239
Trainer	1,704	1,678	1,644	1,642	1,624	1,614	1,603
Utility/Observation/Other	210	189	207	193	206	188	203
TOTAL, USAF	**6,950**	**7,034**	**7,092**	**7,119**	**7,194**	**7,231**	**7,302**
Air National Guard total	1,522	1,560	1,636	1,647	1,703	1,682	1,675
Air Force Reserve total	487	474	452	447	458	456	469
TOTAL, ACTIVE AIRCRAFT, USAF, ANG, AFRES	**8,959**	**9,069**	**9,180**	**9,213**	**9,355**	**9,369**	**9,446**
Active aircraft including foreign government owned	(9,100)	(9,209)	(9,321)	(9,346)	(9,445)	(9,457)	(9,534)
FLYING HOURS (000)							
USAF	2,646	2,596	2,619	2,800	2,843	2,908	2,952
Air National Guard	381	393	406	411	411	417	428
Air Force Reserve	139	136	134	130	132	136	141
TOTAL FLYING HOURS	**3,166**	**3,125**	**3,159**	**3,341**	**3,386**	**3,461**	**3,522**

NOTE: Data in FY '79–83 columns are actual; FY '84 and FY '85 data are estimated.

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	

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	

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	

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	

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	

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

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	

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. Bennie 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	

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	

Air University, now again a major command, 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	

ELECTRONIC SECURITY COMMAND

Col. Roy H. Lynn	Oct. 26, 1948	July 5, 1949
Col. Travis W. 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**	

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**	

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**	

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

SPACE COMMAND

Gen. James V. Hartinger	Sept. 1, 1982

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. Bennie L. Davis	Aug. 1, 1981	

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	

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	

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 (AEROSPACE) DEFENSE COMMAND

Lt. Gen. George E. Stratemeyer	Mar. 27, 1946	Nov. 30, 1948
Maj. Gen. Gordon P. Saville	Dec. 1, 1948	Sept. 1, 1949*
Lt. Gen. Ennis C. Whitehead	Jan. 8, 1951	Aug. 24, 1951
Gen. Benjamin W. Chidlaw	Aug. 25, 1951	May 31, 1955
Maj. Gen. Frederic H. Smith, Jr. (acting)	June 1, 1955	July 19, 1955
Gen. Earle E. Partridge	July 20, 1955	Sept. 16, 1956
Lt. Gen. Joseph H. Atkinson	Sept. 17, 1956	Feb. 28, 1961
Lt. Gen. Robert M. Lee	Mar. 1, 1961	July 5, 1963
Maj. Gen. Robert H. Terrill (acting)	July 6, 1963	July 31, 1963
Lt. Gen. Herbert B. Thatcher	Aug. 1, 1963	July 31, 1967
Lt. Gen. Arthur C. Agan, Jr.	Aug. 1, 1967	Feb. 28, 1970
Lt. Gen. Thomas K. McGehee	Mar. 1, 1970	June 30, 1973
Gen. Seth J. McKee	July 1, 1973	Sept. 30, 1973
Gen. Lucius D. Clay, Jr.	Oct. 1, 1973	Aug. 31, 1975
Gen. Daniel James, Jr.	Sept. 1, 1975	Dec. 6, 1977
Gen. James E. Hill	Dec. 6, 1977	Dec. 31, 1979
Gen. James V. Hartinger	Jan. 1, 1980**	Mar. 31, 1980

*After September 1, 1949, ADC was reduced to paper status and finally inactivated on July 1, 1950. It was reestablished on January 1, 1951.
**With the activation of the Aerospace Defense Center on December 1, 1979, General Hartinger became commander of both ADCOM and the Center. When the major command inactivated in March 1980, he continued as commander of the Center.

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	

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 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 ANG head 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.

UNITED STATES AIR FORCE MEDAL OF HONOR RECIPIENTS—1918–1984

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	Monterey, Calif. (Ret. Lt. 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, March 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	St. Petersburg, Fla.
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, Lt. Col., Randolph 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.

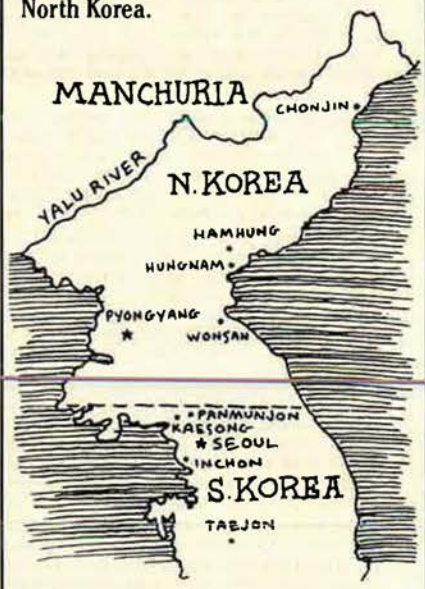
Jan. 27, 1943 First mission against the German homeland: 53 B-17s and B-24s of the 1st and 2d Bomb Wgs., flying from the UK, attacked the Wilhelmshaven naval base.

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.

"Teamwork is the answer—teamwork and confidence."

—Col. George L. Jones, USAF, Korea, March 29th, 1953

Although they didn't think of it that way, Col. George Jones and Maj. Wendel Brady were nearing the end of a test program in the skies over North Korea.

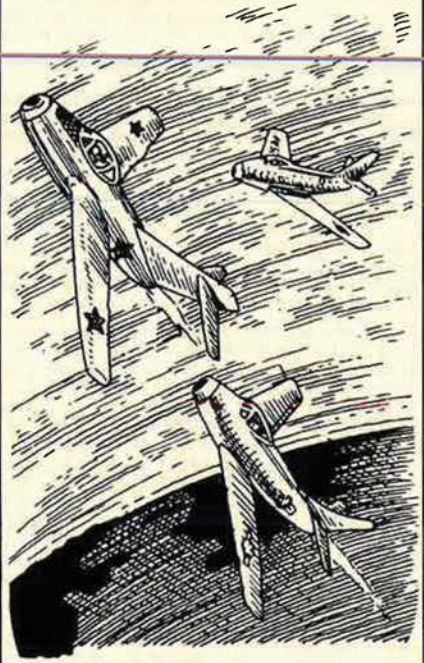


For two years they and other pilots had been proving the ability of the United States Air Force, in its first wartime operation as a separate branch of service, to carry out its mission. Also they had been proving and perfecting the jet fighter, never before in action jet-to-jet, and new combat techniques to go with it.

But on that day they were about to fall back on an old, tried-and-true technique, one that would make all the other tests prove positive.

With Maj. Brady as wingman, Col. Jones had no trouble finding a target 43,000 feet up in "MiG Alley," and began to close for the kill. The MiG had a wingman, too, but each time he tried to shoot Col. Jones off his leader's tail he found himself in front of Maj. Brady's guns, and banked away.

From 800 feet Col. Jones opened fire, and was suddenly blinded by a cloud of debris, smoke, and oil from the MiG. At the same time he lost power in his engine, and dived to break the compressor stall. At 20,000 feet he regained power and leveled off. Peering through the few clear spots on his oil-drenched canopy, he found Maj. Brady still with him. By radio he learned that the MiG wingman had made repeated passes at him before breaking off. If not for Maj. Brady's protection, he would have been a sitting duck.



Heading for home, Col. Jones thought over and over: "Teamwork is the answer—teamwork and confidence."

It still is. Today Air Force teamwork and confidence are indispensable contributors to the security of our nation and the entire Western World.

★ ★ ★ ★ ★

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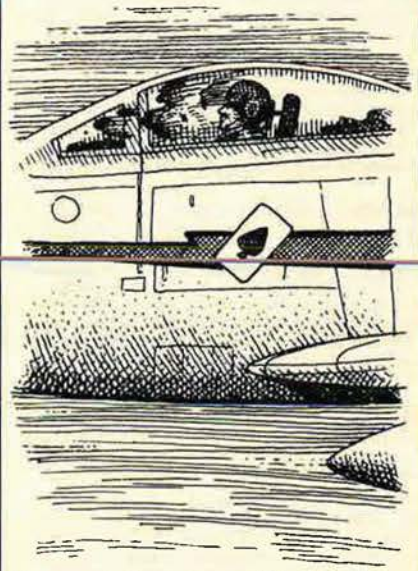

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USAA

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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. 73521; within Altus city limits. Phone (405) 482-8100; AUTOVON 866-1110. MAC base. 443d Military Airlift Wing, Field Training Det. 403; 47th Flying Training Wing, Det. 2 (ATC), T-37 aircraft operations; Det. 4, 17th Weather Sqdn.; Det. 3, 1600th Management Engineering Sqdn.; Det. 4, 1365th Audiovisual Sqdn.; basic flight engineer course; 340th Air Refueling Gp. (SAC); 2002d Communications Sqdn. (AFCC). Base activated Jan. 1942, inactivated May 1945, reactivated Jan. 1953. Area 4,113 acres. Altitude 1,376 ft. Military 3,607; civilians 856. Payroll $73.2 million. Housing: 163 officer; 637 NCO; 249 transient. 30-bed hospital.

Andersen AFB, Guam 96334; 16.8 mi. N of Agana. Phone (671) 322-1110; AUTOVON 366-4110. SAC base. Hq. 3d Air Div.; 43d Strategic Wing; 605th Military Airlift Support Sqdn. (MAC); 54th Weather Reconnaissance Sqdn. (MAC); 27th Communications Sqdn. (AFCC); Det. 11, 2d Aircraft Delivery Gp. (TAC). Base activated as North Field, 1945; renamed Oct. 7, 1949, in memory of Brig. Gen. James Roy Andersen, reported missing on a flight from Guam to Hawaii, Feb. 26, 1945. Area 20,500 acres, including off-base facilities. Altitude 525 ft. Military 3,936; civilians 547. Payroll $90.6 million. Housing: 331 officer; 1,421 NCO; transient 206. Clinic, outpatient care only. 62-bed hospital at Naval Regional Medical Center, Agana, Guam.

Andrews AFB, Md. 20331; 11 mi. SE of Washington, D. C. Phone (301) 981-9111; AUTOVON 858-1110. MAC base. 1776th Air Base Wing; Hq. Air Force Systems Command; 76th Airlift Div.; 89th Military Airlift Wing; 113th Tactical Fighter Wing (ANG); 459th Tactical Airlift Wing (AFRES); 2045th Communications Gp. (AFCC); Det. 11, 1361st Audiovisual Sqdn. Base activated June 1943; named for Lt. Gen. Frank M. Andrews, military air pioneer, WW II commander of the European theater, killed in aircraft accident May 3, 1943, in Iceland. Area 4,332 acres. Altitude 279 ft. Military 5,660; civilians 2,337. Payroll $251.9 million. Housing: 399 officer; 1,695 NCO; 212 mobile home spaces; 354 transient (incl. 68 temp. living quarters for incoming personnel, 18 VIP suites, 212 VOQ, 56 TAQ). 250-bed hospital.

Arnold AFS, Tenn. 37389; approx. 7 mi. SE of Manchester. Phone (615) 455-2611; 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, which support 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 to 1,150 ft. Military 186; civil service 230; contractor employees 3,600. Payroll $121.5 million. Housing: 24 officer; 16 NCO; 48 transient. Dispensary.

Barksdale AFB, La. 71110; 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; 4201st 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), operating A-10s. Also home of the 8th AF Museum. The 917th TFG is the only AFRES A-10 replacement training unit. 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 6,000; civilians 991. Payroll $137.3 million. Housing: 205 officer; 828 NCO; 29 transient. 70-bed hospital.

Beale AFB, Calif. 95903; 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. (SPACECOM); 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 AF 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 4,400; civilians 529. Payroll $100.2 million. Housing: 395 officer; 1,330 NCO; 63 transient. 30-bed hospital.

Bergstrom AFB, Tex. 78743; 7 mi. SE of downtown Austin. Phone (512) 479-4100; AUTOVON 685-4100. TAC base. Hq. 12th Air Force; Hq. 10th Air Force (AFRES); 67th Tactical Recon Wing (host), with RF-4C recon operations; 924th Tactical Fighter Gp. (AFRES), with F-4D fighter operations; TAC NCO Academy West. 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 5,252; civilians 924. Payroll $89.57 million. Housing: 78 officer; 1,268 enlisted; 290 transient. 25-bed hospital.

Blytheville AFB, Ark. 72315; 4 mi. NW of Blytheville. Phone (501) 762-7000; AUTOVON 637-1110. SAC base. 42d Air Div.; 97th Bomb Wing. Base activated June 1942; inactivated Feb. 1947; reactivated Aug. 1955. Area 3,092 acres. Altitude 254 ft. Military 2,894; civilians 334. Payroll $65.1 million. Housing: 197 officer; 733 NCO; 79 transient. 25-bed hospital.

Bolling AFB, D. C. 20332; 3 mi. S of US Capitol. Phone (202) 545-6700; AUTOVON 227-0101. MAC base. 1100th Air Base Wing; 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; Defense Intelligence Agency; US Air Force Honor Guard and US Air Force Band. Activated Oct. 1917; named for Col. Raynal C. Bolling, first high-ranking Air Service officer killed in WW I. Area 605 acres. Altitude 16 ft. Military 2,649; civilians 1,156. Payroll $40 million. Housing: 296 officer; 1,100 NCO; 168 transient (incl. 69 VAQ, 84 VOQ, 15 guest quarters).

Brooks AFB, Tex. 78235; 7 mi. SE of San Antonio. Phone (512) 536-1110; AUTOVON 240-1110. AFSC base. Home of Aerospace Medical Div., USAF School of Aerospace Medicine; USAF Occupational and Environmental Lab, USAF Human Resources Lab; AFSC Systems Acquisition School; tenant units include the USAF Medical Service Center, 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 1,100. Payroll $45.3 million. Housing: 70 officer; 100 NCO; 8 transient. Dispensary.

Cannon AFB, N. M. 88101; 7 mi. W of Clovis. Phone (505) 784-3311; AUTOVON 681-1110. TAC base. 27th Tactical Fighter Wing, F-111D fighter operations. Activated Aug. 1942; named for Gen. John K. Cannon, WW II commander of all Allied Air Forces in Mediterranean theater. Area 25,663 acres. Altitude 4,295 ft. Military 4,000; civilians 415. Payroll $87.9 million. Housing: 149 officer; 861 NCO. 35-bed hospital.

Carswell AFB, Tex. 76127; 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). 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 2,750 acres. Altitude 650 ft. Military 5,050; civilians 961. Payroll $79 million. Housing: 92 officer (VOQ only); 790 NCO. 120-bed hospital.

Castle AFB, Calif. 95342; 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 Sqdn. (TAC), and is site of Castle Air Museum. 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 5,266; civilians 702. Payroll $100.9 million. Housing: 92 officer; 871 NCO; 436 transient (incl. 156 VAQ, 276 VOQ, and 4 transient quarters). 25-bed hospital.

Chanute AFB, Ill. 61868; 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. Chanute Technical Training Display Center is 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 6,200; civilians 1,290. Payroll $117.1 million. Housing: 160 officer; 1,348 enlisted; 194 VOQ, 952 VAQ, 30 TLQ. 40-bed hospital.

Charleston AFB, S. C. 29404; in North Charleston. Phone (803) 554-0230; AUTOVON 583-0111. MAC base. Joint-use airfield. 437th Military Airlift Wing and 315th MAW (AFRES Assoc.). Also 1968th Communications Sqdn.; Det. 1, 87th Fighter Interceptor Sqdn. (TAC); and Det. 7, 1361st Audiovisual Sqdn. Base activated Dec. 1941; inactivated Feb. 1946, reactivated 1952. Area 6,314 acres. Altitude 45 ft. Military 4,374 (incl. AFRES); civilians 1,241. Payroll $119 million. Housing: 142 officer; 813 NCO; 75 trailer spaces; 472 transient (150 VOQ, 322 VAQ). Dispensary.

Columbus AFB, Miss. 39701; 10 mi. NNW of Columbus. Phone (601) 434-7322; AUTOVON 742-1110. ATC base. 14th Flying Training Wing, undergraduate pilot training. Base activated in 1941 for pilot training. Area 6,013 acres. Altitude 214 ft. Military 3,010; civilians 714. Payroll $69.3 million. Housing: 232 officer; 588 NCO. 20-bed hospital.

Davis-Monthan AFB, Ariz. 85707; within city limits of Tucson. Phone (602) 748-3900; AUTOVON 361-1110. TAC base. Hq. 836th Air Div.; 355th Tactical Training Wing, A-10 combat crew training; 602d Tactical Air Control Wing, OA-37 forward air control operations; 390th Strategic Missile Wing (Titan II) (SAC); 868th Tactical Missile Training Sqdn., ground-launched cruise missile training operation; 41st Electronic Combat Sqdn. (EC-130). Also site of AFLC's Military Aircraft Storage and Disposition Center. Base activated in 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 6,898; civilians 1,508. Payroll $142.4 million. Housing: 215 officer; 1,040 enlisted; 1,924 dormitory; 374 transient. 65-bed hospital.

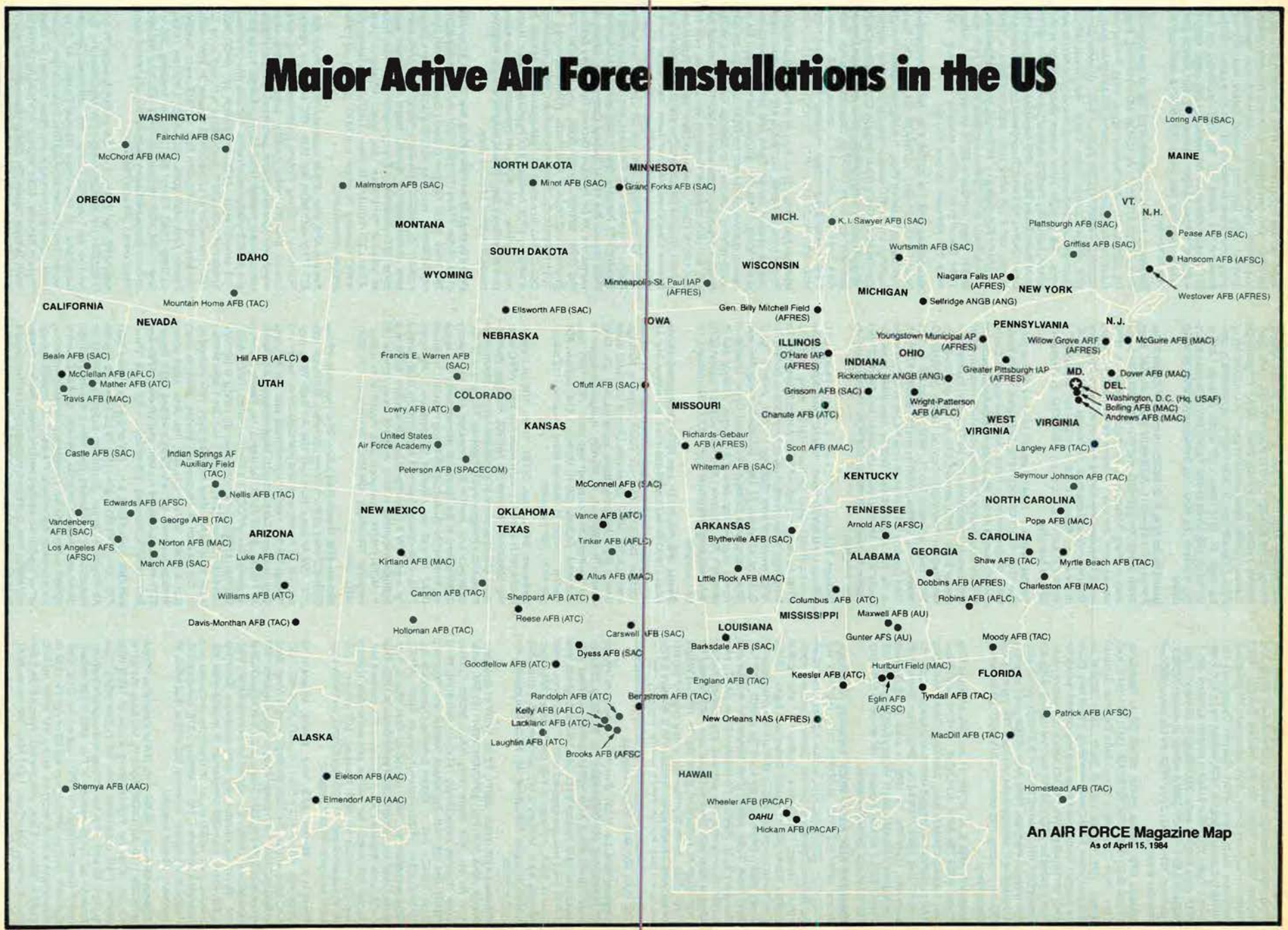
Dover AFB, Del. 19902; 4 mi. SE of Dover. Phone (302) 678-7011; AUTOVON 455-1110. MAC base. 436th Military Airlift Wing and 512th MAW (AFRES Assoc.). Dover is the largest air cargo port on the East Coast. Base activated Dec. 1941; inactivated 1946; reactivated Feb. 1951. Area 3,734 acres. Altitude 28 ft. Military 4,936; civilians 1,930. Payroll $127.3 million. Housing: 229 officer; 1,327 NCO; 297 transient. 30-bed hospital.

Dyess AFB, Tex. 79607; WSW border of Abilene. Phone (915) 696-0212; AUTOVON 461-1110. SAC base. 12th Air Div. and 96th Bomb Wing (SAC); 463d Tactical Airlift Wing (MAC); 1993d Communications Sqdn. (AFCC); 417th Field Training Det. (ATC). Selected as the first base for the B-1B and the 4018th B-1 Combat Training School. Base activated Apr. 1942; deactivated Dec. 1945; reactivated Abilene Air Base, 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 6,097; civilians 442. Payroll $78.2 million. Housing: 150 officer; 848 NCO; 128 transient. 40-bed hospital.

Edwards AFB, Calif. 93523; 20 mi. E of Rosamond. Phone (805) 277-1110; AUTOVON 350-1110. AFSC base. Site of Air Force Flight Test Center (AFFTC), which conducts new and follow-on testing of aircraft and related avionics and weapon systems. AFFTC also operates the USAF Test Pilot School, which trains pilots and flight-test engineers. Also the site of the Air Force Rocket Propulsion Laboratory, US Army Aviation Engineering Flight Activity, and the NASA Dryden Flight Research Facility. Edwards is the primary landing site for all Space Shuttle test and evaluation flights. Base activated Sept. 1933 as Muroc Army Air Field, renamed for Capt. Glen W. Edwards, killed June 5, 1948, in crash of YB-49 "Flying Wing." Area 301,000 acres. Altitude 2,302 ft. Military 3,956; civilians 4,978. Payroll $193 million. Housing: 558 officer; 2,997 enlisted; 92 transient. 15-bed hospital.

Eglin AFB, Fla. 32542; 2 mi. SE 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 and home

Major Active Air Force Installations in the US



An AIR FORCE Magazine Map
As of April 15, 1984

of the AF Armament Div.; AF Armament Lab; 3246th Test Wing; 39th Aerospace Rescue and Recovery Wing; 33d Tactical Fighter Wing; Tac Air Warfare Center; 1972d Communications Sqdn.; 55th Aerospace Rescue and Recovery Sqdn.; and 919th Special Operations Gp. (AFRES). Base activated in 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. Military 11,807; civilians 3,910. Payroll $232.5 million (includes AFRES). Housing: 322 officer; 2,014 NCO; 84 transient. 160-bed regional hospital.

Eielson AFB, Alaska 99702; 26 mi. SE of Fairbanks. Phone (907) 377-1178; AUTOVON (317) 377-1110. AAC base. 343d Composite Wing; 343d Combat Support Group; 18th Tactical Fighter Sqdn.; 25th Tactical Air Support Sqdn. 343d Composite 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). Activated Oct. 1944; named for Carl B. Eielson, Arctic aviation pioneer, died Nov. 1929. Area 35,000 acres (approx). Altitude 534 ft. Military 3,284; civilians 374. Payroll $95.8 million. Housing: 148 officer; 1,015 NCO; 20 transient. Dispensary.

Ellsworth AFB, S. D. 57706; 11 mi. ENE of Rapid City. Phone (605) 342-2400; AUTOVON 747-1110. SAC base. 44th Strategic Missile Wing; 28th Bomb Wing, including SAC postattack command and control system sqdn. Activated July 1954; named for Brig. Gen. Richard E. Ellsworth, killed Mar. 18, 1953, in crash of RB-36. Area 4,906 acres. Altitude 3,200 ft. Military 6,057; civilians 535. Payroll $110.7 million. Housing: 331 officer; 1,526 NCO; 158 transient. 30-bed hospital.

Elmendorf AFB, Alaska 99506; bordering Anchorage. Phone (907) 552-1110; AUTOVON (317) 552-1110. 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.; 1931st Communications Gp. (AFCC); 6981st Electronic Security Sqdn. (ESC); 616th Military Airlift Gp. (MAC); 17th Tactical Airlift Sqdn. (MAC); 71st Aerospace Rescue and Recovery Sqdn. (MAC); 11th Weather Sqdn. (MAC); plus varied US Army and Navy activities. 21st Tactical Fighter Wing is host unit. Base activated July 1940; named for Capt. Hugh M. Elmendorf, killed Jan. 13, 1933, at Wright Field, Ohio, while flight-testing a new type of pursuit plane. Area 13,400 acres. Altitude 118 ft. Military 5,923; civilians 1,646. Payroll $154.5 million. Housing: 232 officer; 1,637 NCO; transient incl. 71 family units (no pets), 120 VOQ, 230 VAQ. 95-bed hospital.

England AFB, La. 71301; 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 France in F-86 crash. Area 2,282 acres. Altitude 89 ft. Military 3,142; civilians 567. Payroll $49 million. Housing: 109 officer; 491 NCO; 44 transient. 40-bed hospital.

Fairchild AFB, Wash. 99011; 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 and Recovery Sqdn. (MAC); Det. 1, 1000th Satellite Operations Gp. (SPACECOM); 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 4,353; civilians 587. Payroll $94 million for civilian and active-duty military and $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. Base activated July 4, 1867; under Army jurisdiction until 1947 when reassigned to USAF. Home of the first Atlas-D ICBM missile wing (1960– 65); named for Francis Emory Warren, Wyoming senator and early governor. Base has 5,872 acres, plus 200 Minuteman III missile sites distributed over 12,600 sq. mi. in Wyoming, Colorado, and Nebraska. Altitude 6,142 ft. Military 3,516; civilians 533. Payroll $72.3 million. Housing: 203 officer; 628 NCO; 36 transient. 25-bed hospital.

George AFB, Calif. 92394; 6 mi. NW of Victorville. Phone (619) 269-1110; AUTOVON 353-1110. TAC base. Hq. 831st Air Div.; 37th Tac Fighter Wing, home of TAC's Wild Weasel F-4G squadrons; 35th Tac Fighter Wing, Pave Spike F-4E sqdn.; F-4 transitional and upgrade training; German Air Force training in F-4. ANG F-106 detachment. Base activated in 1941; named for Brig. Gen. Harold H. George, WW I fighter ace killed Apr. 29, 1942, in Australia in aircraft accident. Area 5,347 acres. Altitude 2,875 ft. Military 5,998; civilians 463. Payroll $124.5 million. Housing: 229 officer; 1,214 NCO; 198 senior NCO; transient 45 TLQ. 35-bed hospital.

Goodfellow AFB, Tex. 76908; 2 mi. SE of San Angelo. Phone (915) 653-3217; AUTOVON 477-3217. ATC base. 3480th Technical Training Wing; USAF Cryptologic Training Center. 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 2,406; civilians 484. Payroll $41.47 million. Housing: 3 officer; 96 NCO; 105 transient (69 VAQ, 36 VOQ). Clinic.

Grand Forks AFB, N. D. 58205; 16 mi. W of Grand Forks. Phone (701) 594-6011; AUTOVON 362-1110. SAC base. 319th Bomb Wing (B-52G and KC-135); 321st Strategic Missile Wing (Minuteman III). Base activated in 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 5,400; civilians 484. Payroll $97.7 million. Housing: 624 officer; 1,653 NCO; 243 transient. 30-bed hospital.

Griffiss AFB, N. Y. 13441; 1 mi. NE of Rome. Phone (315) 330-1110; AUTOVON 587-1110. SAC base. 416th Bomb Wing. Major tenant is Rome Air Development Center (RADC), part of AFSC. Base also houses headquarters of AFCC's Continental Communications Division; 485th Engineering Installations Gp. (AFCC); 49th Fighter Interceptor Sqdn. (TAC); and Hq. 24th Air Div. and the Northeast Region Operations Control Center (NORAD/ADTAC). 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 while in the line of duty during WW II). Area 3,896 acres. Altitude 504 ft. Military 4,800; civilians 2,992. Payroll $106.1 million. Housing: 175 officer; 558 NCO; 140 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 2,810 acres. Altitude 800 ft. Military 3,723; civilians 1,080. Payroll $82.5 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 921-1110. AU station. Hq. Air Force Data Automation Agency and site of Air Force Data Systems Design Center; 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 348 acres. Altitude 220 ft. Military 1,418; civilians 804. Payroll included in Maxwell entry. Housing: 118 officer; 206 NCO; 107 transient.

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 AF 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 2,000; civilians 3,200. Payroll $144 million. Housing: 276 officer; 420 NCO; 33 transient; 775 BOQ/VOQ. Clinic.

Hickam AFB, Hawaii 96853; 6 mi. W of Honolulu. Phone (808) 422-0531 (Oahu military operator); AUTOVON 430-0111. PACAF base. 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 tenants: Hq. Pacific Air Forces; 834th Airlift Div. (MAC); Hq. Pacific Communications Div. (AFCC); 1st Weather Wing (MAC); 649th Test Gp. (AFSC); 154th Composite Gp. (ANG); 619th Military Airlift Support Sqdn. (MAC); and Det. 1, 89th Military Airlift Wing (MAC). Base activated Sept. 1937; 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 5,204; civilians 1,979. Payroll $217 million (includes Hickam and Wheeler AFBs and Bellows AFS). Housing: 535 officer; 1,924 NCO. Clinic.

Hill AFB, Utah 84056; 5 mi. SW of Ogden. Phone (801) 777-7221; AUTOVON 458-1110. AFLC base. Hq. Ogden Air Logistics Center. Furnishing logistics support for Peacekeeper, Minuteman, and Titan II missiles; Bomarc drone and Maverick missiles; Walleye; laser and electro-optical guided bombs; emergency rocket communications systems; MX missile; F-4 and F-16 systems manager; air munitions; aircraft landing gears; wheels, brakes and struts, tires, and tubes; photographic and aerospace training equipment; and COM-10. Also home of the 388th Tactical Fighter Wing; 419th Tactical Fighter Wing (AFRES); 40th Aerospace Rescue and Recovery Sqdn.; and 6545th Test Gp. (AFSC), which includes 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 5,600; civilians 15,000. Payroll $495 million. Housing: 263 officer; 882 NCO; 8 transient. 35-bed hospital.

Holloman AFB, N. M. 88330; 6 mi. SW of Alamogordo. Phone (505) 479-6511; AUTOVON 867-1110. TAC base. Hq. 833d Air Div.; 49th Tactical Fighter Wing (F-15 operations); 479th Tactical Training Wing (AT-38 fighter lead-in training); 4449th Mobility Support Sqdn. (Harvest Bare); 82d Tactical Control Flight. 6585th Test Group (AFSC) conducts test and evaluation of aircraft and missile systems. Twenty-eight other tenant units located at Holloman, including the 82d Tactical Control Flight, 1877th Communications Sqdn., 40th Aerospace Rescue and Recovery Sqdn., Air Force Geophysical Laboratory detachments, and 6 US Army units. Base activated in 1942; named for Col. George V. Holloman, guided-missile pioneer, killed in B-17 crash in Formosa, Mar. 19, 1946. Area 50,697 acres. Altitude 4,093 ft. Military 6,600; civilians 1,094. Payroll $184.1 million. Housing: 191 officer; 1,360 NCO; 255 transient. 35-bed hospital.

Homestead AFB, Fla. 33039; 5 mi. NNE of Homestead. Phone (305) 257-8011; AUTOVON 791-0111. TAC base. 31st Tactical Training Wing; F-4D 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 and Recovery Sqdn. (AFRES). Base activated Apr. 1955. Area 3,491 acres. Altitude 7 ft. Military 6,855; civilians 1,945. Payroll $98.8 million. Housing: 321 officer; 1,294 NCO; 359 transient (214 VAQ, 125 VOQ). 80-bed hospital.

Hurlburt Field, Fla. 32544; 5 mi. W of Fort Walton Beach. Phone (904) 881-6668; AUTOVON 872-1110. MAC base, though located on the Eglin AFB (AFSC) reservation. Home of the 2d Air Div., which is the focal point for all special operations matters for USAF. Under the 2d AD's responsibility are the 1st Special Operations Wing, Hurlburt Field, equipped with the MC-130E (Combat Talon), AC-130H (Spectre Gunship), HH-53 (Pave Low III), and UH-1N (Twin Huey); the USAF Special Operations School; Special Operations Combat Control Team; and Special Operations Weather Team. Also under the 2d AD's responsibility are the 1st Special Operations Sqdn., Clark AB, the Philippines; the 7th Special Operations Sqdn., Rhein-Main AB, Germany; and the helicopters at Howard AFB, Panama. Tenant units assigned to Hurlburt Field include the 4442d Tactical Control Gp., which includes the US Air Force Air Ground Operations School, the 727th Tactical Control Sqdn., and the 823d Civil Engineering Sqdn. ("Red Horse"). Base activated in 1943; named for Lt. Donald W. Hurlburt, WW II pilot killed Oct. 2, 1943, in a crash on Eglin reservation. Altitude 35 ft. Military 3,723; civilians 320. Payroll $93 million. Housing: 74 officer; 306 NCO; 341 transient. Medical clinic only at Hurlburt, but 160-bed hospital at Eglin Regional Hospital located 12 miles away.

Indian Springs AF Auxiliary Field, Nev. 89018; 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 in 1942. Area 1,652 acres. Altitude 3,124 ft. Military 325; civilians 30. (Payroll included in Nellis AFB entry.) Housing: 78 officer and NCO quarters; 40 trailer spaces. Dispensary.

Keesler AFB, Miss. 39534; 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 recon units. TAC airborne command and control sqdn., AFCC installation gp., AFCC NCO Academy/Leadership School. 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 11,640; civilians 3,580. Payroll $271 million. Housing: 363 officer; 1,594 NCO; 90 transient. (414 VOQ and 666 VAQ units on space availability, tech training students occupy many units.) 325-bed hospital.

Kelly AFB, Tex. 78241; 5 mi. SW of San Antonio. Phone (512) 925-1110; AUTOVON 945-1110. AFLC base. Hq. San Antonio Air Logistics Center; Hq. Electronic Security Command; AF Electronic Warfare Center; AF Cryptologic Support Center; Joint Electronic Warfare Center; USAF Service Information and News Center; AF Commissary Service; 433d Tactical Airlift Wing (AFRES); 149th Tactical Fighter Gp. (ANG). Base activated May 7, 1917; named for Lt. George E. M. Kelly, first Army pilot to

lose his life in a military aircraft, killed May 10, 1911. Area 3,992 acres. Altitude 689 ft. Military 4,837; civilians 18,216. Payroll $527.9 million. Housing: 46 officer; 368 NCO. 3-bed dispensary.

Kirtland AFB, N. M. 87117; S of Albuquerque. Phone (505) 844-0011; AUTOVON 244-0011. MAC base. 1606th Air Base Wing. Major agencies and units include AF Contract Management Div. (AFSC); AF Operational Test and Evaluation Center; AF Weapons Laboratory (AFSC); Office of the Chief of Security Police; New Mexico ANG; 1550th Aircrew Training and Test Wing (MAC); Defense Nuclear Agency Field Command; Naval Weapons Evaluation Facility, Sandia Laboratories; Lovelace Biomedical and Environmental Research Institute; Department of Energy's Albuquerque Operations Office; AFSC NCO Academy; AF Directorate of Nuclear Surety; 150th Tactical Fighter Gp. (ANG); 1960th Communications Sqdn.; 3098th Aviation Depot Sqdn.; and 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; and HC-130 search and rescue training. Other major units are the AF Space Technology Center; AFLC Nuclear Support Office; Albuquerque Seismological Laboratory; Command Control Communications Countermeasures Joint Test Force; Univ. of New Mexico Civil Engineering Research Facility; and the 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 51,330 acres. Altitude 5,352 ft. Military 5,019; civilians 12,939. Payroll $684.8 million. Housing: 124 officer; 2,010 NCO; 380 transient (211 VOQ, 169 VAQ). Dispensary and 40-bed hospital.

K. I. Sawyer AFB, Mich. 49843; 20 mi. S of Marquette. Phone (906) 346-6511; AUTOVON 472-1110. SAC base. 410th Bomb Wing; 87th Fighter Interceptor Sqdn. (ADTAC); 2001st Communications Sqdn. (AFCC). Base activated in 1959; named for Kenneth I. Sawyer, who proposed site for county airport, died in 1944. Area 5,278 acres. Altitude 1,220 ft. Military 4,006; civilians 489. Payroll $72.25 million. Housing: 263 officer; 1,430 NCO; 40 BOQ units; 244 transient (incl. 20 fully furnished efficiency apartments and 199 trailer spaces in housing area). 25-bed hospital.

Lackland AFB, Tex. 78236; 8 mi. WSW of San Antonio. Phone (512) 671-1110; AUTOVON 473-1110. ATC base. Provides basic military training for airmen; technical training of basic, 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. Base activated in 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 787 ft. Military 19,314; civilians 4,700. Payroll $415.7 million. Housing: 106 officer; 619 NCO; 1,514 transient. 1,000-bed hospital.

Langley AFB, Va. 23665; 3 mi. N of Hampton. Phone (804) 764-9990; AUTOVON 432-1110. TAC base. Host unit 1st Tactical Fighter Wing. F-15 fighter operations; Hq. Tactical Air Command; 5th Weather Wing (MAC); 2d Aircraft Delivery Gp. (TAC); 480th Reconnaissance Technical Gp. (TAC); US Army TRADOC Flight Det.; 48th Fighter Interceptor Sqdn. (TAC). Base activated Dec. 30, 1916; is the oldest continuously active AFB 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 3,500 acres. Altitude 10 ft. Military 9,918; civilians 1,419. Payroll $275.3 million. Housing: 384 officer; 1,259 NCO; 208 transient. USAF regional 101-bed hospital.

Laughlin AFB, Tex. 78840; 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, Jan. 29, 1942. Area 4,008 acres. Altitude 1,080 ft. Military 2,977; civilians 872. Payroll $62.6 million. Housing: 255 officer; 348 NCO; 37 transient. 20-bed hospital.

Laurence G. Hanscom AFB *(see Hanscom AFB).*

Little Rock AFB, Ark. 72099; 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: 308th Strategic Missile Wing—one of three Titan II missile wings in USAF; air refueling gp. (ANG); 2151st Communications Sqdn.; and 22d Air Force Leadership School. Base activated in 1955. Area 6,894 acres. Altitude 310 ft. Military 6,300; civilians 650. Payroll $111 million. Housing: 313 officer; 1,222 NCO; 387 transient (162 VAQ, 225 VOQ). 30-bed hospital.

Loring AFB, Me. 04751; 4 mi. W of Limestone. Phone (207) 999-1110; AUTOVON 920-1110. SAC base. 42d Bomb Wing was activated here Feb. 25, 1953, as Limestone AFB; renamed for Maj. Charles J. Loring, Jr., F-80 pilot killed Nov. 22, 1952, in North Korea; posthumously awarded Medal of Honor. Area more than 9,000 acres. Altitude 746 ft. Military 3,426; civilians 694. Payroll $71 million. Housing: 319 officer; 1,651 NCO; 135 transient; 4 VIP. 20-bed hospital.

Los Angeles AFS, Calif. 90009; in metropolitan Los Angeles area, city of El Segundo, 3 mi. S of Los Angeles IAP. Phone (213) 643-1000; AUTOVON 833-1110. 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. Station activated Dec. 14, 1960. 24 tenant units on station; also provides support to 41 off-station units/activities. Military 1,502; civilians 1,205. Payroll $79.6 million. Area 96 acres at Los Angeles AFS and 96 acres at Fort MacArthur Annex. Altitude 95 ft. Housing at Fort MacArthur Annex in San Pedro: 200 townhomes for company-grade officers and NCOs with 170 townhomes under construction for completion in May 1985; 33 senior and general officer houses; and unaccompanied dormitories under construction for 58 officers and 54 enlisted personnel, to be completed in August 1984. 18 TLF units. Clinic, commissary, and AF Family Support Center.

Lowry AFB, Colo. 80230; 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, air intelligence, 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 on base and 3,833-acre training annex 25 mi. E of Lowry. Altitude 5,400 ft. Military 10,529; civilians 5,312. Payroll $187.7 million. Housing: 95 officer; 772 enlisted; 40 transient. Dispensary.

Luke AFB, Ariz. 85309; 20 mi. WNW of Phoenix. Phone (602) 856-7411; AUTOVON 853-1110. TAC base. 832d Air Div.; 405th Tactical Training Wing; 58th Tactical Training Wing; 302d Special Operations Sqdn. (AFRES). Luke, the largest fighter training base in the free world, conducts training of USAF aircrews in the F-15 and F-16, and foreign training in the F-5 (at nearby Williams AFB). Base activated in 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. Altitude 1,101 ft. Military 5,364; civilians 1,916. Payroll $171 million. Housing: 95 officer; 779 NCO; 40 transient. 105-bed hospital.

MacDill AFB, Fla. 33608; adjacent to Tampa city limits. Phone (813) 830-1110; AUTOVON 968-1110. TAC base. Host unit 56th Tactical Training Wing. Hq. US Readiness Command; Hq. US Central Command; 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 6,846; civilians 1,009. Payroll $172 million. Housing: 58 officer; 746 enlisted; 350 transient. 75-bed USAF regional hospital.

Malmstrom AFB, Mont. 59402; 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 4,127; civilians 453. Payroll $77.6 million. Housing: 294 officer; 1,112 NCO; 107 transient. 29-bed hospital.

March AFB, Calif. 92518; 9 mi. SE of Riverside. Phone (714) 655-1110; AUTOVON 947-1110. SAC base. Hq. 15th AF; 22d Aerial Refueling Wing; 26th NORAD Region/Air Div. (TAC); 452d Air Refueling Wing (AFRES); 303d Aerospace Rescue and Recovery Sqdn. (AFRES); 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 7,117 acres. Altitude 1,530 ft. Military 3,850; civilians 1,163. Payroll $146 million. Housing: 103 officer; 608 NCO; 146 transient. 110-bed hospital.

Mather AFB, Calif. 95655; 12 mi. ESE of Sacramento. Phone (916) 364-1110; AUTOVON 828-1110. ATC base. DoD executive manager for navigator training (USAF, Navy, Marine Corps basic navigation training). Only navigator training base; also trains USAF electronic warfare officers and navigator-bombardiers. 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 5,500; civilians 2,000. Payroll $158 million. Housing: 370 officer; 901 NCO; 40 transient. 75-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; site of Air War College, AU Center for Aerospace Doctrine, Research and Education; Leadership and Management Development Center; Squadron Officer School; Educational Development Center; AF Historical Research Center; Hq. Air Force ROTC; Hq. Civil Air Patrol-USAF; Community College of the Air Force; 908th Tactical Airlift Gp. (AFRES). (The Senior NCO Academy and Extension Course Institute are at Gunter AFS.) Base activated in 1918; named for 2d Lt. William C. Maxwell, killed in air accident Aug. 12, 1920, in the Philippines. Area 2,523 acres. Altitude 168 ft. Military 4,890; civilians 1,148. Payroll $189.7 million. Housing: 275 officer; 388

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), that NTAS number is listed. Commercial telephone numbers (AC) are given for stations not having access to AUTOVON.

Albrook AFS, APO Miami 34002 (TAC)	AV 222-4012	**Gibbsboro AFS,** New Jersey 08026 (TAC)	NTAS 666-0140
Bellows AFS, Hawaii 96795 (PACAF)	AC (808) 259-5941	**John Hay AS,** APO San Francisco 96298 (PACAF)	AV 822-1201
Calumet AFS, Michigan 49913 (TAC)	NTAS 640-1301	**King Salmon Airport,** APO Seattle 98713 (AAC)	AV 317-721-3550
Cape Canaveral AFS, Florida 32925 (AFSC)	AV 467-1110	**Makah AFS,** Washington 98357 (TAC)	NTAS 490-6343
Cape Cod AFS, Massachusetts 02532 (SPACECOM)	AV 557-2277	**Newark AFS,** Ohio 43055 (AFLC)	AV 580-1110
Cavalier AFS, North Dakota 28220 (SPACECOM)	AV 330-3298	**North Truro AFS,** Massachusetts 02652 (TAC)	NTAS 760-1322
Clear AFS, Alaska APO Seattle 98704 (SPACECOM)	AV 317-585-6409	**Oklahoma City AFS,** Oklahoma 73145 (AFLC)	AV 735-9011
Cudjoe Key AFS, Florida 33039 (TAC)	AV 483-8452	**Point Arena AFS,** California 95468 (TAC)	NTAS 644-4316
Falcon AFS, Colorado (SPACECOM)	AV 692-7011	**Port Austin AFS,** Michigan 48467 (TAC)	NTAS 779-3345
Fort Fisher AFS, North Carolina 28449 (TAC)	NTAS 652-2265	**Sunnyvale AFS,** California 94088 (AFSC)	AV 359-3611
Galena Airport, APO Seattle 98723 (AAC)	AV 317-446-3311	**Tonapah AFS,** Nevada 89049 (AFSC)	AC (702) 643-9252
Gentile AFS, Ohio 45401 (AFLC)	AV 850-5111	**Wallace AS,** APO San Francisco 96277 (PACAF)	AV 822-1201

NCO; 1,029 transient (971 VOQ and 58 VAQ). 90-bed hospital.

McChord AFB, Wash. 98438; 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); SAGE Region 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 6,112; civilians 1,773. Payroll $148.4 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, logistics management, procurement, maintenance, and distribution support for such USAF weapon systems as F-111, FB-111, A-10, T-39; surveillance and warning systems, Space Transportation Systems, communication-electronics equipment, radar sites, and generators; maintenance support for F-4 and F-106 aircraft. Associate units include 41st Rescue and Weather Recon Wing (MAC); 2049th Communications Gp. and 1849th Electronics Installations Sqdn. (AFCC); 1155th Technical Operations Sqdn. (AFSC); 431st Fighter Weapons Sqdn. (TAC); Hq. 4th Air Force (AFRES); Defense Logistics Agency; and US Coast Guard Air Station, Sacramento (DOT). Named for Maj. Hezekiah McClellan, pioneer in Arctic aeronautical experiments, killed in crash May 25, 1936. Area 2,625 acres. Altitude 76 ft. Military 3,981; civilians 14,141. Payroll $444.1 million. Housing: 132 officer; 343 NCO; 21 transient. Dispensary.

McConnell AFB, Kan. 67221; 5 mi. SE of Wichita. Phone (316) 681-6100; AUTOVON 743-1110. SAC base. 381st Strategic Missile Wing; 384th Air Refueling Wing; 184th Tactical Fighter Gp. (ANG). Base activated June 5, 1951; named for Capt. Fred J. McConnell, WW II B-24 pilot who died in a 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 3,716; civilians 942. Payroll $82 million. Housing: 183 officer; 411 NCO; 133 transient. 15-bed hospital.

McGuire AFB, N. J. 08641; 18 mi. SE of Trenton. Phone (609) 724-1110; AUTOVON 440-0111. MAC base. 438th Military Airlift Wing; Hq. 21st Air Force; N. J. ANG; N. J. Civil Air Patrol; 170th Air Refueling Gp. (ANG); 108th Tactical Fighter Wing (ANG); 514th Military Airlift Wing (AFRES Assoc.); the 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 in 1949; named for Maj. Thomas B. McGuire, Jr., P-38 pilot, second leading US ace of WW II, recipient of Medal of Honor, killed in action Jan. 7, 1945, in the Philippines. Area 3,552 acres. Altitude 133 ft. Military 4,898; civilians 1,623. Payroll $113.9 million. Housing: 194 officer; 1,560 NCO; 620 transient (186 VOQ, 244 VAQ, 160 transient family units, 30 transient). Dispensary and 150-bed hospital at Fort Dix.

Minot AFB, N. D. 58705; 13 mi. N of Minot. Phone (701) 727-4761; AUTOVON 344-1110. SAC base. 57th Air Div.; 91st Strategic Missile Wing; 5th Bomb Wing; 5th Fighter Interceptor Sqdn. (TAC). Base activated Feb. 1957. Area 5,050 acres, plus additional 19,324 acres for missile sites. Altitude 1,650 ft. Military 5,900; civilians 550. Payroll $116.5 million. Housing: 543 officer; 1,927 NCO; 104 transient. Dispensary, also 40-bed military hospital in city of Minot.

Moody AFB, Ga. 31699; 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 3,350; civilians 484. Payroll $73 million. Housing: 61 officer; 245 NCO; 42 transient. 25-bed hospital.

Mountain Home AFB, Idaho 83648; 56 mi. SE of Boise. Phone (208) 828-2111; AUTOVON 857-1110. TAC base. 366th Tactical Fighter Wing, F-111A fighter and EF-111A electronic countermeasures operations. Base activated Apr. 1942. Area 6,639 acres. Altitude 3,000 ft. Military 3,990; civilians 564. Payroll $74 million. Housing: 174 officer; 1,374 NCO; 105 transient. 20-bed hospital.

Myrtle Beach AFB, S. C. 29579; in southern 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. Served as Army air base, 1941–47; USAF base since 1956. Area 3,793 acres. Altitude 25 ft. Military 3,450; civilians 455. Payroll $74.4 million. Housing: 118 officer; 682 NCO; 65 trailer lots; 116 transient. 20-bed hospital.

Nellis AFB, Nev. 89191; 8 mi. NE of Las Vegas. Phone (702) 643-1800; AUTOVON 682-1800. TAC base. Tactical Fighter Weapons Center, host unit. F-4E, F-5E, F-15, F-16, F-111, A-10, T-38, UH-1N operations; 57th Fighter Weapons Wing; USAF Thunderbirds Air Demonstration Sqdn.; 4440th Tactical Fighter Training Gp. ("Red Flag"); 554th Operations Support Wing; 554th Range Group; conducts advanced tactical fighter training and realistic combat training for DoD; provides test and evaluation of air tactics and new equipment. Tenant units: 474th TFW; 4450th Tactical Training Gp.; 820th Civil Engineering Sqdn. ("Red Horse"); 3096th Aviation Depot Sqdn.; and 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 11,193 acres, with ranges totaling 3,012,398 acres. Altitude 2,171 ft. Military 10,500; civilians 1,597. Payroll $450 million. Housing: 168 officer; 1,329 NCO; 100 trailer spaces; 1,075 transient (incl. 846 VAQ, 204 VOQ, 25 TLQ). 40-bed hospital.

Norton AFB, Calif. 92409; 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. AF Inspection and Safety Center; Hq. Defense Audiovisual Agency; Hq. AF Audit Agency; Hq. Aerospace Audiovisual Service (MAC). Also Ballistic Missile Office (AFSC); 445th Military Airlift Wing (AFRES Assoc.); and 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 5,455; civilians 2,917. Payroll $223 million. Housing: 56 officer; 208 NCO; 339 transient. Clinic.

Offutt AFB, Neb. 68113; 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; AF Global Weather Central (MAC); 3d Weather Wing (MAC); 3902d Air Base Wing; Strategic Communications Div. (AFCC); 1st Aerospace Communications Gp. (AFCC); 1000th Satellite Operations Gp. (SPACECOM); 3900th Computer Services Sqdn.; 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 Valheureux, France. Area 1,914 acres. Altitude 1,048 ft. Military 12,204; civilians 3,072 (incl. 462 contractor personnel). Payroll $313 million. Housing: 511 officer; 2,169 NCO; 60 transient. 90-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 Equal Opportunity Management Institute; AF Technical Applications Center; 549th Tactical Air Support Gp.; and 2d Combat Communications Gp. (AFCC). Activated in 1940, base is 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 3,127; civilians 1,543. Payroll $133.5 million. Housing: 168 officer; 1,408 NCO. 25-bed hospital.

Pease AFB, N. H. 03801; 3 mi. W of Portsmouth. Phone (603) 430-0100; AUTOVON 852-1110. SAC base. 45th Air Div.; 509th Bomb Wing; 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 4,374 acres. Altitude 101 ft. Military 3,756; civilians 486. Payroll $72.3 million. Housing: 138 officer; 1,073 NCO (including 50 trailer spaces); 128 transient. 70-bed hospital.

Peterson AFB, Colo. 80914; 7 mi. E of Colorado Springs. Phone (303) 554-7321; AUTOVON 692-7011. SPACECOM base. Host unit is 1st Space Wing (SPACECOM). Hq. Space Command; Hq. North American Aerospace Defense Command; NORAD Cheyenne Mountain Complex in Cheyenne Mountain; Hq. Aerospace Defense Command; Aerospace Defense Center; 901st TAG (AFRES). Base activated in 1942; named for 1st Lt. Edward J. Peterson, killed Aug. 8, 1942, in aircraft crash at the base. Area 1,176 acres. Altitude 6,200 ft. Military 3,544; civilians 1,294. Payroll $107 million. Housing: 106 officer; 384 NCO; 40 transient. Clinic.

Plattsburgh AFB, N. Y. 12903; adjacent to Plattsburgh, N. Y. Phone (518) 565-5000; AUTOVON 689-5000. SAC base. 380th Bomb Wing, medium bomber and tanker operations with FB-111 and KC-135. 4007th Combat Crew Training Sqdn. trains all FB-111 combat crews for SAC. Det. 18, 40th Aerospace Rescue and Recovery Sqdn. (MAC); 71st Flying Training Wing (ATC); 2042d Communications Sqdn. (AFCC); 210th Field Training Detachment. Second oldest active military installation in the US, established 1814; AFB since 1955. Area 3,388 acres. Altitude 235 ft. Military 4,200; civilians 651. Payroll $77 million. Housing: 230 officer; 1,412 NCO. 20-bed hospital.

Pope AFB, N. C. 28308; 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). 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. 6, 1919, when his JN-4 "Jenny" ran out of fuel near Fayetteville and crashed. Area 1,750 acres. Altitude 218 ft. Military 4,240; civilians 655. Payroll $71 million. Housing: 89 officer; 370 NCO; 216 transient. Clinic.

Randolph AFB, Tex. 78150; 20 mi. ENE of San Antonio. Phone (512) 652-1110; AUTOVON 487-1110. ATC base. 12th Flying Training Wing, T-37 and T-38 pilot instructor training. Major tenants are Hq. Air Training Command; Air Force Manpower and Personnel Center; Occupational Measurement Center; Office of Civilian Personnel Operations; and 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 5,617; civilians 2,708. Payroll $248 million. Housing: 209 officer; 810 NCO; 288 transient. Dispensary.

Reese AFB, Tex. 79489; 6 mi. W of Lubbock. Phone (806) 885-4511; AUTOVON 838-1110. ATC base. 64th Flying Training Wing, undergraduate pilot training. Base activated in 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 2,588; civilians 570. Payroll $71.6 million. Housing: 112 officer; 295 NCO; 63 transient. 20-bed hospital.

Robins AFB, Ga. 31098; at Warner Robins; 18 mi. SSE of Macon. Phone (912) 926-1110; AUTOVON 468-1110. AFLC base. Hq. Warner Robins Air Logistics Center; Hq. Air Force Reserve (AFRES); 2853d Air Base Gp.; 19th Bomb Wing (SAC); 5th Combat Communications Gp. (AFLC); 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 4,041; civilians 15,886. Payroll $498 million. Housing: 247 officer; 1,149 NCO; 40 transient; 100 trailer spaces. 30-bed hospital.

Sawyer AFB *(see K. I. Sawyer AFB).*

Scott AFB, Ill. 62225; 6 mi. ENE of Belleville. Phone (618) 256-1110; AUTOVON 638-1110. MAC base. 375th Aeromedical Airlift Wing; Hq. Military Airlift Command; Hq. Air Force Communications Command; Hq. 23d Air Force; Hq. Aerospace Rescue and Recovery Service; Hq. Air Weather Service. Also, Defense Commercial Communications Office; Environmental Technical Applications Center; USAF Medical Center, Scott; 7th Weather Wing; 932d Aeromedical Airlift Gp. (AFRES Assoc.); Airlift Communications Div.; and 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 6,823; civilians 3,183. Payroll $272.4 million. Housing: 393 officer; 1,386 NCO, 17 government trailers for airman housing, plus 105 spaces for privately owned trailers; 300 transient. 170-bed hospital; 98-bed aeromedical staging facility.

Seymour Johnson AFB, N. C. 27531; adjacent to Goldsboro. Phone (919) 736-0000; AUTOVON 488-1110. TAC base. 4th Tactical Fighter Wing, F-4E fighter operations with dual-based commitment to NATO; 68th Air Refueling Gp. (SAC); 2012th Communications Sqdn. (AFCC). Base activated June 12, 1942; named for Navy Lt. Seymour A. Johnson, native of Goldsboro, killed Mar. 5, 1941, in an aircraft accident in Maryland. Area 4,281 acres. Altitude 109 ft. Military 5,485; civilians 855. Payroll $110 million. Housing: 217 officer; 1,483 enlisted; 166 transient (46 VOQ, 92 VAQ, and 28 TLF to open in July 1984). 30-bed hospital.

Shaw AFB, S. C. 29152; 10 mi. WNW of Sumter. Phone (803) 668-8110; AUTOVON 965-1110. TAC base. Hq. 9th Air Force (TAC); 363d Tactical Fighter Wing, F-16 fighter and RF-4C recon operations; 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 3,567 acres; supports another 8,078 acres. Altitude 244 ft. Military 6,700; civilians 819. Payroll $129 million. Housing: 389 officer; 1,315 NCO; 225 transient. 40-bed hospital.

Shemya AFB, Alaska (APO Seattle 98736); 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. Activated in 1943. Shemya was used as a bomber base in WW II. The International Date Line has been bent around Shemya so the local date is the same as elsewhere in the US. Area about 4.5 mi. long by 2.5 mi. wide. Altitude 270 ft. Military 650, civilian contract employees 300. Payroll $7.5 million. Housing: 70 transient. Dispensary.

Sheppard AFB, Tex. 76311; 4 mi. N of Wichita Falls. Phone (817) 851-2511; AUTOVON 736-1001. ATC base. Sheppard Technical Training Center provides resident courses in aircraft maintenance, civil engineering, communications, and missile, comptroller, transportation, and instructor training. The 3785th Field Training Gp. provides specialized and advanced training at 72 field training detachments and 18 operating locations worldwide. The School of Health Care Sciences provides training in medicine, dentistry, nursing, biomedical sciences, 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. 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 in 1941. Area 5,000 acres. Altitude 1,015 ft. Military 7,952; civilians 1,607. Payroll $180 million. Housing: 200 officer; 1,087 NCO. 160-bed hospital.

Tinker AFB, Okla. 73145; 8 mi. SE of Oklahoma City.

USAF's Principal Bases Overseas

Ankara AS, Turkey
APO New York 09254
AUTOVON 672-1110
Hq. TUSLOG
7217th Air Base Group, USAFE
Support base, USAFE

Aviano AB, Italy
APO New York 09293
AUTOVON 632-1110
40th Tactical Group, USAFE
Support base, USAFE

Bitburg AB, Germany
APO New York 09132
AUTOVON 453-1110
36th Tactical Fighter Wing, USAFE

Camp New Amsterdam, The Netherlands
APO New York 09292
(Call Ramstein, AUTOVON 480-1110; ask for Camp New Amsterdam.)
32d Tactical Fighter Squadron, USAFE

Clark AB, Philippines
APO San Francisco 96274
AUTOVON 822-1201
Hq. 13th Air Force, PACAF
3d Tactical Fighter Wing, PACAF
374th Tactical Airlift Wing, MAC
6922d Electronic Security Squadron, ESC

Comiso AS, Italy
APO New York 09694
AUTOVON 628-8110
487th Tactical Missile Wing, USAFE

Hahn AB, Germany
APO New York 09109
AUTOVON 450-1110
50th Tactical Fighter Wing, USAFE

Hellenikon AB, Greece
APO New York 09223
AUTOVON 662-1110
Support base, USAFE

Hessisch-Oldendorf AS, Germany
APO New York 09669
(Call Sembach, AUTOVON 496-1110; ask for Hessisch-Oldendorf.)
600th Tactical Control Group, USAFE
Tactical air control base, USAFE

Howard AFB, Panama
APO Miami 34001
AUTOVON 284-1110
Hq. USAF Southern Air Division, TAC

Incirlik AB, Turkey
APO New York 09289
AUTOVON 676-1110
39th Tactical Group, USAFE
Support base, USAFE

Iraklion AS, Greece
APO New York 09291
AUTOVON 668-1110
Support base, USAFE

Izmir AS, Turkey
APO New York 09224
AUTOVON 675-1110
7241st Air Base Group, USAFE
Support base, USAFE

Kadena AB, Okinawa, Japan
APO San Francisco 96239
AUTOVON 630-1110
313th Air Division, PACAF
18th Tactical Fighter Wing, PACAF
376th Strategic Wing, SAC
6990th Electronic Security Group, ESC
961st Airborne Warning and Control Squadron, TAC

Keflavik NAS, Iceland
FPO New York 09571
AUTOVON 231-1290
Fighter-interceptor base, TAC

Kunsan AB, South Korea
APO San Francisco 96264
AUTOVON 272-1110
8th Tactical Fighter Wing, PACAF

Kwang Ju AB, South Korea
APO San Francisco 96324
(Call Korea, AUTOVON 284-4110; ask for Kwang Ju AB.)
Combat support base, PACAF

Lajes Field, Azores
APO New York 09406
AUTOVON 895-3490
Airlift support base, MAC

Lindsey AS, Germany
APO New York 09633
AUTOVON 339-1110
7100th Air Base Group, USAFE
Support base, USAFE

Misawa AB, Japan
APO San Francisco 96519
AUTOVON 248-1101
6112th Air Base Wing, PACAF
6920th Electronic Security Group, ESC

Osan AB, South Korea
APO San Francisco 96570
AUTOVON 284-4110
314th Air Division, PACAF
51st Tactical Fighter Wing, PACAF
6903d Electronic Security Group, ESC

RAF Alconbury, United Kingdom
APO New York 09238
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
AUTOVON 234-1110
7274th Air Base Group, USAFE
Support base, USAFE

RAF Fairford, United Kingdom
APO New York 09125
AUTOVON 247-1110
7020th Air Base Group, USAFE
KC-135 refueling support base, USAFE

RAF Greenham Common, United Kingdom
APO New York 09150
(Call RAF Upper Heyford, AUTOVON 263-1110; ask for Greenham Common.)
501st Tactical Missile Wing, USAFE

RAF Lakenheath, United Kingdom
APO New York 09179
AUTOVON 226-1110
48th Tactical Fighter Wing, USAFE

RAF Mildenhall, United Kingdom
APO New York 09127
AUTOVON 238-1110
Hq. 3d Air Force, USAFE
513th Tactical Airlift Wing, USAFE
306th Strategic Wing, SAC (Rotational)
313th Tactical Airlift Group, MAC (Rotational)

RAF Upper Heyford, United Kingdom
APO New York 09194
AUTOVON 263-1110
20th Tactical Fighter Wing, USAFE

RAF Woodbridge, United Kingdom
APO New York 09405
AUTOVON 225-1110
81st Tactical Fighter Wing, USAFE
67th Aerospace Rescue and Recovery Squadron, MAC

Ramstein AB, Germany
APO New York 09012
AUTOVON 480-1110
Hq. USAFE
86th Tactical Fighter Wing, USAFE
Hq. European Communications Division, AFCC
7th Air Division, SAC
322d Airlift Division, MAC
2d Weather Wing, MAC

Rhein-Main AB, Germany
APO New York 09057
AUTOVON 330-1110
Tactical airlift base, MAC

San Vito AS, Italy
APO New York 09240
AUTOVON 622-1110
7275th Air Base Group, USAFE
Support base, USAFE

Sembach AB, Germany
APO New York 09130
AUTOVON 496-1110
Hq. 17th Air Force, USAFE
601st Tactical Control Wing, USAFE
Tactical air control base, USAFE
Allied Tactical Operations Center (ATOC)

Sondrestrom AB, Greenland
APO New York 09121
(Call Malmstrom AFB, AUTOVON 632-1110; ask for Sondrestrom AB.)
Support base, SPACECOM

Spangdahlem AB, Germany
APO New York 09123
AUTOVON 452-1110
52d Tactical Fighter Wing, USAFE

Suwon AB, South Korea
APO San Francisco 96461
(Call Korea, AUTOVON 284-4110; ask for Suwon AB.)

Taegu AB, South Korea
APO San Francisco 96213
(Call Korea, AUTOVON 284-4110; ask for Taegu AB.)

Tempelhof Central Airport, West Berlin
APO New York 09611
AUTOVON 332-1110
7350th Air Base Group, USAFE
1946th Communications Squadron, AFCC
6912th Electronic Security Group, ESC
Support base, USAFE

Thule AB, Greenland
APO New York 09023
(Call AUTOVON 834-1211; ask for Thule AB.)
Support base, SPACECOM

Torrejon AB, Spain
APO New York 09283
AUTOVON 723-1110
Hq. 16th Air Force, USAFE
401st Tactical Fighter Wing, USAFE

Yokota AB, Japan
APO San Francisco 96328
AUTOVON 248-1101
Hq. US Forces, Japan
Hq. 5th Air Force, PACAF
475th Air Base Wing, PACAF
316th Tactical Airlift Group, MAC

Zaragoza AB, Spain
APO New York 09286
AUTOVON 724-1110
406th Tactical Fighter Training Wing, USAFE
Tactical fighter training base, USAFE

Zweibrücken AB, Germany
APO New York 09860
AUTOVON 498-1110
26th Tactical Reconnaissance Wing, USAFE

Phone (405) 734-7321; AUTOVON 735-1110. AFLC base. Hq. Oklahoma City Air Logistics Center, furnishes logistic support for bombers, jet engines, instruments, and electronics. Electronics Installation Center; 3d Combat Communications Gp.; 552d Airborne Warning and Control Div. (TAC); 507th Tactical Fighter Gp. (AFRES). Base activated Mar. 1941; named for Maj. Gen. Clarence L. Tinker. On June 7, 1942, at the end of the Battle of Midway, General Tinker's LB-30 (an early model B-24) apparently went down at sea after attacking retreating enemy ships. Area 4,277 acres. Altitude 1,291 ft. Military 7,030; civilians 17,541. Payroll $543 million. Housing: 110 officer; 422 NCO. 30-bed hospital.

Travis AFB, Calif. 94535; at Fairfield, 50 mi. NE of San Francisco. 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 25, 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 12,747; civilians 2,207. Payroll $234 million. Housing: 241 officer; 1,926 NCO; 584 transient (incl. 40 transient living quarters, 204 VOQ, 188 VAQ, 83 Aerial Port quarters with cooking facilities, 69 Aerial Port quarters without). 290-bed hospital.

Tyndall AFB, Fla. 32403; 13 mi. E of Panama City. Phone (904) 283-1113; AUTOVON 970-1110. TAC base. Home of the USAF Air Defense Weapons Center with primary units in the 325th Tactical Training Wing, 475th Weapons Evaluation Group, and 325th Combat Support Group. 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. Home of the biennial Project William Tell, the USAF air-to-air weapons meet that tests the mission skills of the best air-to-air fighter units; and TAC's new strategic air defense exercise, Copper Flag. Tenants include 23d North American Aerospace Defense Command Region/TAC Air Div., home of Southeast Region Operations Control Center, tasked with air surveillance of more than 3,000 miles of coastline from Maryland to Texas; Air Force Engineering and Services Center, a separate operating agency charged with management of USAF worldwide engineering and services programs; 3625th Technical Training Sqdn. (ATC); 2021st Communications Sqdn. (AFCC); 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 4,200; civilians 1,600. Payroll $110 million. Housing: 139 officer; 932 NCO. 50-bed hospital.

US Air Force Academy, Colo. 80840; 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 Communications Sqdn.; Frank J. Seiler Research Lab (AFSC); DoD Medical Exam Review Board; Det. 470 of AF Audit Agency; 557th Flying Training Sqdn.; and 94th Air Training Sqdn. Area 18,000 acres. Altitude 7,280 ft. Military 2,748; civilians 1,783. Payroll $149.5 million. Housing: 458 officer; 774 NCO; 91 transient; 28 temporary family quarters. 85-bed hospital.

Vance AFB, Okla. 73705; 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, 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 1,400; civilians 1,300. Payroll $58 million. Housing: 139 officer; 134 NCO; 39 transient; 10 TLF. Clinic.

Vandenberg AFB, Calif. 93437; 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 Test Center (AFSC); and Shuttle Activation Task Force (AFSC). Host command conducts missile crew training and provides facilities and support for operational ICBM tests. Vandenberg is the only base that launches operational ballistic missiles in the SAC deterrent force. WSMC is responsible for conducting R&D testing of USAF space and ballistic missile programs, and unmanned polar-orbiting space operations of DoD, USAF, and NASA. This includes development, testing, and evaluation of the Peacekeeper and the Space Transportation System. Peacekeeper testing began in June 1983, and a total of 20 test launches is scheduled through 1986. Shuttle Activation Task Force (SATAF) is responsible for facility construction, equipment installation, and validation for future Vandenberg Space Shuttle launches beginning in late 1985. Approximately 1,537 launches have taken place from Vandenberg since Dec. 1958. Originally Army's Camp Cooke. Activated Oct. 1941. Base taken over by USAF on June 7, 1957; renamed for Gen. Hoyt S. Vandenberg, USAF's second Chief of Staff, died Apr. 2, 1954. Area 98,400 acres. Altitude 400 ft. Military 4,350; civilians 9,600. Payroll $347.7 million. Housing: 429 officer; 1,651 NCO; 172 mobile trailer spaces; 18 transient. 45-bed hospital.

Warren AFB *(see Francis E. Warren AFB).*

Wheeler AFB, Hawaii 96854; 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 Airlift Support Sqdn., a subordinate unit, and 169th Aircraft Control and Warning Sqdn. (Hawaii Air National Guard—Air Defense Direction Center); US Army aviation units from Schofield Barracks; 6924th Electronic Security Sqdn.; several other tenant units. Base activated Feb. 1922; named for Maj. Sheldon H. Wheeler, who became CO of Luke Field, Hawaii, in 1919, and who was killed there July 13, 1921, when his biplane crashed during an aerial exhibition. Area 1,369 acres. Altitude 845 ft. Military 985; civilians 120. 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 in 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 3,183; civilians 422. Payroll $57 million. Housing: 200 officer; 792 NCO; 81 transient (incl. 22 VOQ, 4 guest houses, and 55 VAQ). 25-bed hospital.

Williams AFB, Ariz. 85224; 16 mi. SE of Mesa. Phone (602) 988-2611; AUTOVON 474-1001. ATC base. 82d Flying Training Wing, largest undergraduate pilot training base; also provides F-5 combat crew training for foreign students. 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 crash of a bomber near Fort De Russy, Hawaii, July 6, 1927. Area 4,762 acres. Altitude 1,385 ft. Military 3,300; civilians 1,070. Payroll $72 million. Housing: 310 officer; 496 NCO; 40 transient. 25-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); 4950th Test Wing (AFSC); Foreign Technology Div. (AFSC); AF Institute of Technology; USAF Medical Center, Wright-Patterson; US Air Force Museum; AF 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 78 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 8,174 acres. Altitude 824 ft. Military 9,000; civilians 17,000; contracted service and contractor employees 6,000. Payroll $713 million. Housing: 1,090 officer; 1,280 NCO; 40 transient. 285-bed hospital.

Wurtsmith AFB, Mich. 48753; 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 in 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 5,213 acres. Altitude 634 ft. Military 3,308; civilians 697. Payroll $85.2 million. Housing: 197 officer; 1,144 NCO; 30 transient. 20-bed hospital. ■

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, beginning on an earlier page.

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 101 acres. Altitude 124 ft. Military 774, technicians 166. Payroll $10.5 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 304, technicians 36. Payroll through Dobbins AFB.

Atlantic City Airport, N. J. (Federal Aviation Administration Technical Center) 08405; 10 mi. W of Atlantic City. Phone (609) 645-6000; AUTOVON 234-1980. 177th Fighter Interceptor Gp. (ANG). Area 123 acres. Altitude 76 ft. Military 945, technicians 258. Payroll $11.8 million.

Baltimore, Md. (Glenn L. Martin State Airport) 21220; 8 mi. E of Baltimore. Phone (301) 687-6270; AUTOVON 235-9210. 175th Tactical Fighter Gp. (ANG); 135th Tactical Airlift Gp. (ANG). Area 75 acres. Altitude 89 ft. Military 1,648, technicians 306. Payroll $17.8 million. Clinic.

Bangor ANG Base, Me. 04401; 4 mi. NW of Bangor. Phone (207) 947-0571; AUTOVON 476-6210. 101st Air Refueling Wg. (ANG). Area 1,094 acres. Altitude 192 ft. Military 1,318, technicians 206. Payroll $13.4 million. Small BX-Foodland.

Battle Creek ANG Base, Mich. 49015; located adjacent to W. K. Kellogg Airport. Phone (616) 963-1596; AUTOVON 580-3210. 110th Tactical Air Support Gp. (ANG). Area 89 acres. Altitude 941 ft. Military 892, technicians 162. Payroll $9 million.

Birmingham Municipal Airport, Ala. (Smith ANG Base) 35217. Phone (205) 599-9200; AUTOVON 694-2260. 117th Tactical Recon Wg. (ANG). ANG base named for Col. Sumpter Smith, who played an important part in promoting the development of Birmingham's airport. Area 86 acres. Altitude 650 ft. Military 1,150, technicians 263. Payroll $15.5 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 2,600 acres (467 acres military). Altitude 2,858 ft. Military 1,230, technicians 263. Payroll $12.2 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., and Hq. Colorado ANG. Also host to Navy Reserve, Marine Corps Reserve, ARNG, and Air Force units. Base activated Apr. 1, 1942, and used 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 3,262 acres. Altitude 5,663 ft. Military 1,179, technicians 267. Payroll $20.1 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 326 acres. Altitude 371 ft. Military 932, technicians 226. Payroll $10.9 million.

Charleston, W. Va. (Kanawha Airport) 25311; 4 mi. NE of Charleston. Phone (304) 357-5100; AUTOVON 366-9210. 130th Tactical Airlift Gp. (ANG). Area 218 acres. Altitude 981 ft. Military 885, technicians 162. Payroll $9.6 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 1,042, technicians 179. Payroll $11.5 million. Clinic.

Cheyenne, Wyo. (Cheyenne Municipal Airport) 82001. Phone (307) 772-6201; AUTOVON 943-6201. 153d Tactical Airlift Gp. (ANG). Area 46 acres. Altitude 6,156 ft. Military 845, technicians 168. Payroll $9.7 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 959, technicians 183. Payroll $11.3 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 967, technicians 245. Payroll $11.7 million.

Dobbins AFB, Ga. 30069; 2 mi. S of Marietta; 16 mi. NW of Atlanta. Phone (404) 429-5055; AUTOVON 925-1110. AFRES base. Hq. 14th Air Force (AFRES); 94th Tactical Airlift Wg. (AFRES); 116th Tactical Fighter Wg. (ANG). Base activated in 1943, named for Capt. Charles Dobbins, WW II pilot killed in action near Sicily. Area 1,729 acres. Altitude 1,068 ft. AFRES: military 275, technicians 900, Reserve 2,547. Payroll $35 million. ANG: military 1,150; technicians 263. Payroll $15.5 million. Housing: 3 officer, 5 NCO. Dispensary.

Duluth International Airport, Minn. 55811; 5 mi. NW of Duluth. Phone (218) 727-6886; AUTOVON 825-7210. 148th Fighter Interceptor Gp. (ANG). USAF base also located at airport. Area 152 acres. Altitude 1,429 ft. Military 942, technicians 245 (plus 22 civilians). Payroll $12.5 million.

Fargo, N. D. (Hector Field) 58105. Phone (701) 237-6030; AUTOVON 362-8110. 119th Fighter Interceptor Gp. (ANG). Area 133 acres. Altitude 900 ft. Military 1,015, technicians 257. Payroll $12.9 million.

Forbes Field, Kan. 66619; 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 862, technicians 191 (plus 43 civilians). Payroll $10.6 million.

Fort Smith Municipal Airport, Ark. (Ebing ANG Base) 72906. Phone (501) 646-1601; AUTOVON 962-8210. 188th Tactical Fighter Gp. (ANG). Area 95 acres. Altitude 468 ft. Military 926, technicians 220. Payroll $9.9 million.

Fort Wayne, Ind. (Fort Wayne Municipal Airport) 46809; 5 mi. SSW of Fort Wayne. Phone (219) 747-4141; AUTOVON 889-1550. 122d Tactical Fighter Wg. (ANG). Area 87 acres. Altitude 800 ft. Military 1,070, technicians 247. Payroll $11.2 million.

Fresno Air Terminal, Calif. 93727; 5 mi. NE of Fresno. Phone (209) 252-4041; AUTOVON 949-9210. 26th NORAD Region and 26th Air Div. (TAC); 194th Fighter Interceptor Sqdn. (TAC); 144th Fighter Interceptor Wg. (ANG). Area 139 acres. Altitude 332 ft. Military 959, technicians 279. Payroll $12.9 million.

Gen. Billy Mitchell Field, Wis. 53207; SE of 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 65 acres. Military 947, technicians 205. Payroll $10.9 million. AFRES phone (414) 481-6400; AUTOVON 786-9110. 440th Tactical Airlift Wg. (AFRES). AFRES area 100 acres. Military 11, technicians 199, Reservists 918. Payroll $11.88 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 137 acres. Altitude 640 ft. Military 903, technicians 163. Payroll $9.3 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) 269-8300; AUTOVON 277-8300. 171st Air Refueling Wg. and 112th Tactical Fighter Gp. (ANG). ANG area 90 acres. Military 1,576, technicians 355. Payroll $17.6 million. AFRES phone (412) 269-8000; AUTOVON 277-8000. 911th Tactical Airlift Gp. (host unit). AFRES area 165 acres. Military 21, technicians 245, 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. 59404; 5 mi. SW of Great Falls. Phone (406) 727-4650; AUTOVON 279-2301. 24th NORAD Region and 24th Air Div. (TAC); SAGE Control Center (NORAD); 120th Fighter Interceptor Gp. (ANG). Area 139 acres. Altitude 3,674 ft. Military 970, technicians 281. Payroll $13.7 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 397, technicians 21. Payroll through Keesler AFB. 2-bed dispensary.

Harrisburg International Airport, Middletown, Pa. 17057; 10 mi. E of Harrisburg. Phone (717) 948-2201; AUTOVON 454-9201. 193d Electronic Combat Gp. (ANG). ANG area 72 acres. Altitude 310 ft. Military 1,046, technicians 223. Payroll $17.3 million.

Houston, Tex. (Ellington AFB) 77209; 17 mi. SE of Houston. Phone (713) 481-1400; AUTOVON 954-2110. 147th Fighter Interceptor Gp. (ANG). Other tenants: NASA Operations, US Coast Guard, Army National Guard, FAA, Military Sealift Command, ANG Transition Caretaker Force. Named for Lt. Eric L. Ellington, a pilot killed Nov. 1913. Area 2,283 acres. Altitude 40 ft. Military 971, technicians 258 (plus 155 civilians). Payroll $16.3 million.

Jackson Municipal Airport, Miss. (Allen C. Thompson Field) 39208; 7 mi. E of Jackson. Phone (601) 939-3633; AUTOVON 731-9310. 172d Tactical Airlift Gp. (ANG). ANG area 84 acres. Altitude 346 ft. Military 853, technicians 180. Payroll $10 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 158 acres. Altitude 30 ft. Military 976, technicians 256. Payroll $12.6 million. 5-bed dispensary.

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: 228th Combat Communications Sqdn. and ANG's I. G. Brown Professional Military Education Center. Area 287 acres. Altitude 980 ft. Military 1,103, technicians 243 (plus 2 civilians). Payroll $13.4 million. Dispensary.

Lincoln Municipal Airport, Neb. 68524; 1 mi. NW of Lincoln. Phone (402) 471-3241; AUTOVON 720-1210. 155th Tactical Recon Gp. (ANG). Also hosts Army National Guard unit. Area 163 acres. Altitude 1,198 ft. Military 1,020, technicians 223. Payroll $11.1 million. Dispensary.

Louisville, Ky. (Standiford Field) 40213. Phone (502) 566-9400; AUTOVON 989-4400. 123d Tactical Recon Wg. (ANG). Area 65 acres. Altitude 497 ft. Military 1,064, technicians 239. Payroll $12.2 million.

Mansfield Lahm Airport, Ohio 44901; 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 858, technicians 167. Payroll $9.3 million. Dispensary.

Martinsburg, W. Va. (Eastern West Virginia Regional Airport) 25401; 4 mi. S of Martinsburg. Phone (304) 263-0801; AUTOVON 242-9210. 167th Tactical Airlift Gp. (ANG). Area 279 acres. Altitude 556 ft. Military 892, technicians 166. Payroll $9 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 Brig. Gen. B. B. McEntire, Jr. (ANG), killed in an F-104 in 1961. Area 2,394 acres. Altitude 250 ft. Military 1,287, technicians 238. Payroll $12.8 million. Dispensary.

Memphis International Airport, Tenn. 38118; within Memphis city limits. Phone (901) 369-4111; AUTOVON 966-8210. 164th Tactical Airlift Gp. (ANG). ANG occupies 82 acres. Altitude 332 ft. Military 876, technicians 167. Payroll $9.3 million. Clinic.

Meridian, Miss. (Key Field) 39301; within city limits. Phone (601) 693-5031; AUTOVON 363-9210. 186th Tactical Recon Gp. (ANG). Area 74 acres. Altitude 297 ft. Military 1,236, technicians 244. Payroll $12.9 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 1,255, technicians 224. Payroll $13.1 million. AFRES phone (612) 725-5011; AUTOVON 825-5100. 934th Tactical Airlift Gp. (AFRES). AFRES area 300 acres. Reservists 888, technicians 350. Payroll $13.5 million for AFRES. 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; and USAF-CAP/NCLR and CAP MNLO.

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 639, technicians 176. Payroll $14.3 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 1,150, technicians 260. Payroll $15.4 million. Dispensary.

Nashville Metropolitan Airport, Tenn. 37217; 6 mi. SE of Nashville. Phone (615) 361-4600; AUTOVON 446-6210. 118th Tactical Airlift Wg. (ANG). Area 75 acres. Altitude 597 ft. Military 1,292, technicians 274. Payroll $15 million.

New Orleans Naval Air Station, La. (Alvin Callender Field) 70143; 15 mi. S of New Orleans. ANG and AFRES have separate phones and facilities. ANG phone (504) 394-2818; AUTOVON 363-3399. 159th Tactical Fighter Gp. (ANG). ANG military 948, technicians 242. Payroll $14.2 million. AFRES phone (504) 393-3293; AUTOVON 363-3293. 926th Tactical Fighter Gp. (AFRES). Military 720, technicians 260. Payroll $8.5 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. Altitude 3 ft. Dispensary.

Niagara Falls International Airport, N. Y. 14304; 6 mi. E of Niagara Falls. Phone (716) 297-4100; AUTOVON 489-3011. AFRES base. 914th Tactical Airlift Gp. (AFRES), 107th Fighter Interceptor Gp. (ANG). Base activated in Jan. 1952. Area 979 acres. Altitude 590 ft. AFRES: 20 active duty; 270 technicians; 930 Reservists. Payroll $12.5 million. ANG: 947 military; 256 technicians. Payroll $11.8 million.

O'Hare Air Reserve Forces Facility, Ill. 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 in Apr. 1946, named for Lt. Cmdr. Edward H. "Butch" O'Hare, USN Medal of Honor recipient, killed Nov. 26, 1943, during battle for the Gilbert Islands. Area 391 acres. Altitude 643 ft. ANG military 1,183, technicians 1,555, Reservists 1,500. Payroll $59.8 million.

Oklahoma City, Okla. (Will Rogers World Airport) 73169; 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 1,033, technicians 197. Payroll $10.8 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 214, technicians 17. Payroll $7.4 million.

Otis ANG Base, Mass. 02542; 7 mi. NNE of Falmouth. Phone (617) 968-4667; AUTOVON 557-4667. 102d Fighter Interceptor Wg. (ANG) and 6th Missile Warning Sqdn. (PAVE PAWS). Other tenants include Coast Guard Air Station Cape Cod; Army National Guard Aviation; Camp Edwards ARNG Training Installation; VA National Cemetery. Named for 1st Lt. Frank J. Otis, ANG flight surgeon and pilot killed in 1937 crash. Area 22,000 acres, incl. ANG 4,000 acres. Altitude 132 ft. Military ANG 1,053, technicians 265 (plus 278 civilians). Payroll $21.3 million. 1,193 housing units on base. USCG administers 601 (10 command, 45 officer, 546 other ranks).

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, also ARNG and Marine Reserve for special training. Named for Capt. W. H. Phelps Collins, American Flying Corps, killed in France, Mar. 1918. Area 2,711 acres. Altitude 689 ft. Military 54. Payroll paid 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 879, technicians 219. Payroll $12.4 million.

Portland International Airport, Portland, Ore. 97218. 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), and Oregon Wg., CAP. Also host to 304th Aerospace Rescue and Recovery Sqdn. (AFRES). 83d Aerial Port Sqdn. (AFRES). Area 273 acres. Altitude 26 ft. Military 1,662, technicians 323 (plus 46 civilians). Payroll $21.4 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 79 acres. Altitude 9 ft. Military 940, technicians 174. Payroll $13.4 million.

Reno, Nev. 89502 (Cannon International Airport—May ANG Base), 1776 ANG Way; 5 mi. SE of Reno. 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 997, technicians 224. Payroll $11.1 million. Dispensary.

Richards-Gebaur AFB, Mo. 64030; 17 mi. S of Kansas City, Mo. Phone (816) 348-2000; AUTOVON 465-1110. 442d Tactical Fighter Gp. (AFRES); 1879th Communications Sqdn. (AFCC); 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 2,418 acres. Approx. 1,900 acres declared excess and turned over to General Services Administration for final conveyance as determined by reuse studies. Some 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 1,400; technicians 400. Payroll $15.4 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 924, technicians 226. Payroll $11.2 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 4,100 acres. Approx. 1,800 acres declared excess and turned over to General Services Administration. Altitude 744 ft. Reserve and ANG military 3,600, active-duty USAF 67, technicians 380. Payroll $32 million. On-base Capehart housing. VOQ and VAQ available, limited on weekends. Consolidated open mess available.

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 50.3 acres. Altitude 320 ft. Military 567, technicians 47. 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 1,259, technicians 235 (plus 33 civilians). Payroll $14.2 million. Dispensary.

San Juan, Puerto Rico (Muniz ANG Base at San Juan IAP) 00913. Phone (809) 791-5450; AUTOVON 434-1860. 156th Tactical Fighter Gp. (ANG). Base named for Lt. Col. José A. Muniz, killed in an aircraft accident July 4, 1960. Area 25 acres. Military 845, technicians 210. Payroll $14.2 million.

Savannah Municipal 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 899, technicians 233. Payroll $14.5 million. Housing: 156 officer; 736 enlisted. 3-bed dispensary.

Schenectady County Airport, N. Y. 12302; 2 mi. N of Schenectady. Phone (518) 372-5621; AUTOVON 974-9221. 109th Tactical Airlift Gp. (ANG). Area 106 acres. Altitude 378 ft. Military 853, technicians 173. Payroll $9.1 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); 403d Aerospace Rescue and Recovery Wg. (AFRES); 927th Tactical Airlift Gp. (AFRES); also hosts 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. Military ANG 1,904, technicians ANG 408 (plus 572 civilians). Payroll $34.6 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 839, technicians 211. Payroll $10.6 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 843, technicians 211. Payroll $10 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 1,058, technicians 257. Payroll $12.7 million. Dispensary.

Springfield-Beckley Airport, Ohio 45501; 5 mi. S of Springfield. Phone (513) 323-8653; AUTOVON 346-2311. 178th Tactical Fighter Gp. (ANG). Area 113 acres. Altitude 1,052 ft. Military 1,143, technicians 239. Payroll $13.7 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 801, technicians 167. Payroll $8.8 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 1,308, technicians 274. Payroll $18.9 million.

Stewart International Airport, Newburgh, N. Y. 12550; 4 mi. W of Newburgh; 15 mi. N of USMA (West Point). Phone (914) 564-7000, ext. 3376; AUTOVON 247-3376. Hq. NYANG and 105th Military Airlift Gp. (ANG); USMA sub-post airport. Formerly Stewart AFB; acquired by state of New York in 1970. ANG area 260 acres. Altitude 491 ft. ANG military 839, technicians 166. Payroll $8.1 million. Dispensary.

Suffolk County Airport, Westhampton Beach, N. Y. 11978; 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 709, technicians 178. Payroll $10.8 million.

Syracuse, N. Y. (Hancock Field) 13211; 5 mi. NE of Syracuse. Phone (315) 458-5500; AUTOVON 587-9110. 174th Tactical Fighter Wg. (ANG). Base operations for Hancock AFB (NORAD site on remote part of Syracuse Hancock International Airport). Area 443 acres. Altitude 421 ft. Military 1,128, technicians 273. Payroll $12.3 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 939, technicians 223. Payroll $11.4 million. 5-bed dispensary.

Toledo Express Airport, Swanton, Ohio 43558; 14 mi. W of Toledo. Phone (419) 866-2078; AUTOVON 580-2110. 180th Tactical Fighter Gp. (ANG). Area 79 acres. Altitude 684 ft. Military 874, technicians 214. Payroll $11.8 million. 4-bed clinic.

Truax Field (Dane County Regional Airport), Madison, Wis. 53704; 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 P-40 training accident in 1941. Area 153 acres. Altitude 862 ft. Military 871, technicians 206. Payroll $10 million. Housing: 7 transient. Dispensary.

Tucson International Airport, Ariz. 85734; within Tucson city limits. Phone (602) 748-1110; AUTOVON 361-1110. 162d Tactical Fighter Gp. (ANG). Area 49 acres. Altitude 2,650 ft. Military 1,112, technicians 412. Payroll $17.3 million.

Tulsa International Airport, Okla. 74115. Phone (918) 836-0381; AUTOVON 956-5297. 138th Tactical Fighter Gp. (ANG) and 219th Electronic Installation Sqdn. Area 78 acres. Altitude 676 ft. Military 1,012, technicians 222. Payroll $10.6 million.

Van Nuys ANG Base, 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 1,615, technicians 321. Payroll $17.9 million.

Volk Field ANG Base, Wis. 54618; 90 mi. NW of Madison. Phone (608) 427-1210; AUTOVON 798-3210. ANG field training site, including air-to-air and air-to-ground gunnery ranges, providing training for ANG flying units. Named for Lt. Jerome A. Volk, first Wisconsin ANG pilot killed in the Korean War. Area 2,260 acres. Altitude 910 ft. Military 57. Payroll $2.4 million.

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 897, technicians 192. Payroll $12.7 million.

Westover AFB, Mass. 01022; 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) 759. Payroll $17.5 million. Housing: 313 family quarters; 432 dormitory rooms; 25 VOQ; 174 BOQ.

Willow Grove Air Reserve Facility, Pa. 19090; 14 mi. N of Philadelphia. ANG and AFRES have separate phones and facilities. Altitude 356 ft. ANG phone (215) 443-1500; AUTOVON 991-1500. 111th Tactical Air Support Gp. (ANG). ANG area 1,000 acres. Military 830, technicians 150. Payroll $9.1 million. AFRES phone (215) 443-1062; AUTOVON 991-1062. 913th Tactical Airlift Gp. (AFRES). AFRES area 162 acres. Reservists 856, technicians 269. Payroll $9.3 million. Other units include Army, Navy, and Marine Corps Reserve. Defense Contract Administration Services Region, Philadelphia; 92d Aerial Port Sqdn. (MAC) as off-base tenant. Base activated Aug. 1958. Navy transient quarters available, but limited.

Wilmington, Del. (Greater Wilmington Airport) 19720; 5 mi. S of Wilmington. Phone (302) 322-2261; AUTOVON 455-9000. 166th Tactical Airlift Gp. (ANG); Army National Guard aviation company. Area 57 acres. Altitude 80 ft. Military 943, technicians 166. Payroll $9.3 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) and Army National Guard aviation battalion. Named for Lt. Eugene M. Bradley, killed in P-40 crash in Aug. 1941. Area 158 acres. Altitude 173 ft. Military 876, technicians 201. Payroll $12.1 million.

Youngstown Municipal Airport, Ohio 44473; 16 mi. N of Youngstown. Phone (216) 856-1645; AUTOVON 346-9211. AFRES base. 910th Tactical Airlift Gp. (AFRES), 757th Tactical Airlift Sqdn. (AFRES). Base activated 1952. Area 226 acres. Altitude 1,196 ft. Reservists 901, technicians 230. Payroll $13 million. ■

A Guide to USAF's R&D Facilities

Principal AFSC R&D Facilities

From AFSC headquarters at Andrews AFB, Md., Gen. Robert T. Marsh, 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 transports, aerial tankers, utility aircraft, rescue helicopters, 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 10,000 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 further develop, acquire, and test the new B-1B strategic

bomber, with the first of 100 scheduled for production to roll out in the fall of 1984; development of an advanced tactical fighter for the mid-1990s and beyond; full-scale development of the T-46A Next-Generation Pilot Trainer; full-scale development of the HH-60D Night Hawk combat rescue helicopter; full-scale development of the C-17 airlift aircraft; reengining and other enhancements to the KC-135 tanker; continued production and improvements to the F-15 Eagle and F-16 Fighting Falcon fighters; procurement of a European distribution system aircraft; production of C-12F and C-21A aircraft to replace CT-39s; lease/buy of C-20A special mission aircraft to replace the aging C-140s; the study and design of a transatmospheric vehicle concept; an update to the EF-111A tactical jamming aircraft; improvements to the B-52 force through installation of a new offensive avionics system and the modifications to carry cruise missiles; and the alternate fighter engine for F-15 and F-16 aircraft.

Missile systems include development of the advanced cruise missile, continued production and deployment of the air-launched cruise missile, and production of the tactical infrared Maverick missile, which is capable of air strikes at night and in adverse weather.

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 large aircraft for conducting test flights and gathering and analyzing test results. These include the Airborne Laser Laboratory, based at Kirtland AFB, N. M., and the Advanced Range Instrumentation Aircraft (ARIA), which deploy worldwide to receive, record, and retransmit telemetry data for missiles, satellites, and launch vehicles. The ARIA aircraft are maintained at Wright-Patterson AFB along with a fleet of test-bed aircraft, including C-130, C-141, C-18, C-135, T-39, and T-37 aircraft to provide customers a low-cost test-bed option.

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 at Wright-Patterson AFB—the Flight Dynamics, Materials, Avionics, and Aero Propulsion Laboratories—and is organizationally located under ASD. AFWAL was established to combine common laboratory overhead, management, and support functions.

Avionics Laboratory conducts research and development programs for reconnaissance, weapon delivery, electronic warfare, electronic technology, and avionics systems.

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.

Flight Dynamics Laboratory is concerned with the development of flight-vehicle technology. Specific technical areas include 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 technologies include AFTI/F-16 and DIGITAC and the X-29A forward-swept wing (jointly with DARPA) and AFTI/F-111 mission adaptive wing. The latter two are technology demonstrators for new wing designs. Additionally, design studies are under way for a short takeoff and landing and maneuvering technology and a critical technology demonstrator.

Materials Laboratory conducts the complete USAF program in materials exploratory development and manufacturing technology. Areas of current emphasis include thermal protection materials; metallic and nonmetallic structural materials; aerospace propulsion materials; 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 is charged with the planning, research, development, and acquisition of conventional air armaments and the test and evaluation of armament and electronic warfare systems and related equipments.

The four major mission areas assigned to AD are research and technology, systems development and acquisition, test and evaluation, and host and base support. This full spectrum assigns cradle-to-grave responsibility for air armaments to one organization. This synergism is further enhanced by the using command tenant organizations assigned to Eglin AFB, Fla.

The research and technology and systems development and acquisition mission areas are organized under a single manager, the Deputy Commander for Development and Acquisition, to control centrally the efforts of AD's Air Force Armament Laboratory and the development plans, systems acquisition, and acquisition logistics organizations. This one focal point ties together the basic research; exploratory development; advanced development; master planning; and conceptual, validation, 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 overall test and evaluation program. To accomplish its mission, the wing utilizes several large land test ranges scattered throughout the 724-square-mile Eglin complex as well as 86,000 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 capabilities 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.

One AD organization, the 6585th Test Group, is located at Holloman AFB, N. M. Among its unique facilities are a 50,000-foot high-speed test track, a radar target scatter facility (RATSCAT), and the Central Inertial Guidance Test Facility (CIGTF).

Air Force Armament Laboratory (AFATL), Eglin AFB, Fla.—AFATL is the principal Air Force laboratory doing research on free-fall and guided nonnuclear munitions and airborne targets and scorers to provide the future technological base for aircraft armaments. These include missile subsystems, bombs, dispensers, fuzes, guns, and ammunition. AFATL also provides consulting services in aircraft munition compatibility and analysis and prediction of munition subsystem performance and weapon effects. AFATL is organizationally assigned to the Armament Division at Eglin AFB, Fla.

Electronic Systems Division (ESD), Hanscom AFB, Mass.—ESD is responsible for development, acquisition, and delivery of electronic systems and equipment for the command control communications and intelligence (C^3I) of aerospace forces. More than 100 projects are under way, including modernization of the North American air defense with new control centers and joint-use Air Force/Federal Aviation Administration radars; satellite communications terminals for aircraft use; a worldwide chain of optical satellite-tracking stations; a triservice secure and survivable tactical communications network for air, ground, and sea forces; upgrading of the NORAD Space Operations Center; the E-3A Sentry airborne radar/direction center for the Air Force and NATO; a survivable unmanned radio network able to withstand disturbances fatal to other systems; and an over-the-horizon backscatter radar system for long-range tactical early warning and surveillance of aircraft approaching North America. Rome Air Development Center at Griffiss AFB, N. Y., supports ESD by providing a technology base for projects that pertain to C^3I. ESD also works directly with the major commands to plan for evolutionary command control and communications improvements.

Rome Air Development Center (RADC), Griffiss AFB, N. Y.—RADC is the principal organization charged with Air Force research and development programs related to C^3I (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; 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 the demonstration and acquisition of 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 Department of Defense 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.
- The Space and Missile Test Organization, the Air Force Satellite Control Facility, the Air Force Space Technology Center, and the Manned Space Flight Support Group, major field elements of SD, described below.

To meet these global responsibilities, SD utilizes 2,967 officers, 2,609 enlisted, and 4,551 civilian personnel. Aerospace Corporation, based adjacent to SD headquarters, also devotes the principal efforts of its highly qualified 1,669-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 enhance military space capabilities and the needs of future space systems.

Collectively, the expertise of these laboratories under AFSTC provides a focus for information about space-related developments in such diverse areas as electronics hardening, laser research, rocket propulsion, and the earth and space environment.

The Center will work through Air Force Systems Command and the newly formed Space Command to provide research results for future systems needs and to identify key technology areas for long-range plans.

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/vulnerability. AFWL also acts as the AFSC focal point for the technical aspects of nuclear safety and development of nuclear hardness criteria for Air Force systems.

Air Force Rocket Propulsion Laboratory (AFRPL), Edwards AFB, Calif.—AFRPL conducts exploratory and advanced development programs for liquid, solid, and hybrid rockets; advanced rocket propellants; and associated ground-support equipment. AFRPL also conducts system support programs for other units and divisions of AFSC, other branches of the armed services, and NASA.

Air Force Geophysics Laboratory (AFGL), Hanscom AFB, Mass.—AFGL is the center for research, exploratory, and advanced development involving the terrestrial, atmospheric, and space environments. AFGL scientists study the effects of the space environment on Air Force satellites; 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; the 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.

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. In addition, BMO provides for alteration of existing intercontinental ballistic missile (ICBM) sites and launch facilities.

One of the major BMO development programs is the Advanced Strategic Missile Systems (ASMS). ASMS is responsible for providing advanced technology to ensure the effectiveness, survivability, and penetration 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.

A second major program within BMO is development activities for the Minuteman missile system, which BMO initially developed more than twenty years ago. These activities include reentry systems, emergency power sources, and command control communications equipment.

BMO is managing the development of the Peacekeeper system, a new, survivable ICBM. Peacekeeper is currently undergoing a flight-test program at Vandenberg AFB, Calif. The scheduled date for the initial operational capability of the Peacekeeper is set for late 1986.

BMO is also managing the development of the Small Intercontinental Ballistic Missile Program (SICBM). This new program office opened at BMO in May 1983. The development of the new small missile is in response to the President's ICBM Modernization Program.

Test Organizations

Space and Missile Test Organization (SAMTO), Van-

denberg AFB, Calif.—SAMTO has two specific functions. First is the management of field test and launch operations for all DoD-directed space programs and long-range ballistic research and development programs. The other is development, management, and operation, through the Eastern and Western Space and Missile Centers, of 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 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 west coast Space Shuttle launch operations scheduled to begin in late 1985.

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 development and processing of the Inertial Upper Stage for the Space Shuttle and Titan 34D, all space launches requiring geosynchronous orbits, and the Trident 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 Grand Bahama, Antigua, and Ascension Islands.

Air Force Satellite Control Facility (AFSCF), Sunnyvale AFS, Calif.—AFSCF develops, maintains, and operates for the Space Division a worldwide network of tracking stations to perform on-orbit tracking, data acquisition, and command and contol of DoD space vehicles.

Manned Space Flight Support Group (MSFSG), Johnson Space Center, Houston, Tex.—The MSFSG is developing the capability to plan for and control DoD Space Transportation System missions and to ensure that those missions are secure. In addition, MSFSG will manage the acquisition phase of the Shuttle Operations and Planning Center portion of the Consolidated Space Operations Center. The MSFSG will also train personnel to support directly the command and control of DoD Space Shuttle missions and transition those personnel to the Space Operations Center.

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 evaluations can also be carried out by AFFTC on aircraft belonging to other US military services and government agencies.

AFFTC is also the Air Force organization responsible for testing and evaluating remotely piloted vehicles, Air Force versions of air- and ground-launched cruise missiles, plus crew, cargo, and special mission parachutes.

Among the aerospace test programs currently under way at AFFTC are those related to the B-1B bomber, the F-15 Eagle, the F-16 Fighting Falcon, the A-10 Thunderbolt II, and the Integrated Weapons System (IWS) that combines test and evaluation of the air-launched cruise missile and the upgraded and modified B-52 bomber into a single test unit.

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.

AFFTC 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 Shuttle program by providing the landing site for the initial series of test and development flights and by carrying out the comprehensive evaluation of the Shuttle's descent characteristics for the Department of Defense. Edwards AFB also remains a contingency landing site for the Space Shuttle.

Arnold Engineering Development Center (AEDC), Arnold AFS, Tenn.—AEDC operates the world's most advanced and largest complex of aerospace flight simulation test facilities—some forty aerodynamic and propulsion wind tunnels, high-altitude rocket and jet engine test cells, space environmental chambers, and ballistic ranges. Twenty-seven of the Center's test units have capabilities unmatched elsewhere.

The Center's mission is to ensure that aerospace hardware—aircraft, missiles, spacecraft, jet and rocket propulsion systems, and other components—will work right the first time they fly. Full-size hardware and scale models are tested at the Center under conditions simulating altitudes of up to 1,000 miles and velocities up to twenty-three times the speed of sound.

The greatest advantage of simulated flight testing is the precise control that can be exercised in repeatedly simulating the variables of the flight envelope. In addition, models can be used rather than flight-weight hardware. Cause of a structural failure can be more easily pinpointed with recoverable hardware. Development of a system can be accelerated by simultaneous development of components and subsystems. It's not necessary to wait for a suitable booster or test-bed for development testing.

Arnold Center has contributed to practically every top-priority aerospace program of the nation. Customers include the National Aeronautics and Space Administration; the Federal Aviation Administration; the Air Force, Army, and Navy; private industry; and government and educational institutions.

AEDC appropriately carries the name of the man directly responsible for its conception—Gen. Henry H. (Hap) Arnold. The original concept of the Center evolved from a study commissioned shortly before the end of World War II by General Arnold, then commander of the Army Air Forces. He had determined that the lack of aeronautical test facilities in the US prior to the war had resulted in technically inferior aeronautical weapon systems compared to those developed in Germany. The study was conducted under the leadership of Dr. Theodore von Kármán, one of the world's leading aeronautical scientists, and began with a detailed survey of German wind tunnels and ground test facilities.

To meet flight simulation needs for the 1980s and 1990s, the Air Force is constructing the Aeropropulsion Systems Test Facility at AEDC, a complex expected to be completed in the mid-1980s. It is designed to test the large advanced jet aircraft engine systems required for future aircraft.

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 directly related 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 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/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 major contractor plants 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. The division also operates one detachment, the Contract Administration Services/European System Office (CASEUR), in Brussels, Belgium, in support of the F-16 multinational coproduction program.

Aerospace Medical Division (AMD), Brooks AFB, Tex.—AMD is charged with management and conduct of research and development in aerospace biotechnology that supports the Air Force mission. Specialized and postgraduate professional education is also conducted in medicine, dentistry, and aerospace medical subjects. AMD scientists seek to counter potential hazards and ensure maximum crew performance in all aerospace environments.

Air Force Human Resources Laboratory (AFHRL), Brooks AFB, Tex.—AFHRL manages and conducts research and exploratory and advanced development programs for manpower and personnel, operational and technical training, simulation, and logistics systems. The Manpower and Personnel Division is located at Brooks AFB. The other AFHRL divisions are the Logistics and Human Factors Division at Wright-Patterson AFB, Ohio; the Operations Training Division at Williams AFB, Ariz.; and the Training Systems Division at Lowry AFB, Colo.

Wilford Hall USAF Medical Center (WHMC), Lackland AFB, Tex.—Established in 1942 as a 100-bed hospital, Wilford Hall USAF Medical Center has grown to accommodate 1,000 beds and more than 1,000,000 outpatient visits annually.

Wilford Hall has completed an addition and alteration project that began in November 1976 and consumed $95 million and seven years of construction time.

A new wing was completed and opened in July 1979; a nine-story bed tower is now in use, as is the three-story clinic area. A new cancer therapy unit was recently opened.

This year a new $6 million clinical investigation facility is expected to open. In the Center's mission of clinical research, investigations have resulted in unprecedented advances in surgical and treatment procedures in such areas as dental work, drug therapy, internal medicine, psychiatric treatment, cancer treatment, experimental surgery, and organ transplants.

Services at the Center include the Air Force's only eye bank, a neonatal intensive care unit, complete dental care, open-heart surgery, kidney and corneal transplants, and a cancer therapy unit that recently began a bone marrow transplant program.

In addition, Wilford Hall is a training center that offers residencies in most major medical specialties, providing eighty-five percent of all postgraduate medical training courses in the Air Force.

Air Force Aerospace Medical Research Laboratory (AFAMRL), Wright-Patterson AFB, Ohio—AFAMRL is part of the Aerospace Medical Division. It conducts behavioral and biomedical research to enhance human performance under conditions of environmental stress. AFAMRL 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 Aerospace Medical Division. Its research mission includes both in-house and contractual work dealing with applied aspects of aeromedical research. Investigations in the Divisions of Data Sciences, Clinical Sciences, Environmental Sciences, and Radiobiology encompass laboratory and clinical studies in biological, environmental, and dynamic conditions that may affect the health and efficiency of aircrews. The Epidemiology Division serves as a consultant and reference laboratory to Air Force medical facilities throughout the world. One of its principal responsibilities is to give advice and assistance in the investigation of disease outbreaks at Air Force installations. USAFSAM operates the USAF Hyperbaric Treatment Center and 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 twenty-five years—longer than any other Air Force NCO Academy. Both the Academy and Leadership School are important phases of the Air Force's five-tier professional military education program offered to the NCO corps. ■

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.

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 for the current inventory of expendable launch vehicles. Launches from the Pacific Coast are conducted by the KSC Western Operations Support Office at Lompoc, Calif. 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.

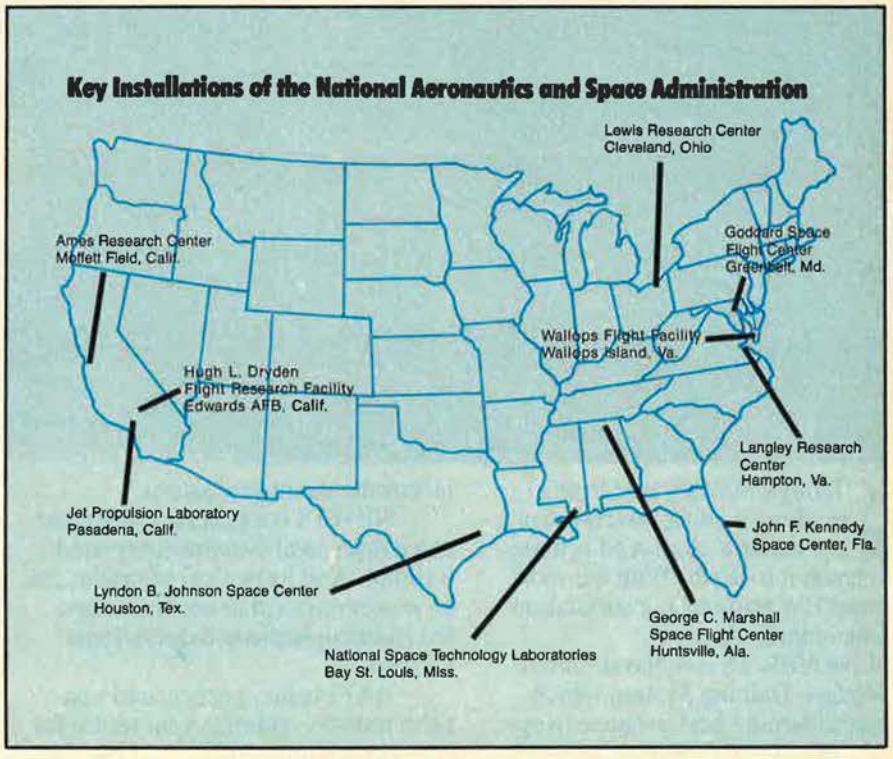
George C. Marshall Space Flight Center, Huntsville, Ala.—Marshall serves as one of NASA's primary centers for the design and development of space transportation systems, orbital systems, scientific payloads, and other means for space exploration. The Marshall Center has major responsibilities for Space Shuttle development, testing, and fabrication, including the main engine and solid rocket boosters and external tanks. Other major projects are Spacelab, Space Telescope, High-Energy Astronomy Observations, solar electric propulsion, and materials processing in space. It manages the Michoud Assembly Facility in New Orleans. Named for the late Gen. George C. Marshall, recipient of the Nobel Peace Prize.

Wallops Flight Facility, Wallops Island, Va.—Wallops 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.

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.

Lyndon B. Johnson Space Center, Houston, Tex.—The Center designs, tests, and develops manned spacecraft and selects and trains astronauts. It directs the Space Shuttle program. 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.

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 program. 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. ■



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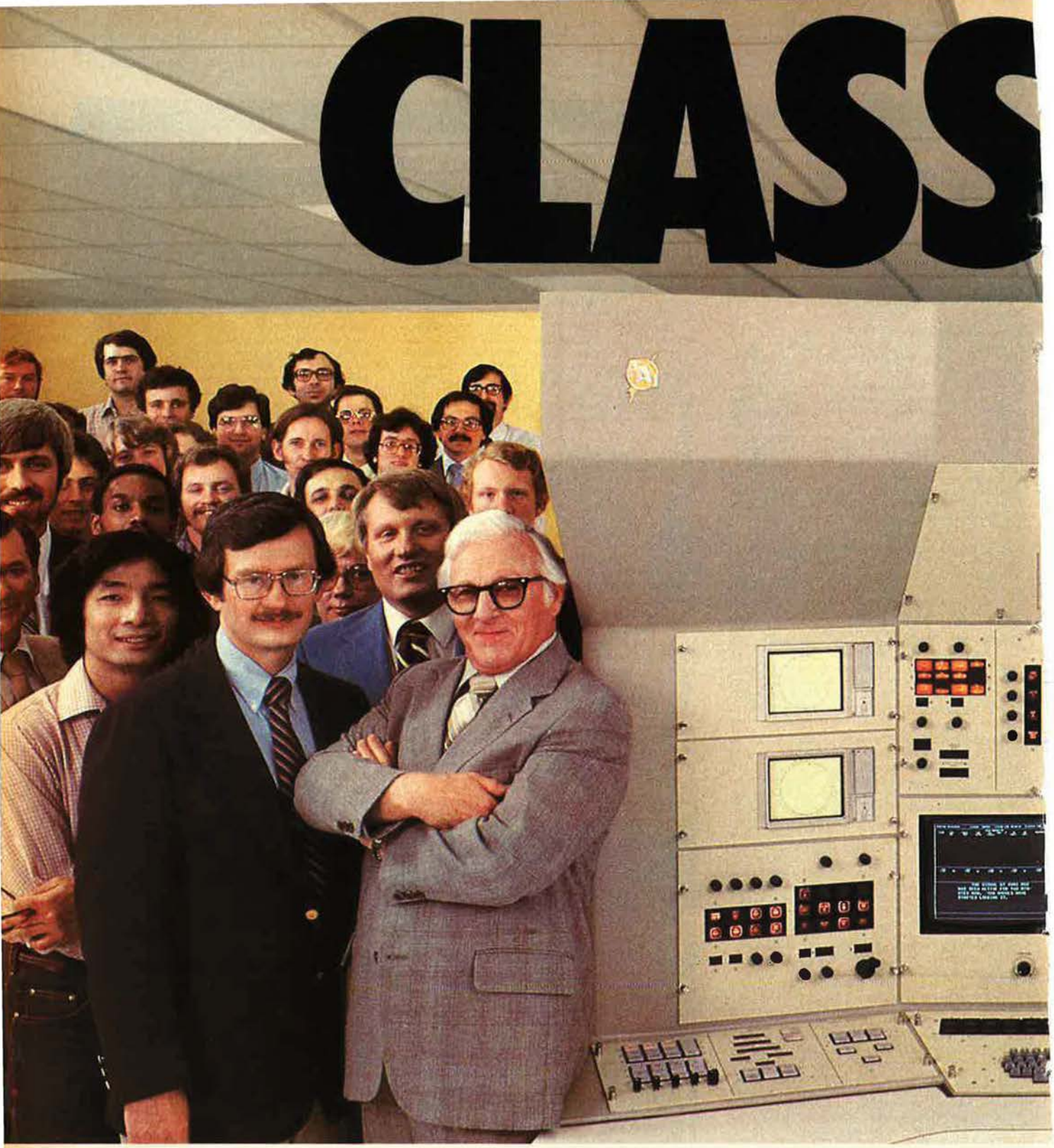

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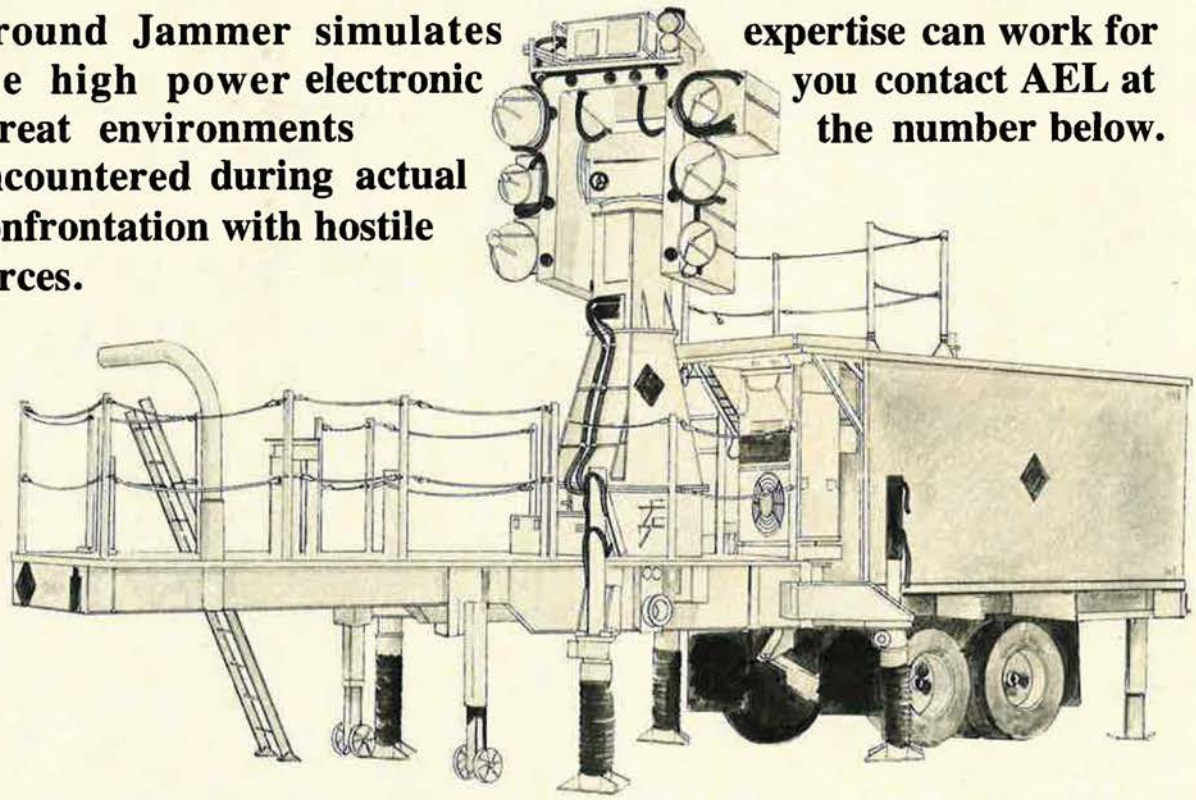

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MiG Hunter

Twelve MiG-15s were poised to attack the fighter-bombers that were beating up a North Korean railroad. F-86 pilot George Davis knew they had to be stopped.

BY JOHN L. FRISBEE

In late November 1950, Chinese Communist armies entered the Korean War in overwhelming numbers, forcing United Nations troops to retreat from North Korea to positions south of the Thirty-eighth Parallel. By the spring of 1951, due in large part to air support provided by Far East Air Forces (FEAF), the United Nations Command had regained the initiative. Communist armies soon stood at the brink of military disaster. On June 23, Jacob Malik, Soviet delegate to the United Nations Security Council, proposed cease-fire talks, which both sides accepted. The talks began on July 10.

Almost immediately, it was apparent that the Communists were using the lull in fighting to build up stockpiles that would allow them to resume the offensive. FEAF's Fifth Air Force F-84 fighter-bombers and B-26s and Bomber Command's B-29s launched a round-the-clock interdiction campaign against lines of communication in North Korea.

The cease-fire talks broke down in August. Early the following month, the Chinese Air Force, with more than 500 MiG-15 jet fighters opposed by fewer than 100 USAF F-86 Sabres—the only plane that could match the MiG in air-to-air combat—began an all-out drive to win air superiority in the North and defeat the crucially important interdiction campaign. It was the job of the F-86 pilots to keep swarms of Chinese MiGs—some of them flown by Russian pilots—off the backs of the bombers, fighter-bombers, and recce planes lest the balance be tilted once more in favor of the Communists.

As the air war over MiG Alley reached a fever pitch, thirty-year-old Maj. George A. Davis reported for duty with the renowned 4th Fighter Interceptor Wing based at Kimpo, some 200 miles south of the Yalu River, where many of the great jet battles took place. Davis was no neophyte. He had shot down seven Japanese planes during World War II, and after the war had been a member of the Air Force jet demonstration team, a forerunner of USAF's Thunderbirds, first flying F-80s, then F-86s.

There are two kinds of fighter pilots—the hunters and the hunted. George Davis not only was a superb, combat-experienced fighter pilot. He was a hunter.

Davis flew his first jet combat mission on November 1, 1951. On November 27, he downed two MiG-15s, and three days later one MiG and three Tu-2 bombers. Two MiGs went down before his guns on December 5, and four more on December 13. In seventeen days, he had become the leading Korean ace, with twelve victories, and had won the Distinguished Service Cross. Then there was a dry spell of a few weeks when Communist pilots stayed at altitude and refused to fight. That ended in February.

On February 10, 1952, George Davis led his sixtieth jet mission over North Korea—a formation of four F-86s on combat patrol to protect fighter-bombers targeted against railroads near Kunu-ri. Major Davis's element leader ran out of oxygen and had to return to Kimpo with his wingman, leaving Davis and the fourth F-86 to continue the patrol alone.

A few minutes later, Davis spotted a formation of twelve MiG-15s heading south toward an area where the F-84 fighter-bombers were working. Disregarding the odds, Davis maneuvered into attack position and dove into the enemy formation, exploding one MiG on his first pass. With fighters on his tail, Davis shot down a second MiG and then, rather than dive to safety, continued his attack in a hazardous maneuver: He reduced speed to slide behind another enemy fighter. One of the remaining MiGs came in from seven o'clock, firing at close range. Davis's F-86 went out of control and crashed on a mountain a few miles south of the Yalu. The MiG formation had been disrupted, the F-84s completed their interdiction mission, but the Air Force lost one of its greatest and most courageous warriors.

Several months later, Air Force Chief of Staff Gen. Nathan F. Twining presented the Medal of Honor posthumously to George Davis's young widow at a ceremony attended by more than 2,000 guests, including many members of Congress.

When the Korean War ended on July 27, 1953, only three Air Force pilots—Capt. Joseph McConnell (sixteen victories), Maj. James Jabara (fifteen), and Capt. Manuel Fernandez (fourteen and a half)—had surpassed George Davis's fourteen victories that were won in less than three months.

That record ended in a supreme act of valor. ■

Medal of Honor winner George Davis is one of USAF's top all-time aces.

THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Senior NCO Academy Honors Enlisted Heroes

In a moving recent ceremony, the Air Force Senior NCO Academy at Gunter AFS, Ala., dedicated the first enlisted Heritage Hall in the Air Force. Concurrently dedicated was an AC-47 gunship now on static display at the school.

Special guests at the dedication ceremonies were three of the only four living enlisted Army Air Forces and USAF Medal of Honor recipients. On hand were Henry E. Erwin of Leeds, Ala., Forrest L. Vosler, Syracuse, N. Y., and John L. Levitow, Washington, D. C. *(see photo).* Erwin and Vosler won their Medals for heroism in World War II. Levitow is the only USAF enlisted man to have won the Medal of Honor; the 180-combat mission veteran did it while flying in Vietnam as a loadmaster on an AC-47 similar to the gunship dedicated at the ceremony.

CMSgt. Bobby G. Renfroe, first enlisted and current Academy Commandant, welcomed guests to the event. Lt. Gen. Charles G. Cleveland, Air University Commander, spoke on the meaning of the Hall as a place to preserve the vast heritage of the enlisted force. He called it "a tribute to the past achievements of Army Air Forces and Air Force enlisted men and women" and an "inspiration" to future airmen.

Forrest "Woody" Vosler was one of the original board members of the fledgling Air Force Association back in 1946.

The top service noncoms got together recently at Fort McNair in Washington, D. C. They are, from left, Sergeant Major of the Army Glen E. Morrell, Sergeant Major of the Marine Corps Robert E. Cleary, Master Chief Petty Officer of the Navy Billy C. Sanders, Chief Master Sergeant of the Air Force Sam E. Parish, and Master Chief Petty Officer of the Coast Guard Carl W. Constantine. (Army photo by Thomas B. Richmond, Jr.)

Three enlisted Medal of Honor recipients look over displays at Enlisted Heritage Hall, Gunter AFS, Ala. From left are Forrest Vosler, John Levitow, and Henry Erwin. See item. (USAF photo by Kenny Shackleford)

ANG Director Receives Zuckert Award

For the first time ever, a member of the Air National Guard has received the prestigious Air Force Zuckert Award. Secretary of the Air Force Verne Orr recently presented the tribute to Maj. Gen. John B. Conaway, ANG Director *(see photo).*

The Zuckert Award is presented annually to an Air Force general officer or equivalent-level civilian for outstanding management contributions. It was established in 1965 as a tribute to former Secretary of the Air Force Eugene M. Zuckert, a recognized prime contributor to effective Air Force management practices.

General Conaway was honored for his "superior management of force modernization and mission readiness for the ANG." He was cited as dramati-

Air Force Secretary Verne Orr, left, presents the Eugene M. Zuckert Management Award to ANG Director Maj. Gen. John B. Conaway.

cally increasing the combat readiness and sustainability of ANG units nationwide and for the highest state of equipment modernization ever attained in the history of the Guard.

DoD Surveying Health-Care Opinions

In a massive mail campaign now under way, DoD is asking nearly 14,000 military families how they feel about their health care. Additionally, more than 5,300 physicians—both military and civilian government employees—will get separate questionnaires as part of the survey.

Congress has told DoD to keep health-care costs under control, and DoD wants to do that. Concurrently, it wants to make sure that military families are still getting all the health-care services they need. Thus, the survey will touch on the quality and accessibility of military medicine and on the degree of general satisfaction with the medical system.

Medical officials hope to have the results back and a report ready by the end of September. DoD is hopeful that the selected respondents will not be bashful and will give thoughtful attention to the surveys to elicit meaningful responses, whether good or bad.

Short Bursts

This is the month that **Vietnam Veterans Memorial Fund** officials had hoped would see the completion of the sculpture of the three servicemen being added to the Memorial. Fund President Jan Scruggs now says that a Memorial Day completion is no longer possible, but that "we feel confident that the statue will be in place for Veterans Day 1984."

The Veterans Administration wants veterans to know that it **will not pay off a VA-guaranteed home loan if the borrower dies.** The surviving spouse or other coowner must continue making payments unless commercial insurance arrangements have been made.

The Air Force took positive steps recently to **speed up issuance of no-fee dependent passports,** an administrative bottleneck that was causing some accompanied families to miss port calls, meaning that they stayed behind. Processing time has been cut from an average of close to seventy-five days to about sixteen days. More than 35,000 passports are needed each year for accompanied Air Force PCS moves.

If you're a military person with at least 150 free-fall military or sport parachute jumps, the **Air Force Academy** would like to talk to you about serving on the faculty for a four-year controlled tour. CBPOs have details.

Teddy Roosevelt was the **first President to fly**—but he didn't do it until after leaving office. The first incumbent President to make regular flights was **Franklin D. Roosevelt.** His presidential planes were a C-54 and a B-24.

Air Force members who served in **Grenada** or outlying islands or flew in airspace above the theater operations from October 23 through November 21, 1983, may be eligible for the **Armed Forces Expeditionary Medal.** Required time in the area is six consecutive or twelve nonconsecutive days. Local personnel offices have specifics.

Shades of R2-D2! Air Force top cops are looking at **possible use of robots for nuclear storage security,** mass parking apron patrols, and alert area security. Just in the talking stage at present, the question being discussed is exactly what characteristics and performance criteria for security robots would be desirable.

A federal appeals court has ruled that school districts **cannot levy tuition charges on military dependents** attending public schools. The case stemmed from a North Carolina attempt, but many states have made similar moves as federal impact aid to military-base neighbor communities has been cut back.

CMSAF Sam Parish made a significant point during recent congressional testimony. Appearing with the top NCOs from the other services, Chief Parish responded to their complaint that the Air Force gets more "people money" by noting that the Air Force makes better use of the funds it does get in this area. Stating that the Air Force puts a **priority on people,** he said, "In the Air Force, people are important. If we take care of our people, they take care of the mission."

It's tougher to graduate from **Officer Training School.** OTS students now must meet more rigorous physical-fitness requirements than previously, including a fifteen-minute test that measures ability in the broad jump, pushups, pull-ups, and a 600-yard run. This is on top of a mile-and-a-half run.

Senior Staff Changes

RETIREMENT: M/G Bill V. **Brown.**

CHANGES: Col. (B/G selectee) Edward R. Bracken, from Cmdr., 48th TFW, USAFE, RAF Lakenheath, UK, to Vice Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., replacing B/G Lee V. Greer . . . **Col. (B/G selectee) Hugh L. Cox III,** from Cmdr., 2d AD, MAC, Hurlburt Field, Fla., to Cmdr., E-3A Component Command, NATO AEW Force, Geilenkirchen, Germany . . . **B/G Lee V. Greer,** from Vice Cmdr., Oklahoma City ALC, AFLC, Tinker AFB, Okla., to Cmdr., Log. Mgmt. Sys. Ctr., & DCS/Log. Mgmt. Sys., Hq. AFLC, Wright-Patterson AFB, Ohio.

Col. (B/G selectee) Raymond V. McMillan, from Spec. Ass't to the Cmdr. for Prgm. Mgmt., Hq. AFSC, Andrews AFB, Md., to DCS/Sys. Integration, Hq. SPACECOM, Peterson AFB, Colo. . . . **Col. (B/G selectee) Earl S. Van Inwegen,** from Ass't DCS/Ops., Hq. SPACECOM, Peterson AFB, Colo., to DCS/Intel., Hq. NORAD/SPACECOM, Peterson AFB, Colo., replacing B/G (M/G selectee) Thomas C. Brandt. ■

Maj. Georges Houle isn't a bit shy about displaying his enthusiasm for the KC-10A Extender tanker parked in the background. His pride shows in his "MY KC10" license plate. Major Houle is a government flight representative assigned to the USAF Plant Representative Office at Douglas Aircraft Co., Long Beach, Calif., where his job is flight-testing the aircraft to ensure mission reliability and contract compliance. (USAF photo by Dick Dee)

Saved by the Light

BY COL. ROLLIN C. REINECK, USAF (RET.)
Cartoons by Bob Stevens

Years later, a navigator learns the rest of the story about a B-24 mission in the soup.

MURPHY'S law was at work, but those of us in the B-29s of the 73d Wing on Saipan in November 1944 didn't know Murphy. Nor did we understand the basic principle of his law—"During any well-planned operation, everything that can go wrong will." But that is exactly what happened as we tried to launch the first Superfortress mission against Tokyo.

We got our first clue that Murphy's irrepressible forces were at work when we landed on Saipan in the middle of October. We had been briefed by higher authority that everything would be in readiness, including two large runways with adjoining taxiways and hardstands with Operations and Maintenance buildings adjacent. Quarters would be away from the runway for the comfort of the crews.

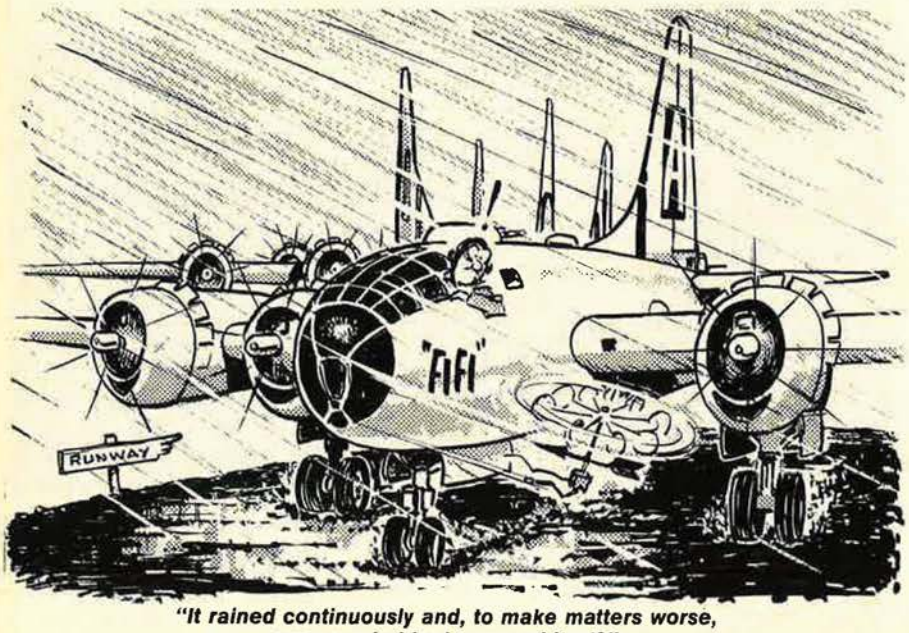
This dream was shattered when we landed and saw that only 6,000 feet of one runway was paved and that there were no Operations or Maintenance buildings in sight. Tents of various sizes in cane patches would serve to protect the crews from the rain and the mud that we had in abundance.

However, we had our marching (or should I say flying?) orders. By the last week in October we had enough B-29s on Saipan to make possible the first combat training mission. Several more training missions against the Japanese islands of Truk and Iwo Jima followed until it was decided that it was time for the main event.

The next several days were devoted to perfecting the plan for the first Tokyo mission. This plan included, among other things, getting all the B-29s aimed in the right direction on the airfield so that on the day of the mission we could taxi them, with the least possible delay, onto our only active runway and take off into the wind.

Uncooperative Weather

On the day of the first mission, the planes were ready, the crews were ready, but the weather was not. It rained continuously and, to make matters worse, runway wind had reversed itself. Everyone knew we couldn't take off with those overloaded birds pointing downwind, but it would have been nearly impossible to turn around all those B-29s on the small, overcrowded airfield. On top of everything else, a large tropical storm had been reported somewhere to the northwest of Saipan. But no one really knew if there was a storm, as Japan wasn't sending out much useful weather data to the metro troops on Saipan. Of course, if there were such a storm northwest of the island, it would present some real problems to the B-29s trying to penetrate it in formation. Everyone was completely frustrated. Tomorrow was another day, however, so we hit the sack early for another early morning takeoff attempt.



"It rained continuously and, to make matters worse, runway wind had reversed itself."

About midnight I was awakened and told to get dressed and to bring my sextant. The General wanted to see me. I was going on a weather mission. "Why me?" I thought, but then I realized the answer to that question. I was the Staff Navigator for the 73d Wing and, more importantly, I was very convenient. My tent was just a couple of hundred feet from Wing Operations.

The briefing was simple and to the point. The General said, "Fly due north from here for about two hours. Then fly southeast as far as you can. Then pick up a southwesterly heading back to the island and land at 0600." In other words, we were to fly an isosceles triangle, the first leg of which would be the base leg of the triangle. The General continued, "You're to fly at 1,000 feet. Take off as soon as you can. Use the staff B-24. Good luck." The pilot, who was also the Wing Operations Officer, and I proceeded to the plane. Soon we were taxiing out. A little wet, but ready. The time was now about 0110.

It didn't take long to climb to our assigned altitude of 1,000 feet and settle on our northerly heading. For the first few minutes I could pick up the base homer—a fifty-watt station at the north end of the island. Then it faded away. There was no LORAN at that time so I thought that I would try a little celestial. My sextant was a British model with a mechanical averager. It was a delight to use and very accurate. However, when I climbed up into the

astrodome, there was nothing but darkness in all directions. Not a star in sight! I talked to the pilot who informed me that he had been on instruments since takeoff. He said he would advise me when it cleared up.

In the Soup

What to do? How could I navigate when there was no way that I could get a wind or take a fix? I figured that the forecast metro was useless. If the weather people had known the weather and wind patterns, then there would have been little need for us to be flying in this garbage. I decided to do an "air plot"—that is, plot my true heading and true airspeed. I could get the information to do this from the instruments in the airplane. Then, when I somehow did get a fix, I could easily determine the wind.

After the first hour we were still in the soup, with rain—hard at times—and a lot of turbulence. I talked over the problem with the pilots. They could offer nothing but to continue on. Then the thought occurred to me that if I could see the water I could get the wind direction and speed by observing the waves. I had done a good deal of this type of navigation in Europe over the Channel and the North Sea while looking for ditched aircrews. With a little practice, judging wind off the water works quite well.

I suggested to the pilot that we open the bomb bay doors. I would then crawl out on the catwalk with the Aldis lamp and shine the lamp toward the water. When I could see the water, I would tell him to level off while I took a reading off the waves. Although the pilot appeared skeptical, we agreed on a procedure to be followed and went ahead with the execution of the plan.

The pilot opened the bomb bay doors, and I went out onto the catwalk. It was then that I remembered that I had a cigarette in my mouth. Before I really thought, I took the cigarette out of my mouth and threw it down toward the water. Instead of it going in my intended direction, the air current within the bomb bay reversed its direction and blew the cigarette back to the fuel tank area of the front bay.

I gazed stunned at the disappearing cigarette with a feeling of total disbelief that I could have done such a stupid thing. Should I tell the pilot? What will he do if I tell him? Or should I say nothing and hope for the best? I chose the latter option, reasoning that there was nothing that could be done in any event. Besides, I didn't want panic in the cockpit to screw things up permanently. So I went about my business.

Down to the Waves

With Aldis lamp in hand, I sat on the catwalk and, over the interphone, told the pilot to descend. My eyes slowly grew accustomed to the strange new situation and shortly I saw the water. I estimated that we were about 200–300 feet above the water, so I told the pilot to level off. The waves were big, and I was able to get a good estimate of both wind speed and direction. I climbed back out of the bomb bay as the pilot closed the clamshell doors and we proceeded on course.

I applied my newfound wind to my "air plot" and determined a good DR position. We went through that procedure two more times during the remainder of the flight. As 0600 hours approached, we were able to receive the Saipan homer. The bird dog showed it dead ahead. We touched down within thirty seconds of 0600.

The pilots briefed the General, and the decision was made to delay the takeoff of the B-29s. Murphy had done it again!

It was two more days before the 73d Wing took off. But finally, on November 24, 1944, 111 B-29s put the Japanese on notice that the beginning of the end was near.

As the years passed, I thought many times about that night in the rain and darkness. I never told anyone about the incident with the cigarette as I was too embarrassed over my stupidity. I did run into the pilot from time to time, and we talked about many things. But it wasn't until some sixteen years later—when we were sipping our martinis waiting for dinner that our wives were putting together—that I brought up the flight and the cigarette incident.

"With Aldis lamp in hand, I sat on the catwalk."

The Last Laugh

I said, "You know, Beetle, I've always wanted to tell you something that happened on that flight, but never had the nerve." He listened as I detailed the facts of what had taken place.

When I finished, he said, "That's interesting, but let me tell you something about that night that I never wanted to be told." He paused a minute, then said, "Remember when you told me to level off as you had the waves in sight?"

"Yes," I replied.

"Well," he said, "I hadn't even started to descend when you told me to level off. If you hadn't gone out on the catwalk at that time and used the Aldis lamp on the waves, we would have flown right into the ocean thinking all the time that we were still at 1,000 feet, as the altimeter indicated. You saved our lives!"

He continued, "What we had done that night was to fly into an intensive low pressure area from a higher pressure area. And, as any pilot worth his salt should know, when you go from a high pressure area to a low pressure area, your altimeter will read higher than you actually are. I've always been too embarrassed over *my* stupidity to tell anybody about that night, but now you know the rest of the story."

When I think about that flight now, I suppose we were the ones to have the last laugh on Murphy. ■

Col. Rollin C. Reineck, USAF (Ret.), served in B-24s based in England early in World War II and, in June 1944, joined the B-29 program as Staff Navigator for the 73d Bomb Wing. Postwar assignments included duty with SAC, Hq. USAF, the Joint Staff, PACAF, and the Minuteman System Program Office. He retired in 1970 and now resides in Hawaii. This is his first article for AIR FORCE *Magazine.*

AIRMAN'S BOOKSHELF

History from the Cockpit

Spitfire: A Test Pilot's Story, by Jeffrey Quill. John Murray, Ltd., London, England, 1983. 316 pages with photos, appendices, and index. $21.95.

Most books about Spitfires are good, and this one is very good. This is the story of the development of the Spitfire told by one most qualified by virtue of having been the primary test pilot throughout most of the program. The problems that arose during the long production of the many Marks of the Spitfire, and how these problems were solved, are explained in a clear, simple manner that should be easily understood by the layman.

Jeffrey Quill applied for a Short Service Commission in the Royal Air Force and was accepted as an Acting Pilot Officer in October 1931. After primary flight training in Avro Tutors and advanced training in Armstrong Whitworth Siskin IIIAs, an open-cockpit biplane fighter then still in first-line service with the RAF, he was graduated as a Pilot Officer with the pilot rating of "exceptional."

After a tour in a fighter squadron, he received an assignment that was to provide invaluable experience for his later work as a test pilot. He joined the Met Flight at Duxford, where he made twice-daily climbs to about 25,000 feet to record and report meteorological data. These climbs were accomplished—quite often in terrible weather—in stripped, supercharged Siskin IIIAs. While with the Met Flight, he and his partner, Flying Officer Dick Reynell, achieved the remarkable record of making their daily flights with 100 percent regularity over a thirteen-month period. Those who know English weather will appreciate this record.

Mr. Quill joined Supermarine, the aircraft subsidiary of the giant Vickers Corp., as assistant experimental test pilot in late 1935. In 1936, after the first test flight of the Spitfire prototype had been flown by Mutt Summers, he began flying regularly on the flight-test program.

The Spitfire acquired its famous name early in the program. The name had previously been used in 1934 to identify an unsuccessful, gull-winged, steam-cooled fighter also designed by R. J. Mitchell, who was less than thrilled at this reuse of the name.

One sobering aspect of the book is the description of how close the Chamberlain government came to canceling Spitfire production, once as late as fourteen months before the Battle of Britain.

I was most impressed by author Quill's account of conducting test flights under virtually solid instrument conditions with almost no radio aids. He and some of his fellow test pilots would routinely take off with the ceiling at less than 200 feet, climb through 10,000–15,000 feet of cloud, conduct the test above the overcast, and then let down and break out, again at less than 200 feet, land, and think nothing of it. In fact, he had to reprimand one pilot for doing slow rolls over the field after a test flight—with the upper wing in the overcast during the roll.

The book covers in some detail all the major Marks of the Spitfire, from the prototype K5054 with a fixed-pitch, two-blade wooden propeller through the Seafire 47 with two three-blade, counterrotating, constant-speed propellers driven by a 2,375-horsepower Rolls-Royce Griffon 85 engine.

During its long service life, the weight of the Spitfire more than doubled, from 5,820 pounds to 12,500 pounds. The author states that the final weight is the equivalent of the Mark I carrying thirty-two passengers each with forty pounds of luggage. The wing loading went from twenty-four to 42.2 pounds per square foot, and the top speed increased from 362 mph to 452 mph. The maximum range increase, from 575 miles to 1,475 miles, would have been of great value early in the war.

During the Battle of Britain, Quill convinced his superiors that he could only properly evaluate the Spitfire in a combat environment. He was permitted to resume his commission and join 65 Squadron for three weeks of combat flying. This was in August 1940, when the battle was in full swing. He had many encounters with enemy aircraft, primarily Messerschmitt 109s, and is officially credited with one victory. A more important result, however, was his firsthand observation of the shortcomings of the Spitfire in combat.

Despite the vaunted maneuverability and handling qualities of the Spitfire, it suffered from serious aileron problems early in its operational career. During his combat tour Quill had found the ailerons to be virtually immovable at high speeds and had resolved to correct this deficiency. A related problem was the slight variations in ailerons that occurred in manufacture. Often, on the first test flight the airplane would be so wing-heavy that two hands were required on the stick. It usually took several flights, with adjustments after each and sometimes a change of one aileron, to obtain a balanced pair. Then if an aileron had to be repaired or replaced in combat, it was often necessary to go through the whole drill again.

After many unsuccessful modifications of the fabric-covered ailerons, Quill tested a Spitfire with all-metal ailerons with thin trailing edges. This did the trick. The airplane was completely maneuverable throughout its speed range. An emergency retrofit was initiated and the fighter squadron commanders were elbowing each other out of the way to be first in line. Not surprisingly, Douglas Bader led all the rest.

Later that year, Jeffrey Quill had the opportunity to fly a captured Messerschmitt Bf 109. He found, to his surprise and relief, that its ailerons were even stiffer at high speeds than the Spitfire's had been. This assuaged some of his guilty feelings about the Spitfire.

In his report to his company engineers following his combat tour, Quill recommended, in addition to the aileron change, that the pilot's windscreen be improved to allow better forward visibility and that the fire-

power be improved by substituting a cannon for the .303-caliber machine guns. Both of these suggestions were carried out in later Marks of the Spitfire.

All in all, this is a fine story that is well told. It should appeal equally to engineers, buffs, pilots, and those who enjoy good writing. I recommend it highly.

—Reviewed by Donald S. Lopez, Deputy Director, National Air and Space Museum.

The Alaskan Bush Pilots

The Flying North, by Jean Potter. Bantam Books, New York, N. Y., 1983. 240 pages with index and map. $2.95.

It was in the early 1920s that airplanes were first used to deliver the US mail to Alaska's remote settlements. To the hearty Alaskans who accomplished the task by dogsled, this was greeted with disdain. "The Aviation"—the term they coined for it—was considered a stunt of no lasting consequence.

But as time passed, "The Aviation" became more widespread. By 1939, the small airplanes of the Alaskan Territory were hauling twenty-three times as many passengers and a thousand times as much freight per capita as were the airlines in the continental US. This was free enterprise at the grass-roots level, with little investment by the federal goverment or the major airlines of the period.

Alaskan aviation, however, changed drastically during World War II. The Territory became an international skyway with the advent of the "Red Star Line"—7,000 Lend-Lease bombers and fighters being ferried from the US to the Soviet Union along the top-of-the-world route. The first aircraft navigational equipment was also being installed.

The story of the Alaskan bush pilots is also one of daring improvisation in which they made use of rough landing strips carved out of Alaska's rugged terrain and often flew in impossible weather.

The Flying North offers twenty chapters of personal recollections of men who pioneered flight in the largely uninhabited and unexplored land and who opened the northern skies to create what is now an international airway across the roof of the globe. Each chapter represents a different aspect of the indelible spirit of these aviation frontiersmen.

There is also more than a touch of humor. For example, Henry Peterson built the first "aircraft" in Alaska in 1912 at the gold-rush settlement of Nome. Dubbed *Ting Mayuk* (Bird of Tundra) by the Eskimos, Peterson's plane never got off the ground and simply plowed along the surface.

The first aircraft to actually become airborne in Alaskan skies was a tractor biplane piloted by James Martin at Fairbanks on July 4, 1914. He had invented the first successful tractor biplane three years earlier and with it had set a world speed record of seventy mph.

Among the nine Alaskan airmen receiving fuller treatment in the book, the author details the life and circumstances surrounding the death of Carl "Ben" Eielson, America's foremost Arctic pilot at the time of his death in 1929. Eielson, awarded the Harmon Trophy and the Distinguished Flying Cross, had pioneered flying in the northland.

The book's last chapter describes the contributions of Jack Jefford, who helped install communications equipment throughout Alaska. Due to his efforts, instrument flight had become routine in the region by the 1940s.

The Flying North is one of six volumes in a series called "The Aviator's Bookshelf." *(For more information on the other volumes in the series, see "Aerospace World," August '83, p. 32.)*

Potter spent a year and a half in Alaska to learn Alaska's aviation history. His book is based on interviews that he conducted nearly forty years ago. The pilots read the text for accuracy, according to Potter. "In a large part it is their own story," he states in the Preface. To verify facts, original documents and contemporary newspapers were also used.

Time has made a treasure of these pilots' recollections. Four of the nine pilots to whom Potter devoted chapters were still flying in the mid-1940s. Today, eight of the nine pilots are dead and the survivor (Sig Wien, who started an Alaskan mail service) has stopped flying.

The writing in this book is for the most part colorful and upbeat. Potter's work is a piece of American history—a unique and authoritative account of the early development of aviation on our northernmost frontier.

—Reviewed by Maj. Michael B. Perini, USAF, Deputy Chief, Operational Forces Branch, Secretary of the Air Force Office of Public Affairs.

New Books in Brief

Airborne Early Warning, by Mike Hirst. The subject of airborne early

INDUSTRIAL ASSOCIATES OF THE AIR FORCE ASSOCIATION

"PARTNERS IN AEROSPACE POWER"

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

ABA Industries, Inc.
Acurex Corp.
Advanced Technology Div. of Tritronics, Inc.
Aero Energy Systems, Inc.
Aerojet ElectroSystems Co.
Aerojet-General Corp.
Aerojet Strategic Propulsion Co.
Aerojet TechSystems Co.
Aerospace Corp.
Aerospatiale, Inc.
Aircraft Porous Media, Inc.
Alkan U.S.A., Inc.
American Airlines Training Corp.
American Electronic Laboratories, Inc.
Amex Systems, Inc.
Analytic Services Inc. (ANSER)
Anheuser-Busch, Inc.
Arco Engineering Co.
Aris Engineering Corp.
Aster Engineering Corp.
Astronautics Corp. of America
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AT&T Technologies
Avco Corp.
Battelle Memorial Institute
BDM Corp., The
Beech Aircraft Corp.
Bell Aerospace Textron
Bell Helicopter Textron
Bendix Corp., The
Benham Group, The
Boeing Co., The
British Aerospace, Inc.
British Aerospace Dynamics Group
Brunswick Corp., Defense Div.
Budd Co., The
CAI, A Division of Recon/Optical, Inc.
California Microwave, Inc., Communication Systems Operation
Calspan Corp., Advanced Technology Center
Canadair, Inc.
Canadian Marconi Co.
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Cypress International, Inc.
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Datatape, Inc.
Decisions and Designs, Inc.
Dowty
Durakon, Inc.
Dynalectron Corp.
Eastman Kodak Co.
Eaton Associates, Inc.
Eaton Corp., AIL Div.
ECI Div., E-Systems, Inc.
EDO Corp., Government Systems Div.
Educational Computer Corp.
E. I. du Pont de Nemours & Co.
Emerson Electric Co.
E-Systems, Inc.
Euromissile
Ex-Cell-O Corp., Aerospace Div.
Fairchild Industries, Inc.
Fairchild Weston Systems, Inc.
Falcon Jet Corp.
Ford Aerospace & Communications Corp.
GA Technologies, Inc.
Garrett Corp., The
Gates Learjet Corp.
General Dynamics Corp.
General Dynamics, Electronics Div.
General Dynamics, Fort Worth Div.
General Electric Co.
GE Aircraft Engine Group
GMC, Delco Systems Operations
GMC, Detroit Diesel Allison Div.
Goodyear Aerospace Corp.
Gould Inc., Computer Systems Div.
Gould Inc., Defense Systems Group
Grumman Aerospace Corp.
Grumman Data Systems Corp.
GTE Government Systems Corp., Communications Systems Div.
GTE Products Corp., Sylvania Systems Group
Gulfstream Aerospace Corp.
Hamilton Technology, Inc.
Harris Government Communications Group
Harris Government Support Systems Div.
Harris Government Systems Sector
Hayes International Corp.
Hazeltine Corp.
Hercules Aerospace Div.
Honeycomb Co. of America, Inc.
Honeywell, Inc., Aerospace & Defense Group
Honeywell, Inc., Precision Weapons Systems Div.
Howell Instruments, Inc.
HR Textron, Inc.
Hughes Aircraft Co.
IBM Corp., Federal Systems Div.
IBM National Accounts Div.
Information Systems & Networks Corp.
Intermetrics, Inc.
Interstate Electronics Corp.
Israel Aircraft Industries Int'l, Inc.
Itek Optical Systems, A Division of Litton Industries
ITT Defense Communications Div.
ITT Defense-Space Group
ITT Federal Electric Corp.
Jane's
Kelsey-Hayes Co.
King Radio Corp.
Kollsman Instrument Co.
Lear Siegler, Inc.
Lewis Engineering Co., Inc.
Litton Aero Products Div.
Litton-Amecom
Litton, Applied Technology Div.
Litton Data Systems
Litton Industries
Litton Industries Guidance & Control Systems Div.
Lockheed Corp.
Lockheed Aircraft Service Co.
Lockheed California Co.
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Lockheed Engineering & Management Services Co., Inc.
Lockheed Georgia Co.
Lockheed Missiles & Space Co.
Logicon, Inc.
Loral Corp.
LTV Aerospace & Defense Co.
Lucas Industries Inc.
Magnavox Government & Industrial Electronics Co.
M.A.N. Truck & Bus Corp.
Marconi Avionics, Inc.
Marquardt Co., The
Martin Marietta Aerospace
Martin Marietta Denver Aerospace
Martin Marietta Orlando Aerospace
MBB
McDonnell Douglas Corp.
Midland-Ross Corp./Grimes Div.
MITRE Corp., The
Moog, Inc.
Morton Thiokol, Inc.
Motorola, Inc., Government Electronics Div.
NORDAM
Northrop Corp.
Northrop Corp., Aircraft Div.
Odetics, Inc.
OEA, Inc.
O. Miller Associates
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Oshkosh Truck Corp.
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Republic Electronics, Inc.
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Rockwell Int'l Defense Electronics Operations
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Sabreliner Corp.
Sanders Associates, Inc.
Science Applications, Inc.
Short Brothers USA, Inc.
Sierra Research Corp.
Simmonds Precision
Singer Co., The
Smiths Industries, Aerospace & Defence Systems Co.
Space Applications Corp.
Space Communications Co.
Space Ordnance Systems
Sperry Corp.
SRS Industries, Inc.
Standard Manufacturing Co., Inc.
Stencel Aero Engineering Corp.
Sundstrand Corp.
Sverdrup Corp.
Syscon Co.
System Development Corp., A Burroughs Co.
Systems Control Technology, Inc.
Systron Donner, Safety Systems Div.
Tandem Computers Inc.
Teledyne, Inc.
Teledyne CAE
Teledyne Ryan Aeronautical
Texas Instruments Inc.
Thomson-CSF, Inc.
Tracor, Inc.
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Turbomach Div. of Solar Turbines, Inc.
United Technologies Corp.
UTC, Chemical Systems Div.
UTC, Hamilton Standard Div.
UTC, Norden Systems, Inc.
UTC, Pratt & Whitney Aircraft Group
UTC, Research Center
UTC, Sikorsky Aircraft Div.
Varo, Inc.
Vega Precision Laboratories
Vitro Corp.
Watkins-Johnson Co.
Western Gear Corp.
Western Union Telegraph Co., Government Systems Div.
Westinghouse Electric Corp.
Wild Heerbrugg Instruments, Inc.
Williams International
Wyman-Gordon Co.
Xerox Corp.

warning is attracting more attention as the use of these systems becomes more visible to the public. Using sophisticated technology, AEW aircraft systems sweep millions of cubic miles of airspace daily, providing long-range intelligence that holds immense deterrence value. Indeed—and though AEW aircraft shoot noth ing but invisible electrons—author Hirst believes that AEW aircraft "are the most potent of all modern warplanes." This informed discussion of the design, development, and operation of AEW systems ranges from a historical perspective on early warning to analysis of AEW radar technology and development to specific examination of such AEW aircraft as the Grumman E-2 Hawkeye, the Boeing E-3 Sentry, the British Aerospace Nimrod, and the various Soviet AEW aircraft. Sections on the individual systems feature detailed line drawings, and the entire book is liberally illustrated with drawings and operational photos. In all, this book constitutes an excellent overview of these "eyes in the skies." With index. Published by Osprey Publishing Ltd., available from Motorbooks International, P. O. Box 2, Prospect Ave., Osceola, Wis. 54020, 1983. 192 pages. $29.95.

B-25 Mitchell at War, by Jerry Scutts. This highly versatile aircraft is probably most famed as the type flown by Jimmy Doolittle and the Doolittle Raiders on the April 1942 carrier-launched raid on Tokyo. However, thousands of other American and allied airmen around the world also flew the dependable, sturdy Mitchell in one or more of its many guises—medium bomber, low-level attack aircraft, strafing machine, maritime patrol aircraft, transport, etc. Author Scutts tells the B-25 story here with gusto, tracing the tale from development at North American Aviation under the legendary Lee Atwood and "Dutch" Kindelberger to combat over Italy and the South Pacific. The narrative is enlivened along the way by first-person anecdotes and more than 200 operational and other historical photos. Published by Ian Allan Ltd., available from Motorbooks International, P. O. Box 2, 729 Prospect Ave., Osceola, Wis. 54020, 1983. 145 pages. $18.95.

Combat Flying Clothing: Army Air Forces Clothing During World War II, by C. G. Sweeting. This book is a well-researched look at an aspect of World War II military aviation that has been largely overlooked in the literature. Drawing on the original sources, this

AIRMAN'S BOOKSHELF

book catalogs in scrupulous detail nearly every piece of clothing and accessory used by American airmen during the war. The narrative addresses such topics as the problems encountered in the development of adequate flight gear, research and testing of designs, manufacture and supply of flying clothing, heated flight suits, and flying helmets, gloves, and boots. Also examined is the often critical impact that the performance and supply of combat flying clothing had on the conduct of the war. *Combat Flying Clothing* is surely destined to be the definitive reference on this subject for both the military historian and the collector. With photos and illustrations, appendices, notes, bibliography, and index. Smithsonian Institution Press, Washington, D. C., 1984. 229 pages. $29.95.

U.S. Marine Corps Aviation, by Peter B. Mersky. Filling something of a void in the aviation history literature, this book covers the development of USMC's air arm from 1912—when 1st Lt. Alfred A. Cunningham became the first official Marine pilot—to the present day. Throughout its seven decades, Marine aviation has often had to fight for existence, and was nearly disbanded in the demobilization following World War I. However, farsighted Marine aviation pioneers fought constantly to maintain a separate Marine air arm, and flying Marines proved themselves many times over during World War II. Author Mersky details growing Marine emphasis on helicopters and close air support during the postwar years and in Korea and Vietnam, and concludes this historical overview by briefly examining Marine aviation's prospects for the future. With more than 200 photos, notes, appendices, and index. The Nautical and Aviation Publishing Co., Annapolis, Md., 1983. 310 pages. $19.95.

—*Reviewed by Hugh Winkler, Assistant Managing Editor.*

• *Senior Editor James W. Canan's 1982 book,* War in Space, *has been published in paperback by the Berkley Publishing Group. A review of the book, which is also a Military Book Club selection, appeared in the May 1983 issue of* Air Force *Magazine.*—THE EDITORS

May 26 at The Broadmoor, Colorado Springs, Colo.

THE TWENTY-FIFTH ANNUAL OUTSTANDING SQUADRON DINNER

Saluting the 1984 Outstanding Squadron at the United States Air Force Academy
Cosponsored by the Air Force Association and its Colorado Springs/Lance Sijan Chapter

More than 600 guests—including parents and friends of the cadets, together with aerospace, AFA, and government 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 drilling and intramural athletics. This is the Academy's most outstanding award of the year.

Reception: 6:00 p.m., Dinner 6:45 p.m., Dancing 10:00 p.m.; The International Center of The Broadmoor.

Dress: Black-tie for civilians, Summer Mess Dress for military.

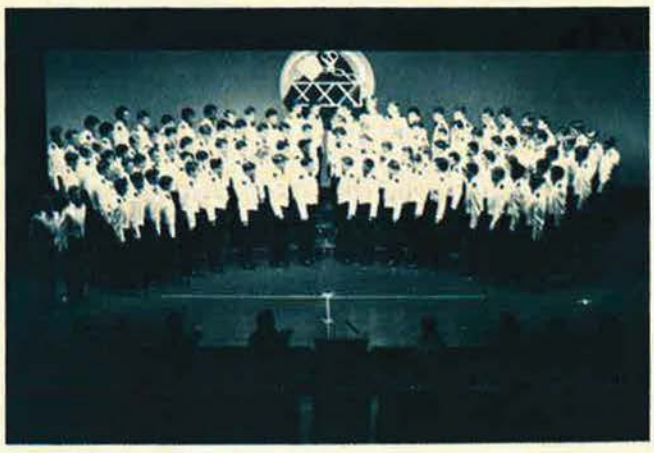
Cost: $60 single, $110 per couple.

Hotel reservations may be made direct with: The Broadmoor, Colorado Springs, Colo. 80901, telephone (303) 634-7711. Singles $95–135, Doubles $100–140, or Clarion Hotel (Four Season Motor Inn), 2886 S. Circle Drive, Colorado Springs, Colo. 80906, telephone (303) 576-5900. Singles $46, Doubles $54, or the Antlers Plaza (under Broadmoor management and providing regular shuttle service to and from The Broadmoor) for $58 Singles, $63 Twin. Be sure to mention AFA when writing or calling for reservations.

A golf tournament will be conducted at The Broadmoor on Friday, May 25. Please write AFA for details.

Dinner Reservation Form

Return to Air Force Association, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006, Attn: D. Flanagan



Please make the following reservation for me at AFA's 1984 Outstanding Squadron Dinner:

_____ Single(s) @ $60 $ _____

_____ Couple(s) @ $110 $ _____

Enclosed is my check for $ _____

☐ Please send information on the golf tournament.

Name _____

Address _____

City _____ State _____ ZIP _____

Telephone ( ) _____

AFA Intercom

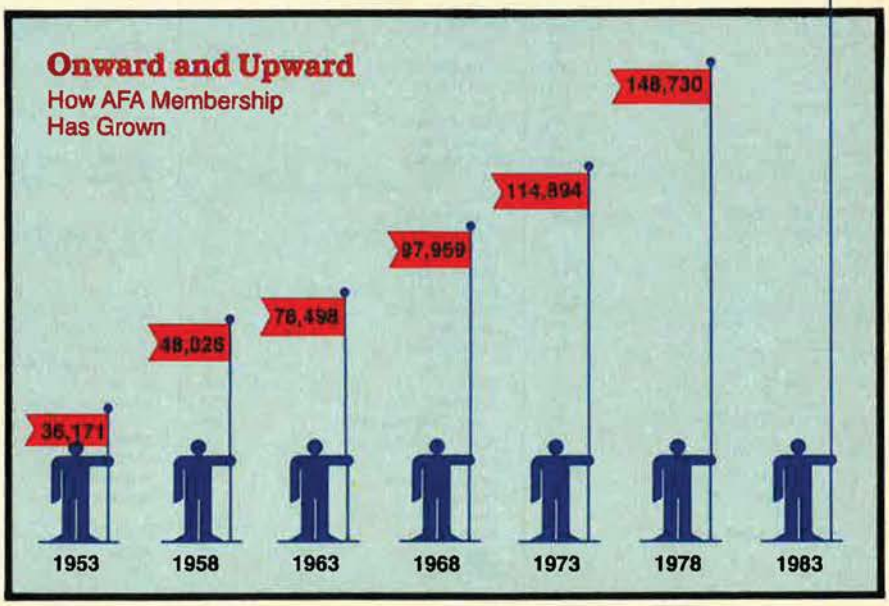
An AFA Almanac

AFA's future home is nearing completion. Move-in is set for this July. (Photo by William A. Ford)

The Air Force Association in Facts and Figures

The information contained in this special edition of "Intercom" was compiled by AFA's National Headquarters staff. Though necessarily limited in scope, this first-ever AFA Almanac is intended to provide readers with a look back at the Association's past, an overview of its present status, and a glimpse of its future. For a more complete account of the history of AFA, we strongly recommend *Crusade for Airpower: The Story of the Air Force Association*, by James H. Straubel.

—THE EDITORS



AFA's National Presidents


James H. Doolittle (1946)


Thomas G. Lanphier, Jr. (1947)


C. R. Smith (1948)


Robert S. Johnson (1949–50)


Harold C. Stuart (1951)


Arthur F. Kelly (1952)


George C. Kenney (1953)


John R. Alison (1954)


Gill Robb Wilson (1955)


John P. Henebry (1956)


Peter J. Schenk (1957–58)


Howard T. Markey (1959)


Thos. F. Stack (1960)


Joe Foss (1961)


John B. Montgomery (1962)


W. R. Lovelace II (1963)

AFA's Regions, States, and Chapters

The figures on the right indicate the number of affiliated members as of December 31, 1983. Listed below each Region is the name of the National Vice President for that Region.

CENTRAL EAST REGION	**9,112**
H. B. Henderson	
Delaware	1,136
Delaware Galaxy	955
Diamond State	181
District of Columbia	1,385
Nation's Capital	1,385
Kentucky	490
General Russell E. Dougherty	453
Lexington	37
Maryland	1,648
Andrews Area	1,315
*Baltimore	333
Virginia	4,315
Danville	31
Donald W. Steele, Sr., Memorial	1,868
Jack Manch	90
Langley	1,560
Leigh Wade	106
Lynchburg	53
Richmond	299
Roanoke	136
Tidewater	172
West Virginia	138
Chuck Yeager	138
FAR WEST REGION	**28,857**
Richard C. Doom	
Arizona	3,717
Frank Luke	832
Phoenix Sky Harbor	1,246
Sedona	62
Tucson	1,577
California	22,023
Antelope Valley	473
David J. Price/Beale	713
*Fresno	436
General Curtis E. LeMay	1,113
*General Doolittle/Los Angeles Area	2,063
General Robert F. Travis	3,094
*Golden Gate	633
Greater Los Angeles Airpower	1,337
High Desert	575
Merced County	811
Monterey Bay Area	257
Pasadena Area	210
Redwood Empire	448
Riverside County	997
Robert H. Goddard	1,188
Sacramento	3,470
San Bernardino Area	2,104
San Diego	1,015
Tennessee Ernie Ford	1,086
Guam	547
Guam-Arc Light	547
Hawaii	1,149
*Hawaii	1,149
Nevada	1,421
Reno	317
Thunderbird	1,104
GREAT LAKES REGION	**15,058**
Howard C. Strand	
Illinois	4,806
Chicagoland-O'Hare	1,821
Greater Peoria	63
Illini	575
Land of Lincoln	81
Scott Memorial	2,116
West Suburban	150
Indiana	1,210
Central Indiana	195
Fort Wayne-Baer Field Area	173
Grissom Memorial	370
Gus Grissom	161
Lawrence D. Bell Museum	19
Lester W. Johnson	24
South Bend	160
Southern Indiana	108
Michigan	2,635
Battle Creek	259
General Claire Chennault	226
Hoyt S. Vandenberg	295
Huron	427
James H. Straubel	412
Kalamazoo	56
Lake Superior Northland	617
Mount Clemens	317
PE-TO-SE-GA	26
Ohio	5,767
Akron	51
*Capt. Eddie Rickenbacker Memorial	539
Cincinnati	147
Cleveland	449
Mid-Ohio	439
Steel Valley	171
*Wright Memorial	3,971
Wisconsin	640
Badger State	69
Billy Mitchell	485
Madison	86
MIDWEST REGION	**8,175**
Charles H. Church, Jr.	
Iowa	150
All-Iowa	150
Kansas	770
Air Capital	622
Topeka	148
Missouri	1,739
Central Missouri	291
Harry S. Truman	492
Ozark	83
Spirit of St. Louis	873
Nebraska	5,516
Ak-Sar-Ben	5,362
Lincoln	154
NEW ENGLAND REGION	**4,314**
Arley McQueen, Jr.	
Connecticut	1,034
Charles A. Lindbergh	154
First Connecticut	290
Flying Yankees	91
General George C. Kenney	60
Igor Sikorsky	153
Northern Connecticut	286
Maine	568
Eastern Maine	75
Southern Maine	71
Spudland	422
Massachusetts	1,607
Boston	260
*Chicopee	36
Laurence G. Hanscom	64
Minuteman	8
Otis	7
Taunton	8
*Worcester	10
New Hampshire	88
Amoskeag	16
Pease	71
Rhode Island	10
Metro Rhode Island	10
Vermont	111
Burlington	111
NORTH CENTRAL REGION	**2,801**
Jan Laitos	
Minnesota	474
General E. W. Rawlings	408
Head of the Lakes	66
North Dakota	1,315
Concrete Mixers	30
General David C. Jones	555
Happy Hooligan	92
Red River Valley	638
South Dakota	1,012
Dacotah	158
Rushmore	854
NORTHEAST REGION	**10,402**
Thomas J. Hanlon	
New Jersey	3,799
Admiral Charles E. Rosendahl	144
Atlantic City Area	145
Garden State	31
Greater Camden Area	113
Hangar One	126
High Point	51
*Hudson	84
Mercer County	95
Middlesex	59
New Jersey Public Affairs	59
New Jersey Wing CAP/AFA	27
*Passaic-Bergen	304
Sal Capriglione	136
Teterboro-Bendix	78

AFA's Board Chairmen

(Pictured are Chairmen who never served as National President)

Jess Larson (1964–66)

Robert W. Smart (1967–68)

George D. Hardy (1969–70)

Martin M. Ostrow (1971–72)

Joe L. Shosid (1973–74)

Edward P. Curtis (1946)

Carl A. Spaatz (1950)

James M. Trail (1958)

eorge M. Douglas (1975–76)

Gerald V. Hasler (1977–78)

Victor R. Kregel (1979–80)

John G. Brosky (1981–82)

David L. Blankenship (1983–84)

Julian B. Rosenthal (1959)

Jack B. Gross (1963)

Daniel F. Callahan (1979–80)

Thomas B. McGuire, Jr.	1,925
Tri-County	46
Union Morris	362
Wings	14
New York	4,036
*Albany	130
Brooklyn "Key"	490
Chautauqua	85
Colin P. Kelly	532
General Daniel "Chappie" James, Jr., Memorial	89
Genesee Valley	161
H. H. Arnold	214
Hudson Valley	83
Iron Gate	353
Lawrence D. Bell	308
Nassau-Mitchell	259
New York Air Reserve & CAP	72
Niagara Frontier	186
Plattsburgh	301
Queens	141
Staten Island Empire	52
Suffolk County	193
Syracuse	215
Thomas Watson, Sr.	62
Westchester Falcon	110
Pennsylvania	2,567
Air Force Mothers	27
Airport Number One	190
Beaver Valley	79
Brandywine	62
Col. Stuart E. Kane, Jr.	123
Erie	85
*Greater Pittsburgh	526
Joe Walker	40
Laurel Highlands	27
Lehigh Valley	169
*Metropolitan Philadelphia	346
*Mifflin County	121
Montgomery-Delaware Valley	185
Olmsted	332
Pocono Northeast	48
Steel Valley	107
York-Lancaster	100
NORTHWEST REGION Victor R. Davis	**6,456**
Alaska	1,239
Anchorage	843
Fairbanks Midnight Sun	396
Idaho	728
Boise Valley	363
Magic Valley	43
Snake River Valley	322
Montana	571
Big Sky	571
Oregon	689
Eugene	150
*Portland	539
Washington	3,229
Central Washington	53
Greater Bellingham	30
Greater Seattle	872
Spokane	807
Tacoma	1,477
ROCKY MOUNTAIN REGION Karen M. Kyritz	**7,541**
Colorado	4,211
Blue Barons	102
Colorado Springs/Lance Sijan	2,360
Flatirons	100
Front Range	900
General Joe C. Moffitt	69
General Robert E. Huyser	68
Long's Peak	98
Pueblo	60
Red Rocks	29
Silver & Gold	394
Weld County	31
Utah	2,678
Gold Card	201
Ogden	696
Rocky Mountain	192
Salt Lake	523
Ute	807
Wasatch	259
Wyoming	652
Cheyenne	652
SOUTH CENTRAL REGION Charles E. Hoffman	**7,562**
Alabama	1,783
Birmingham	221
Mobile	186
Montgomery	1,069
Selma	101
Tennessee Valley	171
War Eagle	35
Arkansas	1,373
Blytheville	285
David D. Terry, Jr.	920
Fort Smith	71
Razorback	97
Louisiana	1,547
Alexandria	154
Ark-La-Tex	1,017
Baton Rouge	146
Greater New Orleans	230
Mississippi	1,469
Golden Triangle	555
Jackson	90
John C. Stennis	825
Tennessee	1,390
Chattanooga	108
Everett R. Cook	185
General Bruce K. Holloway	291
H. H. Arnold Memorial	476
Lt. Gen. Frank M. Andrews	330
SOUTHEAST REGION Lee C. Lingelbach	**16,359**
Florida	7,970
Air Commando	82
Brandon	37
Cape Canaveral	922
Central Florida	1,136
Citrus Belt	70
Daytona Beach	60
Eglin	1,758
Florida Gulf Coast	146
Florida Sun Coast	124
Gainesville	57
Gold Coast	308
Homestead	284
Jax	80
Jerry Waterman	1,117
John C. Meyer	161
Lake Region	213
Naples-Marco	43
Panama City	671
Southwest Florida	158
Tallahassee	209
West Palm Beach	334
Georgia	3,910
Athens	48
Atlanta	115
Carl Vinson Memorial	2,457
Chattahoochee Valley	36
Coosa Valley	39
Dobbins	676
Savannah	282
South Georgia	226
Southeast Georgia	31
North Carolina	2,223
Blue Ridge	63
Kitty Hawk	53
Piedmont	208
Pope	740
Scott Berkeley	833
Tar Heel	214
Triad	112
Puerto Rico	156
San Juan	156
South Carolina	2,100
Charleston	779
Clemson	99
Columbia	305
Grand Strand	337
Swamp Fox	580
SOUTHWEST REGION Joseph H. Turner	**25,687**
New Mexico	2,681
Albuquerque	1,476
Fran Parker	747
Llano Estacado	458
Oklahoma	5,070
Altus	507
Central Oklahoma	3,398
Enid	810
Tulsa	317
Texas	17,974
Abilene	866
Aggieland	92
Alamo	6,509
Austin	1,236
Concho	446
Corpus Christi	125
Dallas	989
Del Rio	503
Denton	31
Fort Worth	3,411
Greater Amarillo	72
Heart of the Hills	159
Houston	968
Lee Glasgow-Waco	84
Lubbock	834
Northeast Texas	168
Paso Del Norte	153
Permian Basin	169
Rio Grande Valley	33
Wichita Falls	1,126

*These Chapters were chartered prior to December 31, 1948, and are considered original charter chapters.

This Is AFA

The Air Force Association is an independent, nonprofit, aerospace organization serving no personal, political, or commercial interests; established January 26, 1946; incorporated February 4, 1946.

OBJECTIVES: The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principle of freedom and equal rights for all mankind.

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Tulsa, Okla.

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Information regarding AFA activity within a particular state may be obtained from the Vice President of the Region in which the state is located.

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Nebraska, Iowa, Missouri, Kansas

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Anchorage, Alaska 99503
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Montana, Washington, Idaho, Oregon, Alaska

Richard C. Doom
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H. H. Arnold Award Recipients

AFA's highest Aerospace Award is the H. H. Arnold Award. Named for the World War II leader of the Army Air Forces, it is presented annually in recognition of the most outstanding contributions in the field of aerospace activity.

YEAR	RECIPIENT(S)
1948	Hon. W. Stuart Symington, Secretary of the Air Force
1949	Maj. Gen. William H. Tunner and the men of the Berlin Airlift
1950	Airmen of the United Nations in the Far East
1951	Gen. Curtis E. LeMay and the personnel of Strategic Air Command
1952	Senators Lyndon B. Johnson and Joseph C. O'Mahoney
1953	Gen. Hoyt S. Vandenberg, former Chief of Staff, USAF
1954	Hon. John Foster Dulles, Secretary of State
1955	Gen. Nathan F. Twining, Chief of Staff, USAF
1956	Senator W. Stuart Symington
1957	Edward P. Curtis, Special Assistant to the President
1958	Maj. Gen. Bernard A. Schriever, Commander, Ballistic Missile Division, ARDC
1959	Gen. Thomas S. Power, Commander in Chief, Strategic Air Command
1960	Gen. Thomas D. White, Chief of Staff, USAF
1961	Hon. Lyle S. Garlock, Assistant Secretary of the Air Force
1962	Dr. A. C. Dickieson and John R. Pierce, Bell Telephone Laboratories
1963	The 363d Tactical Reconnaissance Wing, TAC, and the 4080th Strategic Wing, SAC
1964	Gen. Curtis E. LeMay, Chief of Staff, USAF
1965	The 2d Air Division, PACAF
1966	The 8th, 12th, 355th, 366th, and 388th Tactical Fighter Wings, and the 432d and 460th Tactical Reconnaissance Wings
1967	Gen. William W. Momyer, Commander, Seventh Air Force, PACAF
1968	Col. Frank Borman, USAF; Capt. James Lovell, USN; and Lt. Col. William Anders, USAF—Apollo-8 Crew
1969	(No Presentation)
1970	Apollo-11 Team (J. L. Atwood, Lt. Gen. Samuel C. Phillips, USAF, and Astronauts Neil Armstrong, Col. Edwin E. Aldrin, Jr., USAF, and Col. Michael Collins, USAF)
1971	Dr. John S. Foster, Jr., Director of Defense Research and Engineering
1972	Air Units of the Allied Forces in SEA (Air Force, Navy, Army, Marine Corps, and the Vietnamese Air Force)
1973	Gen. John D. Ryan, USAF (Ret.), former Chief of Staff, USAF
1974	Gen. George S. Brown, Chairman, Joint Chiefs of Staff
1975	James R. Schlesinger, Secretary of Defense
1976	Senator Barry M. Goldwater
1977	Senator Howard W. Cannon
1978	Gen. Alexander M. Haig, Jr., USA, Supreme Allied Commander, Europe
1979	Senator John C. Stennis
1980	Gen. Richard H. Ellis, Commander in Chief, Strategic Air Command
1981	Gen. David C. Jones, Chairman, Joint Chiefs of Staff
1982	Gen. Lew Allen, Jr., USAF (Ret.), former Chief of Staff, USAF
1983	Ronald Reagan, President of the United States

AFA's "Man of the Year" Award Recipients

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

YEAR	RECIPIENT(S)
1953	Julian B. Rosenthal (New York)
1954	George A. Anderl (Illinois)
1955	Arthur C. Storz (Nebraska)
1956	Thos. F. Stack (California)
1957	George D. Hardy (Maryland)
1958	Jack B. Gross (Pennsylvania)
1959	Carl J. Long (Pennsylvania).
1960	O. Donald Olson (Colorado)
1961	Robert P. Stewart (Utah)
1962	(No Presentation)
1963	N. W. DeBenardinis (Louisiana) and Joe L. Shosid (Texas)
1964	Maxwell A. Kriendler (New York)
1965	(No Presentation)
1966	Milton Caniff (New York)
1967	William W. Spruance (Delaware)
1968	Sam E. Keith, Jr. (Texas)
1969	Marjorie O. Hunt (Michigan)
1970	Lester C. Curl (Florida)
1971	Paul W. Gaillard (Nebraska)
1972	J. Raymond Bell (New York) and Martin H. Harris (Florida)
1973	Joe Higgins (California)
1974	Howard T. Markey (Washington, D. C.)
1975	Martin M. Ostrow (California)
1976	Victor R. Kregel (Texas)
1977	Edward A. Stearn (California)
1978	William J. Demas (New Jersey)
1979	Alexander C. Field, Jr. (Illinois)
1980	David C. Noerr (California)
1981	Daniel F. Callahan (Florida)
1982	Thomas W. Anthony (Maryland)
1983	Richard H. Becker (Illinois)

AFA's First National Officers and Board of Directors

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

OFFICERS

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Forrest Vosler
Benjamin F. Warmer
Lowell P. Weicker
C. V. Whitney
J. H. Whitney

A Chronology of AFA National Conventions

YEAR	CITY
1947	Columbus, Ohio
1948	New York, N. Y.
1949	Chicago, Ill.
1950	Boston, Mass.
1951	Los Angeles, Calif.
1952	Detroit, Mich.
1953	Washington, D. C.
1954	Omaha, Neb.
1955	San Francisco, Calif.
1956	New Orleans, La.
1957	Washington, D. C.
1958	Dallas, Tex.
1959	Miami Beach, Fla.
1960	San Francisco, Calif.
1961	Philadelphia, Pa.
1962	Las Vegas, Nev.
1963	Washington, D. C.
1964	Washington, D. C.
1965	(No Convention held)
1966	Dallas, Tex.
1967	San Francisco, Calif.
1968	Atlanta, Ga.
1969	Houston, Tex.
1970–83	Washington, D. C.

Aerospace Education Foundation Officers

YEAR	PRESIDENT	CHAIRMAN OF THE BOARD
1961–62	—	Dr. W. Randolph Lovelace II
1963	John B. Montgomery	Dr. W. Randolph Lovelace II
1964–66	Dr. Lindley J. Stiles	Dr. W. Randolph Lovelace II
1966–67	Dr. B. Frank Brown	Dr. Walter J. Hesse
1967–68	Dr. Leon M. Lessinger	Dr. Walter J. Hesse
1968–69	Dr. L. V. Rasmussen	Dr. Walter J. Hesse
1968–71	Dr. L. V. Rasmussen	J. Gilbert Nettleton, Jr.
1971–73	Dr. Leon M. Lessinger	J. Gilbert Nettleton, Jr.
1973–74	Dr. Wayne O. Reed	George D. Hardy
1974–75	Dr. William L. Ramsey	George D. Hardy
1975–80	Dr. William L. Ramsey	Sen. Barry M. Goldwater
1981–84	Dr. Don C. Garrison	Sen. Barry M. Goldwater

Unit Reunions

American Fighter Aces Ass'n
The twenty-third American Fighter Aces Association reunion will be held on May 24–27, 1984, at The Pointe Resort in Phoenix, Ariz. **Contact:** Gerald Brown, 6227 N. 22d Dr., Phoenix, Ariz. 85015.

Pampa Army Airfield Ass'n
The Pampa Army Airfield Association will hold its annual réunion on August 9–12, 1984, in Pampa, Tex. **Contact:** PAAF Association, P. O. Box 2015, Pampa, Tex. 79065. Phone: (806) 665-2526.

Stalag Luft
Former prisoners of war of Stalag Luft Four and Six will hold their reunion on July 19, 1984, at the Sea Tac Red Lion Inn, Seattle, Wash. **Contact:** Leonard E. Rose, 8103 E. 50th St., Indianapolis, Ind. 46226.

Nam POWs, Inc.
The fraternal organization of former Vietnam prisoners of war will hold a reunion on June 21–24, 1984, in Austin, Tex. **Contact:** Nam POWs Reunion Committee, P. O. Box 9093, Austin, Tex. 78766. Phone: (512) 459-8300 or (512) 258-0585 or (512) 892-1277.

4th Ferrying Group
The forty-second anniversary reunion of the 4th Ferrying Group, formerly based at Nashville and Memphis, Tenn., will be held on June 29–30, 1984, at the Hilton Airport Inn in Nashville, Tenn. Former 20th Ferrying Group members and wives are also welcome. **Contact:** T. L. Clark, 708 Lakeshore Dr., Lebanon, Tenn. 37087. Phone: (615) 444-7312.

4th Fighter Squadron
Members of the 4th Fighter Squadron will hold their reunion on July 26–28, 1984, at Selfridge ANG Base in Mount Clemens, Mich. Members of the 2d and 5th Fighter Squadrons and 52d Fighter Group are welcome. **Contact:** Ken Bumford, 23137 Play View, St. Clair Shores, Mich. 48082. Phone: (313) 293-2563.

7th Troop Carrier Squadron
Members of the 7th Troop Carrier Squadron/Military Airlift Squadron that were stationed at Larson and McChord AFBs, Wash. (1954–64), will hold a reunion on August 17–19, 1984, in Tacoma, Wash. **Contact:** Ray E. Schauer, 8414 Woodlawn Ave., S. W., Tacoma, Wash. 98499. Phone: (206) 582-3731.

7th and 17th Tac Comm Squadrons
Veterans of the 7th and 17th Tactical Communications Squadrons will hold their reunion on August 20–23, 1984, in Galveston, Tex. **Contact:** Frank Fotorny, P. O. Box 9306, College Station, Tex. 77840. Phone: (713) 693-2444.

10th Combat Cargo Squadron
The sixth annual reunion of the 10th Combat Cargo Squadron (331st Troop Carrier Squadron) and the 3d Combat Cargo Group (513th Troop Carrier Group) will be held on August 30–September 2, 1984, in conjunction with the Hump Pilots Association annual meeting at the Marriott North Hotel in Columbus, Ohio. **Contact:** Thornton W. Rose, 2614 Mirror Lake Dr., Fayetteville, N. C. 28303. Phone: (919) 323-9051 or (919) 484-9060.

19th Bombardment Ass'n
The 19th Bomb Group and Wing will hold its reunion on August 20–26, 1984, at the New Tower Inn, Omaha, Neb. **Contact:** Herbert A. Frank, 90-13 201st St., Hollis, N. Y. 11423. Phone: (212) 465-5740.

33d Troop Carrier Squadron
A reunion for the 33d Troop Carrier Squadron will be held on July 19–22, 1984, at the Denver Marriott Hotel Southeast in Denver, Colo. **Contact:** Earl R. Kohler, 3361 S. Fairfax, Denver, Colo. 80222.

37th Fighter Squadron
Members of the 37th Fighter Squadron, 14th Fighter Group, Twelfth and Fifteenth Air Forces, will hold their reunion on July 11–15, 1984, in Sacramento, Calif. **Contact:** Earvie T. "Bud" Cloyd, 4236 N. 34th Pl., Phoenix, Ariz. 85018.

P-47 Thunderbolt Pilots
The twenty-third annual P-47 Thunderbolt Pilots reunion will be held on May 31–June 6, 1984, at the Hotel Concorde La Fayette in Paris, France, to commemorate the fortieth anniversary of D-Day. **Contact:** Robert T. Forrest, 63 Roseland Ave., Apt. 48, Caldwell, N. J. 07006.

49th Fighter Group
Members of the 49th Fighter Group, comprising the 7th, 8th, 9th, Headquarters, and Fighter Control Squadrons, will hold their reunion on July 19–22, 1984, at the Stouffer's Dayton Plaza Hotel in Dayton, Ohio. **Contact:** Al Meschino, 9328 Clancy Dr., Des Plaines, Ill. 60016. Phone: (312) 299-3473.

P-51 Mustang Pilots
The Mustang Pilots will hold their fourth annual reunion on July 19–22, 1984, at the Stouffer's Dayton Plaza Hotel in Dayton, Ohio. **Contact:** Dr. Herbert O. Fisher, 628 Mountain Rd., Smoke Rise, Kinnelon, N. J. 07405. Phone: (201) 838-2040.

Class 54-M
Former members of Pilot Training Class 54-M will hold their thirtieth-year reunion on July 6–8, 1984, in San Antonio, Tex. **Contact:** Donald H. Weisiger, 629 N. E. 7th Ave., Apt. 5, Fort Lauderdale, Fla. 33304.

63d AACS
Former members of the 63d Army Airways Communications Systems (Group and Squadrons) will hold a reunion on September 21–23, 1984, in Washington, D. C. **Contact:** L. B. C. Fong, 4063 N. 27th St., Arlington, Va. 22207. Phone: (703) 528-3664.

65th Troop Carrier Squadron
A reunion for the 65th Troop Carrier Squadron will be held on August 2–5, 1984, in Tulsa, Okla. **Contact:** Bud Hawkey, 106 Union Dr., New Madison, Ohio 45346. Phone: (513) 996-3851.

68th Fighter Squadron Ass'n
Veterans of the 68th Fighter Squadron will hold a reunion on August 24–26, 1984, in Indianapolis, Ind. **Contact:** Allen "Deacon" Roth, 3522 E. Southport Rd., Indianapolis, Ind. 46227. Phone: (317) 787-0134.

71st Tactical Recon Group
The 71st Tactical Reconnaissance Group, Fifth Air Force, and attached squadrons will hold a reunion on August 9–12, 1984, in Orlando, Fla. **Contact:** Sy Rosenblatt, 1223 S. Orange Ave., Orlando, Fla. 32805. Phone: (305) 273-1534 or (305) 846-8266.

78th Fighter Group Ass'n
A reunion of the 78th Fighter Group (Duxford Aerodrome, Cambridgeshire, England) and service squadrons will be held

on June 14–17, 1984, at the Galt Hotel in Louisville, Ky. **Contact:** Al Wendt, 811 N. Forrest, Arlington Heights, Ill. 60004. Phone: (312) 255-3733.

81st Troop Carrier Squadron
The 81st Troop Carrier Squadron, 436th Troop Carrier Group, will hold its reunion on August 24–26, 1984, in Dayton, Ohio. **Contact:** T. W. Bonecutter, 620 Randolph St., Wilmington, Ohio 45177. Phone: (513) 382-4351.

91st Bomb Group Memorial Ass'n
The 91st Bomb Group and its supporting units, known as "Wray's Ragged Irregulars," will hold a reunion on September 5–8, 1984, in Colorado Springs, Colo. **Contact:** George W. Parks, 109 Wilshire Ave., Vallejo, Calif. 94591.

305th Bomb Group Ass'n
Members of the 305th Bomb Group will hold their reunion on August 22–26, 1984,

AFA STAFF PROFILES

AFA's Own Bell-Ringer

By Richard M. Skinner, MANAGING EDITOR

Clarine Penewell belongs in the *Guinness Book of World Records*. She's in a class by herself. By conservative estimate she has—since October 1946—answered AFA's telephone some 1,143,000 times. Sometimes it's "Good morning, Air Force Association." Sometimes "Good afternoon, Air Force Association." And sometimes—but always with a lilt in the voice—just "Air Force Association."

But however it's done, it's a lot. And it's a record that's likely to stand, though Mrs. Penewell—AFA's longtime receptionist—adds to it daily during this, her "option year."

"I've thought some about retirement," says Mrs. Penewell, "but I do want to see AFA settled in our new building first." That will likely keep Mrs. Penewell at her post until perhaps this time next year; AFA's move to its new home in northern Virginia is slated for this summer. The settling-in comes afterward.

Clarine Penewell's history is the history of AFA. She is, by a wide margin, AFA's senior employee in terms of service. She's the only member of the current staff who has worked in all of AFA's offices. First of these was at 903 16th St., N. W., in Washington, D. C., where Clarine (she was still Clarine Nelson then) reported to work in October 1946. She was hired to help bring order to the "ocean of three-by-five cards" then used to keep track of new members and changes of address.

It was chaos, Mrs. Penewell remembers, as AFA—then in its infancy and learning by doing—struggled for survival, much less identity, during those first postwar years. But AFA and Clarine persisted. She married Mel Penewell in July of 1947 and AFA moved to new quarters at 1616 K St., and there Clarine undertook her first switchboard duties. It was this office that AFA's first President, Jimmy Doolittle, visited, greeting everyone and shaking hands—a memory Mrs. Penewell still cherishes.

Another move followed, to 901 16th St., and now the publishing part of the operation was brought to Washington from New York City, and AIR FORCE Magazine and AFA combined under newly arrived James H. Straubel, Executive Director as well as Editor and Publisher.

The years and the changes of scenery rolled by, and the AFA headquarters moved to offices at 1424 K St., and then to the Mills Building at 17th St. and Pennsylvania Ave., near the White House, and then to 1901 Pennsylvania Ave., and finally to the present site on the Fourth Floor at 1750 Pennsylvania Ave. And all the time and in all those places the phones kept ringing, and Mrs. Penewell kept answering (always with the lilt in the voice) and dealing with the caller's request, problem, complaint, query, or whatever. And always with grace, consideration, great patience, and good humor. Well, mostly.

There was the time, in the early 1950s, when operating money was so scarce that the Office Manager decreed that all long-distance calls would be *strictly* limited to five minutes, and that at the end of five minutes, the switchboard operator would Pull the Plug! Mrs. Penewell did that only once. It was on a call from then Advertising Director Sandy Wolf, calling from New York City, to Publisher Jim Straubel. From this we learn that—no matter what the office policy may be—Publishers do not like having the plug pulled on them, and the policy was quickly changed.

It may be all those phone calls that will get Mrs. Penewell into the Guinness Book, but the switchboard is only part of her job. She is also in charge of subscribers (there are thousands of libraries, government agencies, news dealers, and the like, as well as individuals who subscribe to AIR FORCE Magazine without being members of AFA), and as a result, she has "pen pals" all over the world. Unfortunately, when Mrs. Penewell gets a letter from one of her pen pals, it's usually reporting nonreceipt of the latest issue or that the copy came but is missing its covers, or some other such complaint. Whatever the problem, Mrs. Penewell—between phone calls—works out the solution.

It would be nice to be able to report that, through the day, every day, Mrs. Penewell is a model of efficiency and serenity. This is *almost* the case, but not quite. Mrs. Penewell is, like the rest of us, merely mortal. Her mere mortality used to show up, some years back and several models of switchboards ago, when Mrs. Penewell would grow impatient if you didn't answer your phone promptly enough. She then had the kind of switchboard where the operator could hold a toggle switch back and the phone being called would ring continuously. Some of us would sometimes bristle a bit at this kind of activity and would respond with "The Treatment." "The Treatment" consisted of arranging for half the office to call Mrs. Penewell simultaneously. When that happened, her switchboard would totally light up, all the buzzers would buzz, and we'd get a most satisfying whoop and holler from Mrs. Penewell.

Most AFA members who visit headquarters or who call have had firsthand experience with our Mrs. Penewell. Those meeting her for the first time are at once put at ease. For those who are long-timers, it's meeting and greeting an old friend. And when you get right down to it, those qualities are what make Mrs. Penewell a world-class person.

Clarine Penewell answers an incoming call—a service she's provided more than a million times.

AFA Intercom

in Denver, Colo. **Contact:** Abe Millar, P. O. Box 757, Sanger, Tex. 76266. Phone: (817) 458-3516.

345th Fighter Squadron
The 345th Fighter Squadron "Devil Hawks" reunion will be held on August 2–4, 1984, at the Marriott Inn North, San Antonio, Tex. **Contact:** Jake Kingsbury, 2106 Wesley Ave., Collinsville, Ill. 62234. Phone: (618) 344-0131.

369th Fighter Squadron Ass'n
A reunion for the 368th, 369th, and 370th Fighter Squadrons, 359th Fighter Group, will be held on August 9–12, 1984, at the Midway Motor Lodge in Chicago, Ill. **Contact:** Anthony Chardella, 105 Mohawk Trail Dr., Pittsburgh, Pa. 15235. Phone: (412) 793-9010.

375th Troop Carrier Group
Veterans of the 375th Troop Carrier Group will hold a reunion on August 10–12, 1984, at the Holiday Inn, Fairborn, Ohio. **Contact:** William J. Maloney, 1440 Dorchester Rd., Havertown, Pa. 19083.

388th Bomb Group Ass'n
The 388th Bomb Group will hold its reunion on August 6, 1984, in Boston, Mass. **Contact:** Ed Huntzinger, 1925 S. E. 37th St., Cape Coral, Fla. 33904.

431st Fighter-Interceptor Squadron
A reunion for personnel who served at Wheelus Field, Libya (1953–56), along with the 431st Fighter Interceptor Squadron will be held on August 9–11, 1984. **Contact:** Val Phillips, 8116 Windwood Way, Parker, Colo. 80134.

442d Air Reserve Ass'n
The 442d Air Reserve Association reunion will be held on June 1–2, 1984, at Richards-Gebaur AFB, Mo. Reservation deadline is May 20. **Contact:** Alice R. Morris, 924 Crestline, Wichita, Kan. 67212. Phone: (316) 722-7337.

451st Bomb Group
The 451st Bomb Group (724th, 725th, 726th, and 727th Bomb Squadrons and headquarters unit), Fifteenth Air Force, will hold a reunion on August 10–12, 1984, in Dayton, Ohio. **Contact:** Robert Karstensen, 1032 S. State St., Marengo, Ill. 60152. Phone: (815) 568-7766.

464th Bomb Group
The 464th Bomb Group reunion will be held on August 9–12, 1984, at the Hilton Airport Inn, Nashville, Tenn. **Contact:** H. Robert Anderson, 4321 Miller Ave., Erie, Pa. 16509.

475th Fighter Group
Members and friends of the 475th Fighter Group will hold a reunion on May 17–20, 1984, at the Fort Doubletree Inn, Scottsdale, Ariz. **Contact:** Pete Madison, 150 N. Meyers St., Los Angeles, Calif. 90033. Phone: (213) 261-7171.

505th Bomb Group
Veterans of the 505th Bomb Group and associated units of the 313th Bomb Wing will hold their third reunion on August 31–September 2, 1984, at the Marriott Hotel in Dayton, Ohio. **Contact:** William J. Gibson, 5214 Pierce Ave., Ogden, Utah 84403.

903d Aerial Refueling Squadron
A twenty-fifth anniversary reunion of the 903d Aerial Refueling Squadron will be held on June 1–3, 1984, in Sacramento, Calif. **Contact:** John Burger, c/o Golden State, 630 Fulton Ave., Sacramento, Calif. 95825.

Mustang Pilots Ass'n
The Mustang Pilots Association is looking for former P-51 or F-51 pilots who would like to join the association and attend its next reunion, scheduled for July 1984.

Please contact the address below.

Don Bennett
P. O. Box 552
Newport, N. H. 03773

23d Troop Carrier Squadron
A reunion is being planned for former members of the 23d Troop Carrier Squadron, the 349th Troop Carrier Group, and the 311th, 312th, 313th, and 314th Troop Carrier Squadrons.

Please contact the address below for additional information.

Col. Glen Getty,
USAF (Ret.)
4300 Grand Dr.
Austin, Tex. 78731

Class 51-C
We would like to hear from members of Class 51-C who served at Williams AFB, Ariz., for the purpose of holding a reunion in Las Vegas.

Please contact one of the addresses below.

D. D. Brown
2475 Sunset Dr.
Riverside, Calif. 92506
or
D. D. Rines
6025 Keswick Ave.
Riverside, Calif. 92506

Class 75-03/04
I would like to hear from former students of Class 75-03/04 (Webb AFB, Tex.) for the purpose of planning a fall 1984 reunion.

Please contact the address below.

Tom Holt
417 Knoll Wood Court
Euless, Tex. 76039
Phone: (817) 571-2158

501st Tactical Control Group
We would like to hear from the following USAF units, stationed in Germany (1951–57), for the purpose of planning a reunion: the 501st Tactical Control Group, the 807th Tactical Control Squadron, and

Executive Director Russell E. Dougherty, right, recently presented AFA's Major General A. M. Minton Award to James R. Millican. Mr. Millican received the award, which is given each year for the best article in the Air Force Engineering and Services Quarterly, *for his article "Housing Our People."*

the 601st, 602d, 603d, and 604th Aircraft Control and Warning Squadrons.

Please contact one of the addresses below.

William H. Sherrill
12332 Manely St.
Garden Grove, Calif. 92645
Phone: (714) 893-1758

or

Carol Wenberg
33 Centerboard Lane
South Yarmouth, Mass. 02664
Phone: (617) 398-9449

Coming Events

May 4–6, **Alaska State Convention,** Anchorage . . . May 5, **Maryland State Convention,** Rockville . . . May 11–13, **Washington State Convention,** Spokane . . . May 19, **Illinois State Convention,** Rantoul . . . May 19, **Missouri State Convention,** Independence . . . May 25, **AFA National Board of Directors Meeting,** Colorado Springs, Colo. . . . May 25–26, **Tennessee State Convention,** Knoxville . . . May 26, **Outstanding Squadron Dinner,** The Broadmoor, Colorado Springs, Colo. . . . June 1–2, **North Dakota State Convention,** Grand Forks . . . June 6, **Senior Statesmen Dinner,** Washington, D. C. . . . June 8, **Alabama State Convention,** Montgomery . . . June 9, **Louisiana State Convention,** Alexandria . . . June 22–23, **Colorado State Convention,** Air Force Academy, Colorado Springs . . . June 23, **Ohio State Convention,** Dayton . . . June 29–July 1, **New Jersey State Convention,** Cape May . . . July 13–15, **Pennsylvania State Convention,** Carlisle Barracks . . . July 27–29, **Florida State Convention,** MacDill AFB . . . July 27–29, **Texas State Convention,** Abilene . . . August 9–11, **Utah State Convention,** Ogden . . . August 17–18, **New York State Convention,** Mitchel Field . . . August 17–18, **Arkansas State Convention,** Little Rock . . . August 18, **Michigan State Convention,** Southfield . . . August 23–25, **California State Convention,** Irvine . . . August 24–26, **Oregon State Convention,** Portland.

When a Single Accident or Illness Could Cost *You* Thousands of Dollars, You Need AFA CHAMPLUS®. . . for *Strong* Protection against Costs CHAMPUS Doesn't Cover!

For military retirees and their dependents . . . and dependents of active-duty personnel . . . more and more medical care is being provided through the government CHAMPUS program.

And, of course CHAMPUS pays 75% of allowable charges.

But today's soaring hospital costs—*up to $500 a day* in some major metropolitan medical centers—can run up a $20,000 bill for even a moderately serious accident or illness.

Your 25% of $20,000 is no joke!

AFA CHAMPLUS® protects you against that kind of financial catastrophe *and* covers most of your share of routine medical expenses as well.

HOW AFA CHAMPLUS® WORKS FOR YOU!

WHO IS ELIGIBLE?

1) All AFA members under 65 years of age who are currently receiving military retired pay and are eligible for benefits under Public Law 89-614 (CHAMPUS), their spouses under age 65 and their unmarried dependent children under age 21 (or age 23 if in college).
2) All eligible dependents of AFA members on active duty. Eligible dependents are spouses under age 65 and unmarried dependent children under age 21 (or age 23 if in college).

EXCEPTIONAL BENEFIT PLAN

(See chart at right)

FOUR YEAR BASIC BENEFIT. Benefits for most injuries or illnesses may be paid for up to a four-year period.

PLUS THESE SPECIAL BENEFITS . . .

1) Up to 45 consecutive days of in-hospital care for mental, nervous, or emotional disorders. Outpatient care may include up to 20 visits of a physician or $500 per insured person each year.
2) Up to 30 days care per insured per year in a Skilled Nursing Facility.
3) Up to 30 days care per insured per year and up to 60 days lifetime in a CHAMPUS-approved Residential Treatment Center.
4) Up to 30 days care per insured per year and up to 60 days lifetime in a CHAMPUS-approved Special Treatment Facility.
5) Up to 5 visits per insured per year to Marriage and Family Counselors under conditions defined by CHAMPUS.

YOUR INSURANCE IS NON-CANCELLABLE

As long as you are a member of the Force Association, pay your premiums time, and the master contract remains force, your insurance cannot be c celled.

ADMINISTERED BY YOUR ASSOCIATION . . . UNDERWRITTEN BY MUTUAL OF OMAHA

AFA CHAMPLUS® insurance is adn istered by trained insurance professior on your Association staff. You get pron reliable, courteous service from peo who know your needs and know ev detail of your coverage. Your insuranc underwritten by Mutual of Omaha, largest individual and family health in ance company in the world.

AFA OFFERS YOU HOSPITAL BENEFITS AFTER AGE 65

Once you reach Age 65 and are cove under Medicare, AFA offers you pro tion against hospital expenses not c ered by Medicare through the *Senior A Benefit Plan* of AFA Hospital Indemr Insurance. Members enrolled in A CHAMPLUS® will automatically rece full information about AFA's Medicare s plement program upon attainment of A 65 so there will be no lapse in covera

AFA CHAMPLUS® BENEFIT SCHEDULE

Care	*CHAMPUS Pays*	*AFA CHAMPLUS® Pays*
	For Military Retirees Under Age 65 and Their Dependents	
Inpatient civilian hospital care	CHAMPUS pays 75% of allowable charges.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $6.55 per day subsistence fee, not covered by CHAMPUS.	CHAMPLUS® pays the $6.55 per day subsistence fee.
Outpatient care	CHAMPUS COVERS 75% of outpatient care fees after an annual deductible of $50 per person ($100 maximum per family) is satisfied.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.
	For Dependents of Active-Duty Military Personnel	
Inpatient civilian hospital care	CHAMPUS pays all covered services and supplies furnished by a hospital less $25 or $6.55 per day, whichever is greater.	CHAMPLUS® pays the greater of $6.55 per day or $25 of the reasonable hospital charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $6.55 per day fee, not covered by CHAMPUS.	CHAMPLUS® pays the $6.55 per day subsistence fee.
Outpatient care	CHAMPUS covers 80% of outpatient care fees after an annual deductible of $50 per person ($100 maximum per family) is satisfied.	CHAMPLUS® pays the 20% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.

NOTE: Outpatient benefits cover emergency room treatment, doctor bills, pharmaceuticals, and other professional services.

There are some reasonable limitations and exclusions for both inpatient and outpatient coverage. Please note these elsewhere in the plan description.

gainst Costs CHAMPUS Doesn't Cover

PPLY TODAY!

JST FOLLOW THESE STEPS

hoose either AFA CHAMPLUS® Inpatient verage or combined Inpatient and Out- ient coverage for yourself. Determine coverage you want for dependent mbers of your family. Complete the en- sed application form in full. Total the mium for the coverage you select from premium tables on this page. Mail the plication with your check or money der for your initial premium payment, yable to AFA.

AFA's CHAMPLUS®

IMITATIONS

overage will not be provided for condi- ons for which treatment has been re- ived during the 12-month period prior the effective date of insurance until the piration of 12 consecutive months of surance coverage without further treat- ent. *After coverage has been in force for consecutive months, pre-existing* con- itions will be covered regardless of prior eatment.

XCLUSIONS

his plan does not cover and no payment hall be made for:

a) routine physical examinations or immu- izations

b) domiciliary or custodial care

c) dental care (except as required as a ecessary adjunct to medical or surgical reatment)

d) routine care of the newborn or well- aby care

e) injuries or sickness resulting from leclared or undeclared war or any act hereof

f) injuries or sickness due to acts of inten- ional self-destruction or attempted sui- ide, while sane or insane

g) treatment for prevention or cure of al- coholism or drug addiction

h) eye refraction examinations

i) Prosthetic devices (other than artificial limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and con- tact lenses

j) expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS)

PREMIUM SCHEDULE

Plan 1—For military retirees and dependents (Quarterly Premiums)

Inpatient Benefits

Member's Attained Age	Member	Spouse	Each Child
Under 50	$19.03	$23.30	$14.85
50–54	$26.16	$32.01	$14.85
55–59	$36.16	$44.28	$14.85
60–64	$43.62	$53.41	$14.85

Inpatient and Outpatient Benefits

Under 50	$26.80	$31.05	$37.13
50–54	$36.83	$42.68	$37.13
55–59	$50.92	$59.02	$37.13
60–64	$61.41	$71.20	$37.13

Plan 2—For dependents of active-duty personnel (Annual Premiums)

Inpatient Only	None	$ 9.68	$ 5.94
Inpatient and Outpatient	None	$38.72	$29.70

APPLICATION FOR AFA CHAMPLUS®

Group Policy GMG-FC70
Mutual of Omaha Insurance Company
Home Office: Omaha, Nebraska

Full name of Member _____
Rank Last First Middle

Address _____
Number and Street City State ZIP Code

Date of Birth _____ Current Age _____ Height _____ Weight _____ Soc. Sec. No. _____
Month/Day/Year

This insurance coverage may only be issued to AFA members. Please check the appropriate box below:

☐ I am currently an AFA Member.

☐ I enclose $15 for annual AFA membership dues (includes subscription ($14) to AIR FORCE Magazine).

PLAN & TYPE OF COVERAGE REQUESTED

Plan Requested (Check One)
☐ AFA CHAMPLUS® PLAN I (for military retirees & dependents)
☐ AFA CHAMPLUS® PLAN II (for dependents of active-duty personnel)

Coverage Requested (Check One)
☐ Inpatient Benefits Only
☐ Inpatient and Outpatient Benefits

Person(s) to be insured (Check One)
☐ Member Only
☐ Spouse Only
☐ Member & Spouse
☐ Member & Children
☐ Spouse & Children
☐ Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Plan I premium payments are normally paid on a quarterly basis but, if desired, they may be made on either a semi-annual (multiply by 2), or annual (multiply by 4) basis.

Quarterly (annual) premium for member (age ____) $_____

Quarterly (annual) premium for spouse (based on member's age) $_____

Quarterly (annual) premium for ____ children @ $ $_____

Total premium enclosed $_____

If this application requests coverage for your spouse and/or eligible children, please complete the following information for each person for whom you are requesting coverage.

Names of Dependents to be Insured	Relationship to Member	Date of Birth (Month/Day/Year)

(To list additional dependents, please use a separate sheet.)

In applying for this coverage, I understand and agree that (a) coverage shall become effective on the last day of the calendar month during which my application together with the proper amount is mailed to AFA, (b) only hospital confinements (both inpatient and outpatient) or other CHAMPUS-approved services commencing after the effective date of insurance are covered and (c) any conditions for which I or my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within 12 months prior to the effective date of this insurance coverage will not be covered until the expiration of 12 consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such conditions. I also understand and agree that all such pre-existing conditions will be covered after this insurance has been in effect for 24 consecutive months.

Date _____, 19 ____ _____
Member's Signature

5/84

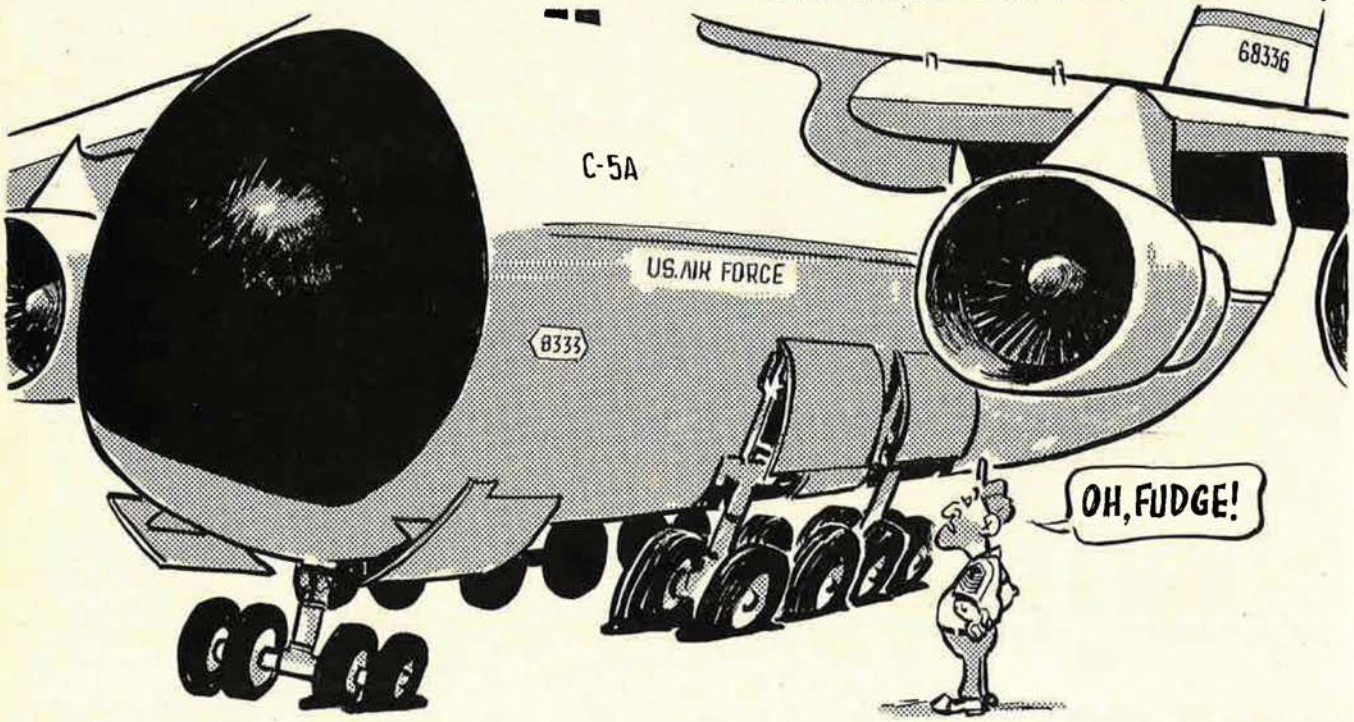
NOTE: Application must be accompanied by check or money order.
Send remittance to:
Insurance Division, AFA, 1750 Pennsylvania Ave., NW, Washington, D.C. 20006.

Form 6173GH App.

Bob Stevens'

"There I was..."

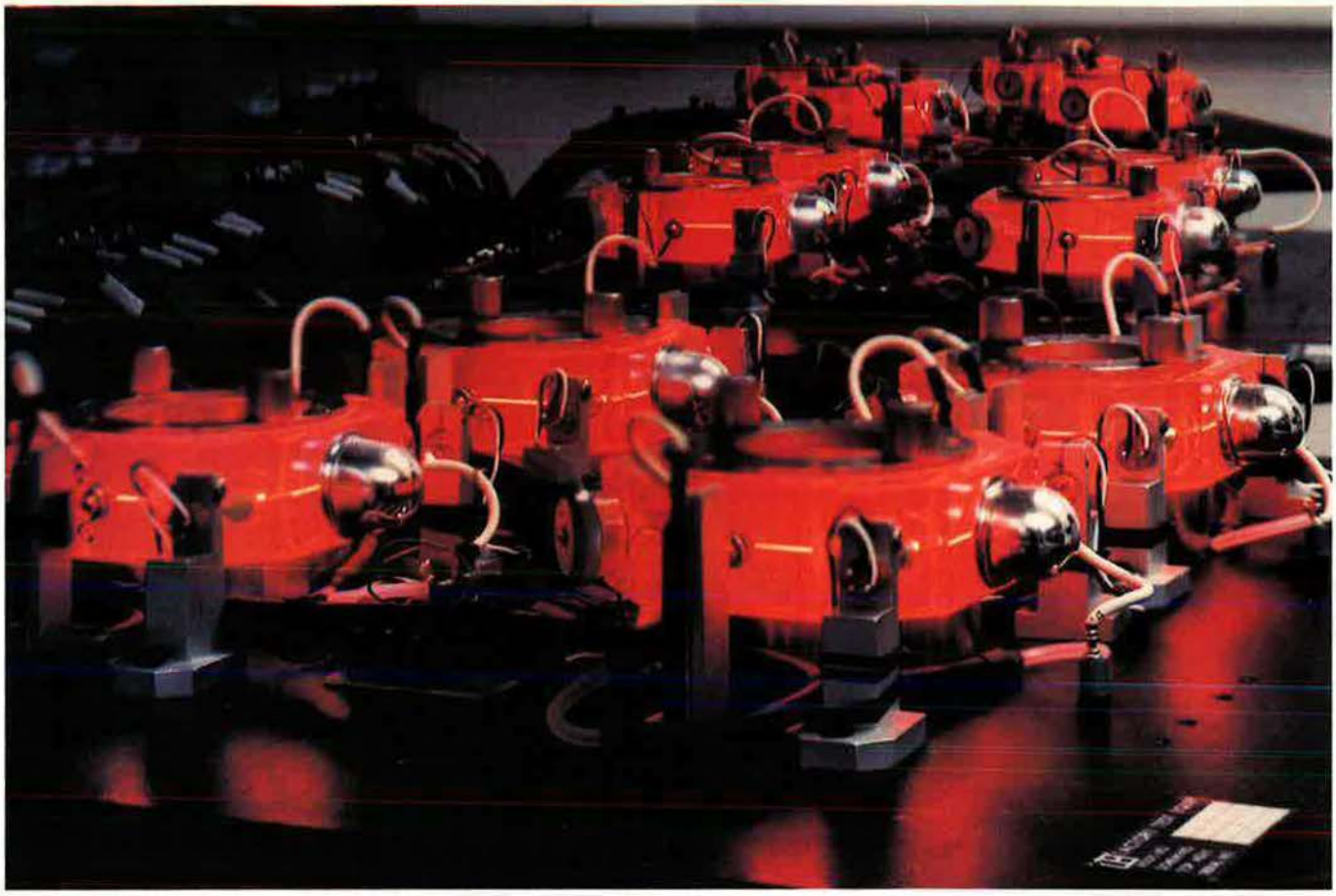
IT'S BIG BIRD TIME, AGAIN. IN THE PAST YOUR AUTHOR HAS BEEN ACCUSED OF DEVOTING TOO MUCH SPACE TO FIGHTER TYPES. THIS, and SEVERAL RECENT PAST ISSUES, SHOULD RECTIFY THIS IMBALANCE. (THERE'S AN ULTERIOR MOTIVE, TOO. THESE BEHEMOTHS FILL SPACE WITH LESS DRAWING!)



THERE ARE THREE STOCK PHONE ANSWERS TO A MAC AIRCREWMAN'S MOST FREQUENT QUERIES—

"THE CREW BUS IS ON ITS WAY"
"YOUR PER DIEM CHECK IS IN THE MAIL"
"YOU'RE THE **ONLY** ONE AVAILABLE"

Bob Stevens



LITTON "PRODUCTIONIZES" HIGH TECHNOLOGY.

We've moved our ring laser fabrication from the laboratory into two completely modern factories with current production capacity of 250 ring laser gyros per month. "Productionizing" high-tech products is high technology, too. And no one knows how to do it better than Litton.

The unique and extensive knowledge gained as world leader in the high-volume production of more than twenty thousand sophisticated inertial navigation systems enables us to transition highly complex technology into full production with minimal problems.

Again leading the industry we pioneered, our ring laser gyros will be onboard the first operational military aircraft to use ring laser technology, the E-6A. In addition to the E-6A program, our assembly lines are producing ring laser gyros for such activities as: LTN-90 ARINC System Production for the Falcon 50, Gulfstream IIB, and A310 Airbus; Inertial Sensor Assembly Development for MRASM; CAINS II Development and Flight Test; USAF RLG Standard INU Development and Flight Test Program; NWC Cost Reduction Gyro Development Program; and NADC multiple redundant Integrated Inertial Sensor Assembly (ISSA) Program.

Our diversity of product line is appropriate to tactical and strategic missiles, aircraft, ship, and submarine navigation.

LITTON
NAVIGATION, GUIDANCE AND CONTROL SYSTEMS

WHEN THE WEATHER TURNS FOUL, WE NEED TO KEEP OUR RESISTANCE UP.

To hostile ground forces, bad weather presents a good opportunity.

Rain, sleet and clouds compromise the radar and firepower of most fighters. So foul weather offers just the cover ground forces need to make their move.

Night can be their ally as well.

How serious a problem is this? Worldwide weather statistics show that most nations are under clouds or in darkness 70% of the time—rendering most fighters useless.

The solution: Combat aircraft like the dual role F-15E, impervious to bad weather and night.

Nothing can cloud the F-15's view. Computer navigation coupled with photo-quality sensors let Eagle crews identify and track targets over any terrain, day or night, in good weather and bad. And the F-15's all-weather missiles seek out and succeed against their targets in any kind of weather.

The all-weather, day and night, dual role F-15 Eagle. It's the most potent of adversaries any time, all the time.

MCDONNELL DOUGLAS