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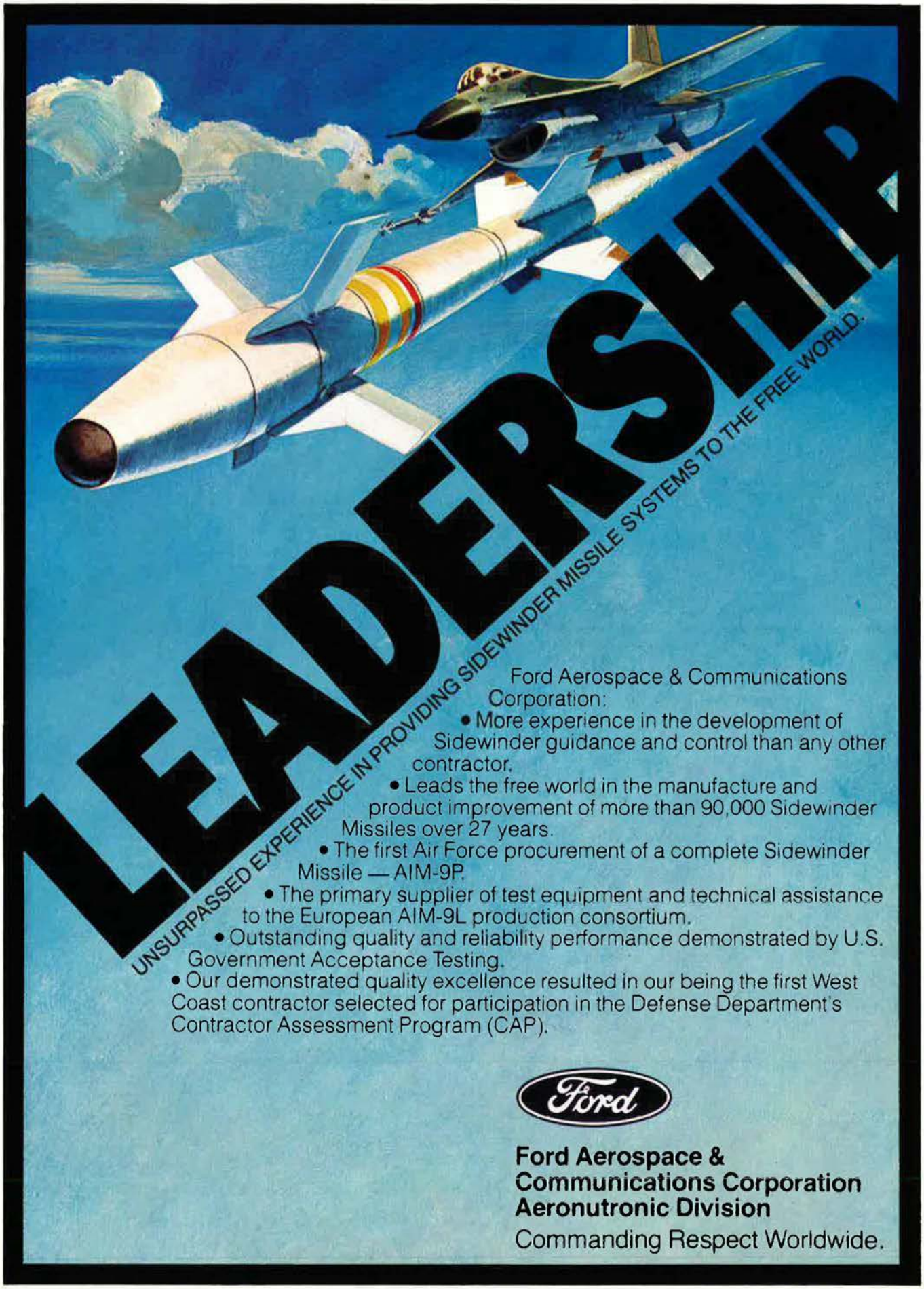
AIR FORCE ALMANAC 1981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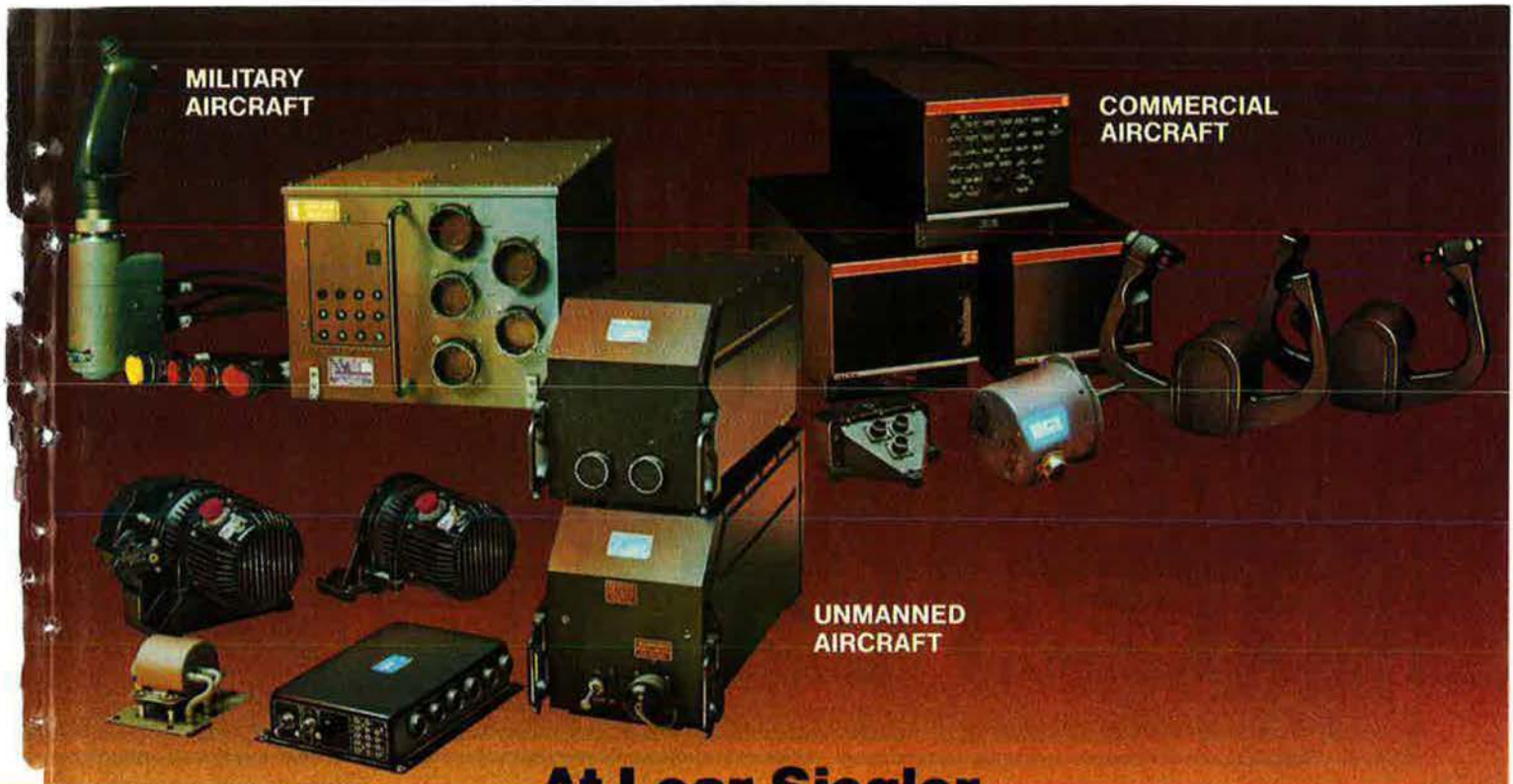

At Lear Siegler Astronics is Flight Control

When you're looking for experience and technology in flight control... the Astronics Division has the answers in:

MILITARY AIRCRAFT

As early as 1949, the Astronics Division achieved notable success in flight control with the receipt of the Collier Trophy for development of the first high-volume production autopilot for jet aircraft. The airplane was the **F-84**...the autopilot was one of more than 10,000 produced by LSI for the USAF.

The tradition continued with technology innovation—in 1953 the first fighter autopilot coupled to an ILS receiver for the **F-86D;** in 1954 the first jet transport autopilot for the **KC-135;** the first solid state 3-axis damper for the **F-104** in 1955.

More recently, the Astronics Division's AFCS for the **LTV A-7** initiated two breakthroughs—control augmentation with control stick steering and a two-channel fail passive AFCS. This system was later modified and put into production for the Lockheed **P-3C** to insure absolute reliability and safety.

The latest addition to the Astronics line of automatic flight control is the first production fly-by-wire flight control computer and sidestick controller for the General Dynamics **F-16.**

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The Astronics Division's success with Automatic Flight Controls for piloted aircraft led to the development of control systems for pilotless aircraft.

LSI's versatile drone autopilot was designed for use in many drone aircraft. By merely changing circuit cards and sensors, each drone can be programmed to fly a variety of missions. It has flown thousands of missions in the USAF/USN series of **BQM-34** targets.

The LSI TACAN Guidance Augmentation System was the first Astronics drone autopilot with homing capability, enabling the Drone to simulate a variety of incoming anti-ship missile threats.

In 20 years, LSI produced more than 4,000 drone autopilots.

Because of this broad experience, the U.S. Air Force selected the Astronics Division for the design and development of an integrated system of modular avionics to interface with new and existing remotely piloted vehicles.

The resulting "CORE" Avionics system was later selected for the USAF **BGM-34C** program and successfully completed a 30 flight test program.

COMMERCIAL AIRCRAFT

In 1956 the Astronics Division brought innovation to the commercial jet transport world with the first Category 3A automatic landing system for the **SUD Caravelle.**

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Using state-of-the-art technology, King Radio Corporation has developed an all new communications system, incorporating a solid-state R/T, digitally controlled automatic antenna coupler, and a microprocessor control system.

The result is a highly cost-effective design that offers full 280,000 frequency capability and worldwide communications at your fingertips.

Performance.

The new KHF 950 is the smallest, lightest and easiest-to-operate HF/SSB system available today.

The entire system, which consists of the KCU 951 panel-mounted display/controller, the KAC 952 remote-mounted power amplifier/antenna coupler, and the KTR 953 remote receiver/exciter, weighs only 19.3 pounds (8.76 kg).

Yet, it provides the full 280,000 HF frequency spectrum in 0.1 kHz steps from 2.0 to 29.999 MHz—all pilot-selectable from the cockpit for sure and immediate worldwide coverage.

In addition, 99 of these HF frequencies can be stored in the system's memory as preset numbered channels for instant selection in flight. No special programmer is required. And other frequencies can be directly tuned with the single-digit cursor without disturbing the preset channels.

Selcal operation is also available, with dedicated Selcal monitoring. So, there's no need to select the AM mode for Selcal operation.

Normal operational modes include LSB, USB and AM, all of which may be preset and stored along with the channelized frequencies.

For maximum range and performance, the KHF 950 delivers 150 watts peak envelope power (PEP) in the SSB operational mode and 37 watts average throughout the AM range.

Warm up is fast: nominally two minutes.

And since large, self-dimming gas discharge readouts are used to display all frequency, channel, mode, programming and transmission indications, there's never any doubt about the operational condition of the system, and no need to refer to a channel chart to verify a frequency in flight.

Antenna tuning is also fully automatic. The electronic antenna coupler maximizes performance on all frequencies. With both wire antennas and most fixed rod or towel bar antennas for rotary-wing aircraft, keying the mike will automatically tune the antenna. The antenna coupler can match open wire antennas of from 15 to 45 feet in length and grounded antennas of from 10 to 35 feet.

Where ground station transmissions may be slightly out of adjustment in single sideband operation, a clarifier function improves the received audio to enhance clear communication.

Reliability.

The use of solid-state components, digital microprocessors and custom LSI circuitry has significantly reduced both the number of electrical connections and electrical parts used in the KHF 950 system.

And this reduced parts count means increased reliability. After all, if it isn't there, it can't fail.

But just as important, since heat-generating tubes and bulky high voltage power supplies have been designed right out of the system, the KHF 950's two remote-mounted units can be operated in an unpressurized environment up to 55,000 feet and at temperatures from −55 degrees to +70 degrees Celsius.

That means greater installation flexibility.

With its die-cast chassis, the KHF 950 system is exceptionally rugged. It's been shock tested to 6g/11 ms and proved crashworthy to 15g, 11 ms.

In addition to meeting all FCC requirements, the system complies with all MIL E 5400 specifications and is TSO'd to C-31c and C-32c criteria (RTCA DO-160 and DO-163).

Maintainability.

The KHF 950 is designed to give years of failure-free service. And it's backed by a full one year warranty on parts and labor. But beyond that, it's been specifically engineered to minimize downtime for installation, removal and servicing.

Field adjustments and calibration are not required. There is no periodic maintenance schedule. Maintainability is enhanced by the modular fold-out chassis which offers quick access to vital circuits and components. And flight line testing is greatly simplified by the use of separate coaxial connectors for transmit and antenna coupler inputs, thus allowing checks of transmitter power without removing the unit from the aircraft.

Naturally, since all frequencies are generated by a digital synthesizer, there's no downtime required for changing crystals. And to further simplify operation, the system's built-in fault logic indicates to the operator any errors or problems in frequency selection, antenna tuning, or equipment malfunction.

	KING		COLLINS			SUNAIR	
FEATURE	KHF 950	HF 200	HF 220	718U-5M	618T-3B	ASB 500	ASB 850
Power Output (PEP) Watts	150	100	100	100	400	100	100
Frequency Range (MHz)	2.0-29.9999	2.0-22.999	2.0-22.9999	2.0-29.9999	2.0-29.9999	2.0-17.9995	2.0-29.9999
Number of Operating Freqs.	280,000	20 presets only	210,000	280,000	280,000	32,000	280,000
Number of Preset Channels	99	20	16	9	0	0	0
Preset Channels Available for Semi-Duplex	99	12	16	9	0	0	0
Preset Channels that are Pilot Programmable	99	0	0	9	0	0	0
Freq. Digitally Displayed During Channelized Operation	Yes	No	No	Yes	N.A.	N.A.	N.A.
Number of Units in System****	3	4	4	3	3	3	3
Selcal Available	Yes	No	No	Yes	Yes	Yes	Yes
Max. Altitude (Feet)	55,000	35,000	35,000	50,000***	*30,000	30,000	30,000
Weight (lbs)	19.6	24.5	25.0	34.0	69.7	33.6	39.6
*Suggested Purchase Price	$8,990.00	$8,285.00	$9,950.00	$33,920.00	$33,444.00	$8,550.00	$11,850.00

*With 490 T-1 Antenna Coupler
**Less selcal when optional—prices as of April 1, 1981
***With 548S-3A Power Amp/Coupler
****Includes receiver, exciter, power amplifier control/display and antenna coupler. Does not include antenna.

Cost.

The KHF 950 was designed with the military operator in mind—and priced to satisfy the most demanding procurement personnel.

In fact, to agencies of the U.S. Government, the KHF 950 is available off-the-shelf for only $6,000, today.

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- ☐ Satellite communications
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- ☐ Satellite navigation
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This Month

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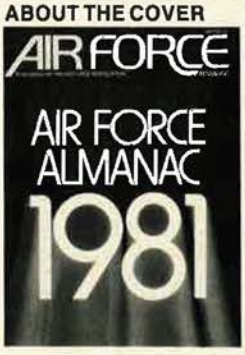
ANNUAL AIR FORCE ALMANAC ISSUE

Reports from the Major Commands

Reports from the SOAs, the DRUs, and the Air National Guard

An Air Force Almanac

ABOUT THE COVER



This annual Almanac issue is the most comprehensive unclassified reference work available on the organization, missions, bases, personnel, equipment, and financing of the United States Air Force. The cover design is by Art Director William A. Ford.

Departments

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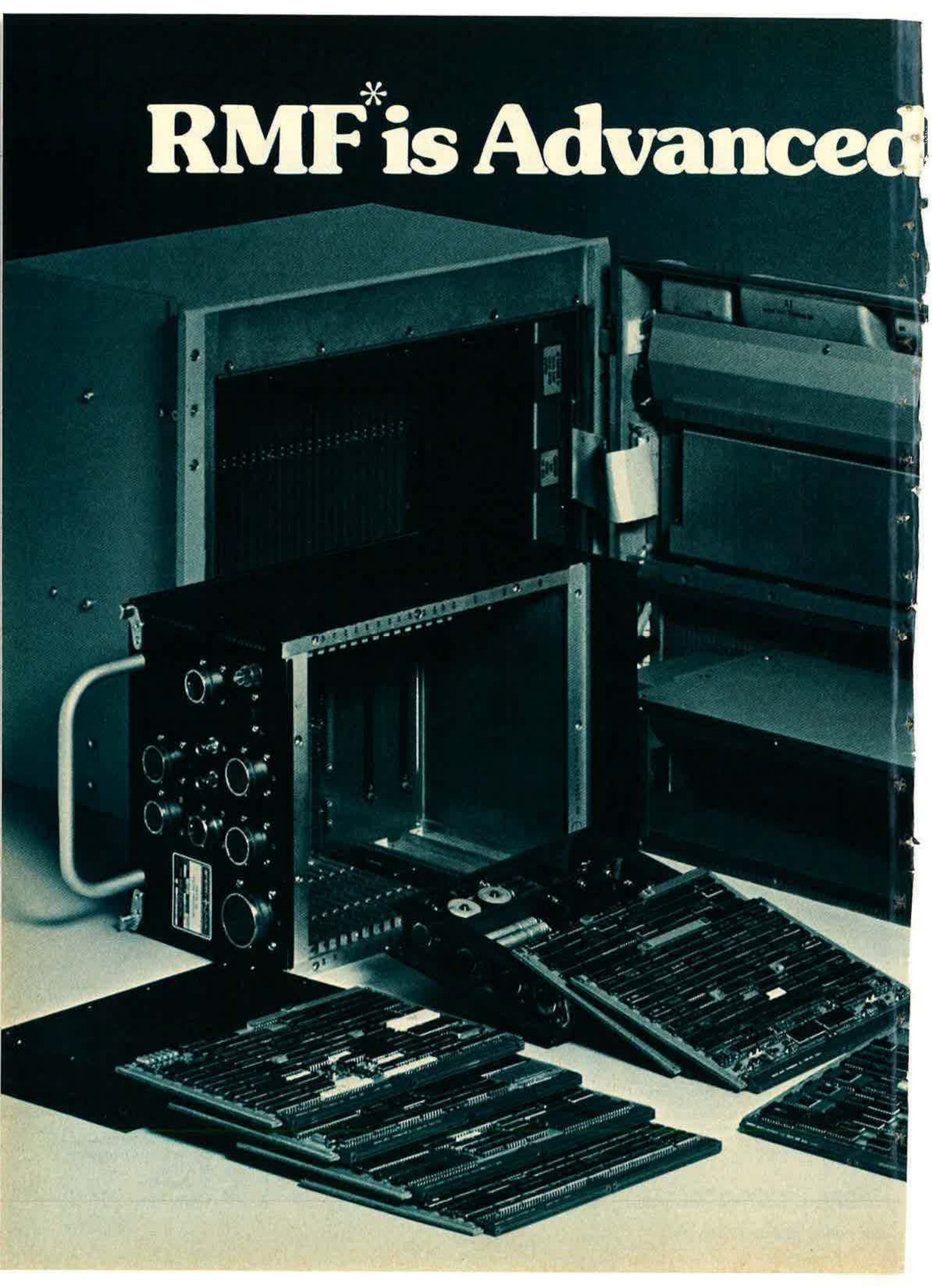

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DEFENSE SYSTEMS

AN EDITORIAL

The Interlocking Families

READERS of this issue will find references to Air Force families in the statements by Air Force Secretary Orr, Chief of Staff Allen, and CMSAF McCoy. Their common theme is the importance of the family, and recognition of its worth, to US aerospace power.

The family is an intangible but vital asset, exerting powerful influence on the everyday actions and decisions by Air Force military and civilian members. Certainly family harmony contributes to good job performance, and family discord can carry over into the workplace, missile silo, or cockpit, degrading efficiency and readiness.

Largely overlooked in the past two decades of sterile micromanagement, concern for the family and its contributions to readiness have now taken a spotlighted position at the forefront of USAF concerns and programs for improvement. This is as it should be. The benefits are obvious and the costs rather modest by comparison with development of major weapon systems. An airman whose spouse complains about Air Force life is not a likely reenlistment prospect. On the other hand, one whose spouse and children receive civil treatment at the dispensary and who has comparison-shopped to conclude that commissary shopping can save a few dollars has built-in incentives to sign for another hitch.

The real payoffs occur when the going gets tough. If Air Force leadership throughout the chain of command has truly led and convinced its members that the Air Force really is an extended family, then they will perform above and beyond the wildest expectations of the calculator chaps with their semi-scientific mumbo jumbo. The point is, the "family" can be a group comprising spouses with or without children, it can be a small unit such as maintenance or aircrew, or it can encompass an entire Air Force as visualized by the top leaders.

Given the recognized value of the human family in the Air Force's well-being, it seems reasonable to consider extending the concept. That is, to look at all aspects of the Air Force's existence in terms of interlocking families of various types. As one astute training planner said recently, "Without trained pilots, a new sophisticated aircraft is as useless as new F-15s without F100 engines." By the same token, the trained pilot and ready engines are just as useless without ready avionics, or fuel delivery, or munitions handlers to upload and prepare the air-to-air missiles for action. The whole system, whether F-15 or some other, is an interlocking network of different families. Some are people, some are engines, others avionics, missiles, and so on. But as with human families, the members are interdependent. An ailment in one member affects all the others.

Going along with this reasoning, it makes more sense to consider and evaluate Air Force programs as members of a very complex set of interlocking families. That makes more sense than treating them separately, as stand-alone, discrete line items in a budget or points in a talking paper.

Two current contentious issues can illustrate the point: the MX system and the fighter debate. Gen. Russ Dougherty, AFA's Executive Director, has written elsewhere that the MX must be the "bedrock" of our defense. But he does not make the case on the virtues of the MX alone. Rather, he advocates MX development and deployment "in a timely manner, and complement[ing] it with other efficient strategic and theater nuclear forces in sound deployment modes" as part of an encompassing national strategy. There's the difference between his advocacy and the position of most opponents.

The opponents most often attack the system on single grounds, depending on their biases. One will say it should be sea-based, not land-based. Another says the possible environmental damage compels its abandonment. Other critics will concentrate on drawdown of water table, or disruption of school systems, or the shortage of Portland cement. Each in isolation may have a point for discussion, but none of the "single-issue" critics of MX considers the overall "family" character of the system. MX is a member of a complex set of families, all of whose characteristics act interdependently for the survival of the whole body. A similar analogy can be drawn in the "quality vs. quantity" dispute over fighter aircraft development.

In this space last month, the Luftwaffe experience with the Messerschmitt Bf 109 was cited. The most numerous of fighters, the Bf 109's war-fighting value diminished as World War II extended and as Allied aircraft surpassed it. A similar outcome is postulated if the "quantity" school prevails and if USAF is forced to buy numbers of cheap but low-quality fighters. The advocates of buying cheap omit two vital qualities the next generation of fighters must possess: capability better than their opponents' and military worth. Those qualities are like family members; they interlock and are interdependent. The cheap, quantity-built, low-quality fighter may give an illusion of power before the fight, but fall to earth in greater numbers when put against more capable aircraft.

The "quantity" school considers only cost, not military worth. The military worth is like a war-winning family, of which cost is but one member. In constructing the Air Force of today and tomorrow, both its critics and its supporters would do well to consider the entire family, as the Secretary, General Allen, and CMSAF McCoy have done. —F. CLIFTON BERRY, JR.

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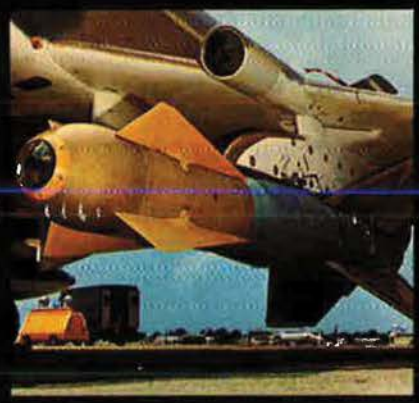

against heavily defended, high-value targets.

HELLFIRE Anti-armor Modular Missile System, for another. It's ready for production. HELLFIRE's launch and leave capability gives helicopters the ability to hide behind protective terrain as the missile seeks its target when the target is remotely designated.

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SCIENCE/SCOPE

Special radar techniques make the F-15 Strike Eagle the most versatile all-weather air force fighter, capable of air-to-air and air-to-surface missions. The radar can create a detailed map from far away with minimum obscuration due to intervening weather effects. The map is "frozen" on the display so the crew has time to discern a target and place a cursor over it. Inertial corrections to the designated position preclude errors due to designation delays. The radar displays moving targets as blinking symbols and can maintain a lock on a fixed point for navigation. It also has a terrain-avoidance feature so the aircraft can hug the ground while flying at high speed. The radar discriminates against rain backscatter and highlights obstacles like cliffs and towers. Hughes supplies the AN/APG-63 radar to McDonnell Douglas Corp., builder of the F-15.

U.S. Army forward observer teams operating from armored vehicles will be able to pinpoint targets for laser-homing weapons or conventional weapons by using a modified Ground/Vehicular Laser Locator Designator. The device was developed by Hughes to be mounted on the M113 Fire Support Team (FIST) armored vehicles. It determines the distance to a target based on the length of time for a burst of laser light to reach the target and bounce back. The laser beam also can illuminate the target to provide a bull's-eye for laser-homing weapons. The system maintains its capability to be mounted on a tripod.

A new communications system delivered to the U.S. Navy saves weight and space over previous systems. The Hughes tactical information exchange system (TIES) uses a single set of hardware to accommodate many different digital and voice communications processing. This was made possible by a new frequency translator unit and a programmable signal processor. Previous systems used separate pieces of equipment for amplitude modulation or frequency modulation of voice and data.

Eight more U.S. Navy guided-missile frigates of the FFG-7 class will carry advanced consoles for displaying data from ship radars and acoustic, television, and electronic warfare sensors. The Hughes AN/UYA-4 consoles will serve as part of the Naval Tactical Data System, which links ship sensors, computers, and weapons while detecting, tracking, and evaluating enemy threats. The consoles have increased display capability for tactical symbols, operate at higher data rates than earlier systems, and are more reliable. This family of displays is installed on or planned for more than 100 ship and shore installations of the United States and its allies.

Gunners aboard U.S. Army Cobra attack helicopters will be able to fire TOW anti-tank missiles, cannon rounds, and rockets with unprecedented precision, thanks to a telescopic sight equipped with a mini-laser rangefinder. The sight, called the Laser Augmented Airborne TOW (LAAT), determines a target's range based on the time it takes a laser burst to reach the target and bounce back. This data is fed to the Cobra's fire control computer with information on wind and ammunition ballistics. Hughes delivered the first production LAAT system on schedule and just 12 months after the go-ahead for delivery of 157 systems.

AIRMAIL

Project Hydra

The April 1981 issue of your magazine contains two references to sea-basing of the MX missile. In the "Capitol Hill" section [p. 26], you have referred (accurately) to statements attributed recently to Secretary of the Navy John Lehman and Chief of Naval Operations Adm. Thomas Hayward. The former stated that ICBMs on ships are targetable by barrage-type of attack until the missiles are put in the water. The latter stated that floating missiles present command and control problems "bobbing around in the middle of the ocean."

In answer to the first objection, it should be obvious that moving targets deployed over millions of square miles of ocean are not that easy to detect, identify, track, target, and attack. Also, attacks would have to be time-coordinated so that no ships would remain to launch a retaliatory attack after the initial ones were hit. If these surface ships are so vulnerable, why cannot the same be said of the rest of the surface ships of the US Navy?

As for Admiral Hayward's objections to untended missiles bobbing in the ocean, I can only restate the position I have taken consistently for the past twenty years. These missiles are carried on board surface ships or in submarines, and only released into the water after a launch command has been received. They spend all of one or two minutes in the water—the time it takes to self-erect and clear the stern of the ship by a hundred yards or so for launch safety.

In the article "The Dangerous Decade" by Edgar Ulsamer [April '81, p. 36], it is stated that ". . . Hydra is devoid of the hardening of the land-based ICBM force. . . . " Let's put the shoe on the other foot and say that the land-based ICBM force is not as flexible or mobile as a sea-based Hydra missile force. If I were allowed to choose between hardened, reinforced concrete that will remain stationary at known locations forever, and a mobile sea-based system—either submarine or surface ship—I would have to go for the sea-based system. I also note that the after-effects of nuclear explosions within CONUS were not compared with a similar exchange occurring in remote ocean areas. The MX/MPS invites heavy radioactive fallout over practically all the US due to prevailing westerly winds.

Finally, Hydra is a launch method, or technique, and not a system. The SUM [shallow underwater missile] small submarine system actually contemplates use of encapsulated floating launch. So, one could have a submarine-transported Hydra missile system, or a surface-ship-transported Hydra missile system, or an SES-transported Hydra missile system, etc. In fact, the same missile could be used for all modes; and therein lies the flexibility. In the final analysis, the Hydra "launch method" has to be the least expensive since it needs no launcher at all—only the rocket is required. How could one get any more "bang for the buck" than that?

The MX missile itself could be Hydra-launched without having to redesign any of the rocket motors, or warheads, or most other major components. The guidance system would have to be modified, but this could be done while still retaining accuracy, as proposed by the SUM proponents.

It may be of some interest to your readers that my analyses of Soviet SLBMs carried out over the past fifteen years have confirmed conclusively that they are Hydra missiles. Having a specific gravity less than unity, due to their use of liquid fuel, the Russian missiles are floated up to the surface from their submerged submarines. Then they are ignited, using the ocean as a "launch pad." Admiral Gorshkov used this phrase himself in one of his books; unfortunately, few in this country took him literally.

Capt. John E. Draim, USN (Ret.)
Former Program Manager for
Project Hydra
Vienna, Va.

• *For more on the Hydra concept, see "In Focus," p. 24 of this issue.*—THE EDITORS

Kind Words from *Sea Power*

Heartiest congratulations on your March issue. It is superb, from the splendid cover by William S. Phillips to the extremely detailed coverage of the USSR's still-growing strengths and capabilities.

I have personally never seen any other publication with such a wealth of information—authoritative and well-written, to boot—on Soviet naval/military/space capabilities across the board. It should be "must" reading for all Americans—and particularly for those still not certain whether the nation can afford the much increased US defense program proposed by President Reagan.

James D. Hessman
Editor in Chief
Sea Power Magazine
Washington, D. C.

Thank You, General

I was delighted with the February issue of AIR FORCE Magazine. It's absolutely first rate.

I will hold you to your promise to write about other logistics items in the months to come. The current issue has already raised an awareness of logistics procedures and problems all across the Air Force and was commented on in several European and Middle East nations during my most recent trip.

Thank you again.

Gen. Bryce Poe II, USAF
Commander, Hq. AFLC
Wright-Patterson AFB, Ohio

Civilians Part of the Team Too

I must voice my concern about one comment that went unchallenged in a letter appearing in the "Airmail" section [p. 9] of the February 1981 issue of your magazine. This particular letter expressed concern about pilot training for engineering students. The comment I would like to address read as follows: "Using civil servants in S&T positions will help fill shortages, but I'll guarantee you that it will be nearly impossible to get them out on a weekend or stay in the office after 5:00 p.m. to finish a project."

I feel this is an unfair accusation

and continuation of a stereotype that is detrimental to accomplishment of the mission of the United States Air Force.

I view the total work force of the Air Force as a team of civilian and military, combined to accomplish the mission. No one segment of this force lacks in dedication. I know personally and have worked with many fine and dedicated civilian employees who have time after time worked late on a workday or returned on a weekend to "finish a project" that required finishing.

There are a large number of civilians in the Air Force community, working in maintenance, distribution, procurement, and many other areas who are as dedicated to mission accomplishment as any military personnel. It is unfair to suggest otherwise. I must admit that it was somewhat disappointing to note the lack of comment on this point in the Air Staff response or by AIR FORCE Magazine editors.

Now, although it may be true that we civilians do not always "pass in review" in a military manner, our dedication to the mission should not be questioned. If the job needs doing, we are there.

I normally ignore inferences such as the quotation above and maybe I'm getting thin-skinned, but I must admit in this period of economic problems and energy constraints, I have serious concerns about the security of this nation. The Air Force, as one of the key instruments of our security (and the security of our children), cannot allow itself to tolerate or condone rhetoric divisive to that end. We, military and civilian, each lending our own unique talents, must work together. The net result of a harmonious, united effort will be what we all strive for—a force ready to do the job, whatever the challenge.

George F. Ruestow
Special Assistant for Airlift
Directorate of Transportation
Hq. USAF
Washington, D. C.

Combined Air Warfare Course

Major Sack's article "New Strides in Professional Military Education" in the January '81 issue was excellent. However, I believe that the failure to mention the Combined Air Warfare Course (CAWC) is an important omission.

CAWC provides officers of all grades who have not yet or may not ever attend PME beyond SOS in residence a condensed curriculum in air war-fighting. CAWC's course structure is tailored to the current environment the Air Force officer will find in dealing with command relationships, force employment, logistics, and enemy and allied war-fighting capabilities. Like the Air War College curriculum, CAWC ends with the students participating in the Theater War Exercise. (Indeed, the picture on p. 89 of Major Sack's article is of a CAWC student and Army advisor.)

I have found the Combined Air Warfare Course (Class 80-D) to be outstanding preparation for my assignment here in Europe. It has, as the cliché goes, allowed me "to hit the ground running." I have attended a number of Air Force courses and schools, but never one so relevant and immediately useful. Any discussion of the Air Force PME should not fail to mention CAWC.

Capt. Robert E. Mansfield, Jr., USAF
APO New York 09012

AIRMAIL

Widows and Dependents Home

An item in the January 1981 "Bulletin Board" column resulted in an unexpectedly large number of inquiries about residency at the Air Force Enlisted Men's Widows and Dependents Home Foundation. So many inquiries were received that we cannot meet the ten-day response time promised.

Readers of AIR FORCE Magazine who sent us a request are asked to please bear with us—your reply will be in the mail shortly.

D. N. Masone
President and Chief Executive Officer
Air Force Enlisted Men's Widows and Dependents Home Foundation
Fort Walton Beach, Fla.

Fun and Games

Frank Harvey (March '81 "Airmail," p. 13) hit it right on the head! The fun and games *are* gone. Here at Barksdale, the O-Club is about the deadest place going—when it's open. It's closed almost a third of the year for various reasons, such as holidays, Mondays, fumigation days (!), and so on. Our benefactors at Social Actions (the Air Force's answer to Carrie Nation) have whittled "Happy Hour" down to the mundane "Reduced Price Drinks," and this festive period comes around twice a week. The overall atmosphere of the O-Club is that of a stodgy old men's club.

I can only imagine the trouble that would be visited upon anyone foolhardy enough to attempt Mr. Harvey's games, but it would be fun to try—when I have my PCS orders firmly in hand.

Oh yes, please withhold my name—I don't have those orders yet.

Name withheld by request

MX a Mistake?

The Air Force has stated that acquisition of the MX will show our "nation's resolve" and will defend against "surprise attack."

I submit that our nation's resolve to defend itself would be better demonstrated by the reinstitution of the draft and the upgrading of our conventional forces.

As for a surprise attack, the Air Force says USSR ICBMs will have about a thirty-minute flight time. Once those missiles are detected being launched, why would ours be left on the pad? But assuming that all our land-based ballistic missiles were caught on their pads, we still have enough other delivery systems to incinerate a good portion of the USSR.

When the call from the White House is for prudent expenditures, it makes no sense for the Defense Department to pursue the purchase of unnecessary weapons costing many billions of scarce tax dollars that should be spent elsewhere.

Col. Peter E. Boyes, USAF (Ret.)
South Lake Tahoe, Calif.

Years of the Quiet Sun

I read with interest the article by William and Harriet Fast Scott entitled "Space: Are the Soviets Ahead?" in the March issue.

To set the record straight on one point, however, it should be noted that the International Geophysical Year (IGY) and the International Years of the Quiet Sun (IYQS) were distinct efforts. The dates of the IGY were from July 1, 1957, to December 31, 1958, at the maximum of the eleven-year solar activity cycle. The IYQS was from January 1, 1964, through December 31, 1965, during solar minimum.

Edward W. Cliver
Space Physics Division
Air Force Geophysics Laboratory
Hanscom AFB, Mass.

Craig AFB

Page 10 of your March issue contained a letter from Robert B. Jones, Jr., referring to Shaw AFB as being near Selma, Ala.

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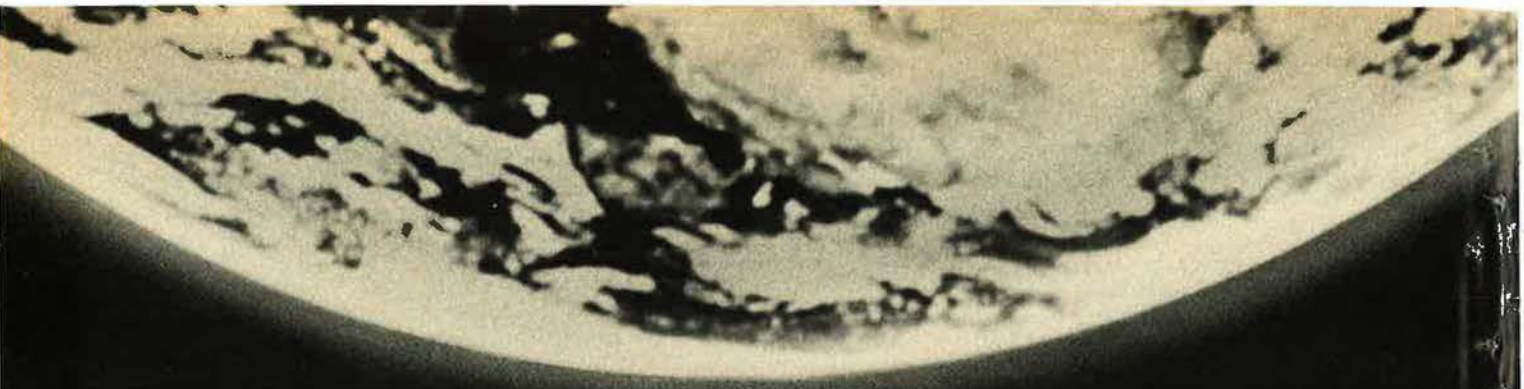

The ultimate proving ground.

There are moments when history presents us with challenges of such a compelling nature that to miss them is to miss the whole meaning of an epoch. Shakespeare sensed this 400 years ago:

There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves
Or lose our ventures.

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Was there really a Shaw AFB in Selma, Ala.? I always thought it was Craig AFB.

C. Seebaldt
Georgetown, S. C.

• *Shaw AFB is an active Air Force base near Sumter in South Carolina. Craig AFB, closed a few years ago, was near Selma in Alabama.*—THE EDITORS

Scrambled Yemens

Leave it to the Mapping Agency to look at the maps! [January '81 issue, p. 102.]

We bring to your attention that North Yemen or Yemen Arab Republic (capital Sanaa) may not appreciate being identified as their southern brothers in the People's Democratic (!) Republic of Yemen (capital Aden).

Congratulations on an otherwise super mag!

SMSgt. Michael G. Rohrer, USAF
Defense Mapping Agency
APO New York 09666

B-17 *Memphis Belle*

This is to inform readers of the ongoing restoration project of B-17F *Memphis Belle* of 91st Bomb Group fame. Work is progressing quite nicely, with ultimate plans to house the plane in a museum to be built here in Memphis. The plane is on loan to the Memphis Belle Memorial Association from the Air Force Museum.

We would like to appeal to readers to lend, sell, or donate to us items of interest and pertinence to this project. We are particularly in need of manuals, charts, and technical orders, and can use any and all items of personal equipment, as well as equipment that would have been attached to or used on this aircraft. A four-page want list of parts can be sent on request.

At this time, the plane is a pleasure to behold, and the finishing touches will soon be applied to the exterior. We hope to make this a memorial to be appreciated by all B-17 crews from WW II.

Thanks for any help readers may be able to offer.

Harry Friedman, M. D.
5910 Haymarket Rd.
Memphis, Tenn. 38119

Anecdotes Needed

A Los Angeles-based writer seeks interviews and correspondence with World War II B-29 pilots and crew members. Veterans stationed in Saipan and Tinian who flew missions over Japan are needed to provide information on the following topics:

AIRMAIL

B-29 aircraft maneuvers and crew interaction; American military base installations on Saipan and Tinian; and POW experiences while held in or near Hiroshima.

Photographs and personal stories that describe service are also requested.

The writer guarantees that all information will remain confidential. Any material used in the final story will be fictionalized to protect the interests and identities of contributors.

Those interested may contact:

Len Janson
25260 Malibu Rd.
Malibu, Calif. 90265
Phone: (213) 456-9404

Air Force Songs

I am preparing with my colleague Joe Forsyth, who served with the Air Force in WW II, a book of Air Force songs to be titled *The Winged Muse: Songs of the U.S. Air Force.* We have a collection of more than 100 songs from WW I to the present.

If you would like to send us any songs or songbooks, please do so. We will copy and send back your contributions if you wish. All contributions will be acknowledged in the book. We hope to send the manuscript to a publisher by September 1, 1981, so please respond soon if you'd like to help.

Professor Joseph Tuso
Department of English
Box 3E
New Mexico State University
Las Cruces, N. M. 88001

20th Air Force Pictorial Album

The 20th Air Force Association is in the process of publishing an Official Pictorial Album of its activities during World War II.

If you have photos of those days in India, China, and the Marianas, we will appreciate hearing from you.

The photos or slides must be in a very good condition and of more than personal interest.

Please let us add your name and address to our growing list of those who wish to contribute to this long-awaited and historic book.

Richard M. Keenan
Executive Director
20th Air Force Association
P. O. Box 5534
Washington, D. C. 20016

Info Needed on B-17

The first in a series of monographs I am doing on the B-17 will be published by *Detail & Scale* this summer. For follow-on editions I am in need of data and photographs of operational B-17s. Specifically, I need data and drawings of the Higgins A-1 rescue boat, B-17F nose gun installations made by the VIII Bomber Command; photos of operational RB-17/F-9 photoreconnaissance/photomapping aircraft, and individual aircraft markings. I wish to illustrate adequately the monographs for historical/modeling purposes. Only named aircraft with serial number, unit of assignment, and unit codes will be published.

To achieve this level of completeness, I must be able to review as many photographs as possible to capture the salient details. All loaned material will be properly cared for and promptly returned. Any material used will be appropriately credited, and all assistance will be gratefully appreciated.

Alwyn T. Lloyd
17465 N. E. 11th St.
Bellevue, Wash. 98008

315th Troop Carrier Group

We are trying to locate former members of the old 315th Troop Carrier Group from World War II days and, after a thirty-five-year hiatus, it is a very difficult task. We have been able to locate more than 500 of our former members during the past four years. As we continue to locate old orders we hope to be able to locate another 1,000 or 1,500 men who served with the 315th during WW II.

If you served in Africa, Europe, or South America with the 34th, 43d, 309th, or 310th Troop Carrier Squadrons or supporting units and would like to receive our newsletter, a current roster, a pictorial review of past reunions, and information on our 1982 Chicago reunion, then drop a line with information on your service to:

Robert L. Cloer
1417 Valley View Dr.
Yuba City, Calif. 95991

B-52 Bomber Unit Emblems

The 449th Flying Training Squadron (navigator/bombing training) at Mather AFB, Calif., is the center for training all navigator/bombardiers for the Air Force. We are currently putting together a display of all B-52 bomber unit emblems. This display will cover both active and inactive squadrons and wings.

We would like to solicit donations of unit patches and any information about these units from former crew

members or squadron members. What we need most are patches from wings that are no longer active. These patches will be permanently displayed at the 449th.

If you have any patches or memorabilia and would like to donate them, please contact:

Capt. Lee Johnson, USAF
449th Flying Training Sqdn.
Mather AFB, Calif. 95655

33d Squadron B-24 Reunion

The 22d Bomb Group had its thirty-first reunion last summer and only two 33d Squadron members from the B-24 days attended.

Lee Shelton and I are trying to locate as many B-24 crew members as possible for a reunion during September 10–13 at Colorado Springs, Colo. We have seven men so far and would like to get many more, so please get in touch with me as soon as possible.

James F. Rock
402 Ridgewood Dr.
Fairborn, Ohio 45324

United Airlines Modification Center

I am looking for any information on the United Airlines Modification Center in Cheyenne, Wyo., from 1941 to 1945.

This Center was famous for the Cheyenne tail turret that was used on the B-17G. But the Center was used to modify B-24s and Navy PBY bombers along with the B-17s.

I am trying to get information and pictures together for a book. Any pictures or articles on the Center will be greatly appreciated. All items can be returned if requested. Please send information to:

Robert B. Lumpkin, Jr.
1208 Cribbon Ave.
Cheyenne, Wyo. 82001

AIRMAIL

Nomex Flight Jacket

I am a collector of USAF flight equipment. I am currently looking for a USAF "Nomex" flight jacket (winter or summer type). I am willing to pay a fair amount for it.

Any reader who has and is willing to sell me such a flight jacket is invited to write:

Rick B. Versteeg
Fahrenheitstraat 1
3817 WB Amersfoort
The Netherlands

USAF Insignia

I am trying to rebuild my collection of USAF insignia. The original collection was destroyed in its entirety when my old squadron was burned to the ground. Along with it, of course, went everything I owned. Years of effort and thousands of insignia were gone in minutes.

I would like to obtain unit hat patches, pocket patches, decals, etc. As long as it is Air Force-related and represents a unit, it would be most welcome.

Please contact:

Leon D. Humiston, Jr.
2672 Stoneybrook Dr.
Anaheim, Calif. 92804

AFROTC Det. 800

The University of Tennessee's Air Force ROTC (Detachment 800) is organizing an alumni association. If you were a member of the AFROTC Cadet Corps, or are a graduate of the University of Tennessee, commissioned in the Air Force, please let us know where you are and what you're doing. Write us at the following address:

AFROTC Alumni Association
Capt. Ron Daniel, USAF
215 Stokely Athletics Center
University of Tennessee
Knoxville, Tenn. 37916

UNIT REUNIONS

Ex-POWs

The American Ex-Prisoners of War will hold their national convention July 22–24, 1981, in Fort Worth, Tex. **Contact:** Earline Summers, 3712 Brambleton, Fort Worth, Tex. 76119. Phone: (817) 536-3057; or Ike Franklin (817) 451-0156.

Glenn L. Martin State Airport

The Praise & Prayer Fly-In will be held June 6, 1981. **Contact:** George Meese, Sr., 194 Acton Rd., Annapolis, Md. 21403. Phone: (301) 263-4054.

Goodfellow AFB, Tex.

Members of the 68th School Sqdn. will celebrate their fortieth anniversary on July 3–4, 1981. **Contact:** P. A. Reary, Route 5, Box 5230, San Angelo, Tex. 76901. Phone: (915) 944-1211 or (915) 653-5373.

Goodfellow AFB, Tex., Personnel

In an effort to bring back former members of Goodfellow AFB, the command will celebrate its fortieth anniversary on July 4, 1981. **Contact:** Office of Information, Hq., 3480th Tech. Tng. Wing, Goodfellow AFB, Tex. 76903. Phone: (915) 653-3231, ext. 2322.

Ninety-Nines

The Ninety-Nines will hold their convention on July 15–19, 1981, at the Copley Plaza Hotel, Boston, Mass. **Contact:** Harriet Fuller, P. O. Box 99, Shrewsbury, Mass. 01545. Phone: (617) 842-4261.

North-East Aviation Fair

The Experimental Aircraft Association will hold a fly-in on June 6–7, 1981, at Linden Airport, N. J. **Contact:** EAA, Chapter 230, Box 357-WOB, West Orange, N. J. 07052. Phone: (201) 736-9092.

Saigon Mission Association

The Saigon Mission will hold its fifth annual reunion on May 22–24, 1981, at the Holiday Inn, Fairborn, Ohio. Membership in the SMA is open to military, civilians, and contractors who served in Vietnam through April 29, 1975. **Contact:** Hal Segerson, 5662 Burkhardt Rd., Dayton, Ohio 45431. Phone: (513) 254-4154; or Jack Goldberg (513) 426-5131.

2d Bomb Group (H)

The 2d Bomb Group will be holding its reunion at the Chamberlin Hotel, on Chesapeake Bay in Hampton, Va., September 17–19, 1981. **Contact:** Phil Glassman, 1209 Helmen Dr., South Bend, Ind. 46615. Phone: (219) 288-1554. John P. Stephen, 215 D St., Keyser, W. Va. 26726. Phone: (304) 788-1235.

2d Bomb Sqdn./22d Bomb Gp., 5th AF

Members of the 2d Bomb Sqdn. and the 22d Bomb Group will hold their reunion June 11–13, 1981, at the Landis Valley Motor Inn, Oregon Pike, Lancaster, Pa. 17601. **Contact:** Jim Bradley, 5803 N. W. 70th Ave., Fort Lauderdale, Fla. 33319. Phone: (305) 721-9262.

3d Strategic Air Depot, 25th Bomb Group, 8th AF

A reunion for the 3d SAD and 25th Bomb Group of 8th AF, Watton, England, July 23–25, 1981, in Nashville, Tenn. **Contact:** W. S. Noble, 7266 Goodwood Ave., Baton Rouge, La. 70806.

5th Fighter Group

The 5th Fighter Group of the Chinese-American Composite Wing (WW II), will hold its first reunion in August 1981, in Atlanta, Ga. **Contact:** Joseph T. Millington, 1633 Colonial Way, Frederick, Md. 21701.

8th Fighter Group

Members of the 33d, 35th, 36th, 80th, 8th Fighter Control Sqdns., and attached units (WW II), will hold their reunion August 14–16, 1981, at the Marriott Inn, Providence, R. I. **Contact:** Vincent W. Steffanic, 21 Curson St., West Warwick, R. I. 02893.

14th Air Force Ass'n, Flying Tigers

The thirty-fourth annual convention for the Flying Tigers will be held at the Colony Square Hotel in Atlanta, Ga., September

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Jellicoe

Brown

Lee

Scheer

Richthofen

24–26, 1981. It is open to anyone assigned to the American Volunteer Group, the China Air Task Force, or the 14th Air Force in China during WW II. **Contact:** A. W. "Al" Johnson, 16 Spoon Ct., Alpharetta, Ga. 30201.

15th Constabulary Sqdn. Ass'n
This Association will hold its fifth reunion July 17–19, 1981, at the Howard Johnson's Hotel, Lexington, Ky. **Contact:** John Howard, 159 Winding Way Dr., Frankfort, Ky. 40601.

19th Bomb Group and Wing
A reunion for the 19th Bomb Group and Wing will be held at the Quality Inn-Airport, Indianapolis, Ind., July 24–26, 1981. **Contact:** Herbert A. Frank, 90-13 201st St., Hollis, N. Y. 11423. Phone: (212) 465-5740.

29th Air Service Group, 13th AF
A thirty-fifth reunion for the 29th Air Service Group will be held in Charlotte, N. C., July 12–17, 1981. **Contact:** Frank Pace, 315 W. 15th St., Dover, Ohio 44622.

Class 35, Kelly Field Grads
The February 1935 Kelly Field graduating class, including members of July 1935 and October 1934, will hold a reunion June 3–4, 1981, in San Antonio, Tex. **Contact:** T. M. Bartley, Jr., 4003 Towering Oaks, San Antonio, Tex. 78217. Phone: (512) 655-8700. George S. Buchanan, 6306 Cypress Creek, San Antonio, Tex. 78239. Phone: (512) 653-1000.

Class 38-C
A reunion is planned for the Flying Class 38-C. **Contact:** Doug Courtney, 5927 Northgap, San Antonio, Tex. 78239. Phone: (512) 654-1932.

P-40 Warhawk Fighter Pilots
The tenth convention for the P-40 Warhawks will be held July 20–22, 1981, Sands Hotel, Las Vegas, Nev. **Contact:** John Balason, 3708 San Joaquin, Las Vegas, Nev. 89102. Phone: (702) 896-5863.

48th Troop Carrier Sqdn. (WW II)
A reunion for the 48th Troop Carrier Sqdn. will be held July 31–August 1, 1981, at the Peek-n-Peak Recreational Center, Clymer, N. Y. **Contact:** Felix Pulinski, 147 Park St., Sherman, N. Y. 14781. Phone: (716) 761-6078 (days); or (716) 761-6466 (evenings).

49th Fighter Group
Members of the 49th Fighter Group, including the 7th, 8th, 9th Squadrons, and all others connected with the 49th, will be holding their reunion July 9–11, 1981, in Colorado Springs, Colo. **Contact:** Don Lee, 2940 S. Parker Ct., Aurora, Colo. 80014.

49th Fighter Sqdn./14th Fighter Gp.
A reunion for the 49th Fighter Sqdn. and the 14th Fighter Group of WW II will be held August 7–9, 1981, in Indianapolis, Ind. **Contact:** S. D. Huff, 3200 Chetwood Dr., Del City, Okla. 73115.

56th Fighter Group
The 56th Fighter Group reunion will be held on June 27–28, 1981, at the Executive Inn, Walterson Expressway, Louisville, Ky. A special invitation is extended to the 56th TFW, MacDill AFB, Fla. **Contact:** Leo Lester, 600 E. Prospect St., Kewanee, Ill. 61443.

UNIT REUNIONS

57th Bomb Wing (M)
Members of the 57th Bomb Wing are holding their thirteenth reunion on July 15–19, 1981, the Red Lion Inn, Seattle, Wash. Plans are to include the following units of the 57th: 310th, 319th, 321st, and 340th Bomb Groups; also the 308th Signal Wing attached. **Contact:** Hal Lynch, 11720 Whisper Bow Dr., San Antonio, Tex. 78230.

58th Bomb Wing Ass'n
A twenty-fifth reunion for the 58th Bomb Wing will be held on July 28–August 1, 1981, at the Ramada Inn-Airport, Milwaukee, Wis. The Association includes the 40th, 444th, 462d, and 468th Bomb Groups; and the 25th, 28th, 86th, and 87th Air Service Groups. **Contact:** Clarence M. Miller, 6839 N. 99th St., Milwaukee, Wis. 53224. Phone: (414) 353-8039.

Classes 60–64
The Desert High School classes of 1960–64 are planning a reunion. **Contact:** Henry C. MacQueen, 3212 Chesapeake Bay, Davis, Calif. 95616. Phone: (916) 756-1590.

69th Bomb Squadron
The 69th Bomb Sqdn. is having its reunion in Atlanta, Ga., on August 7–9, 1981. **Contact:** Nathan Lane, 186 Market St., P. O. Box 2287, Paterson, N. J. 07509.

75th Troop Carrier Sqdn.
The 75th Troop Carrier Squadron will hold its reunion in Nashville, Tenn., July 24–26, 1981. **Contact:** Robert Richards, 139 Kiser Dr., Tipp City, Ohio 45371.

79th Fighter Group (WW II)
Members of the 79th Fighter Group and the 85th, 86th, and 87th Sqdns. will hold their reunion June 3–7, 1981, at the Howard Johnson's Florida Center in Orlando. **Contact:** Edwin Newbould, 1123 E. 173d Pl., South Holland, Ill. 60473. Phone: (312) 331-3744.

80th Fighter Group
The Burma Banshees reunion will be held July 24–26, 1981, at the Imperial House, North Dayton, Ohio. **Contact:** George F. Schlagel, Tiffany Textile Corp., 13361 Molette St., Santa Fe Springs, Calif. 90670.

99th Bomb Group
The 99th Bomb Group will hold its reunion on July 18, 1981, Rapid City, S. D. **Contact:** Mike Yarina, Fairburn, S. D. 57738. Phone: (605) 255-4238.

AC-130 Gunship
All associated with the 16th SOS are invited to the seventh annual mini-reunion to be held at the Fontenelle Hills Country Club near Omaha, Neb., May 22–24, 1981. **Contact:** R. A. Wicklund, 602 Martin Dr., North, Bellevue, Neb. 68005. Phone: (402) 291-4690.

155th Tactical Reconnaissance Gp.
The thirty-fifth anniversary will be observed for the 155th Tac Recce Group (ANG), on July 26, 1981. **Contact:** Lt. Col. Richard Wade, Nebraska ANG, 1300 Military Rd., Lincoln, Neb. 68508.

318th Fighter Gp., 7th AAF
The 318th Fighter Group, serving with the 7th Army Air Force during World War II, is trying to locate former members for a reunion to be held in Colorado Springs, Colo., June 25–28, 1981. **Contact:** 318th Fighter Group Association, c/o Thomas E. Foote, 166 Harvard Ave., Tacoma, Wash. 98466.

319th Bomb Group
Members of the 319th Bomb Group, including the 437th, 438th, 439th, and 440th Squadrons, will be holding their seventh reunion in Salt Lake City, Utah, on July 23–26, 1981. **Contact:** Harold E. Oyster, 662 Deering Dr., Akron, Ohio 44313. Phone: (216) 836-4716.

362d Fighter Group, 9th AAF
The 362d Fighter Group, including the 377th, 378th, and 379th Fighter Squadrons, and Group Headquarters, will be holding their reunion on July 13–18, 1981, in Chicago, Ill. **Contact:** Bill Marles, 2838 Blue Brick Dr., Nashville, Tenn. 37214. Phone: (615) 883-1208.

387th Bomb Group (M)
Members of the 387th Bomb Group will hold their reunion June 12–14, 1981, at the Hilton Inn, 5000 E. Skelly Dr., Tulsa, Okla. **Contact:** Bob Allen, 1030 S. Fernandez #1-R, Arlington Heights, Ill. 60005. Phone: (312) 394-8805.

454th Bomb Sqdn., 323d Bomb Gp.
The sixth reunion for the 454th Bomb Sqdn. and the 323d Bomb Group will be held July 15–19, 1981, in Colorado Springs, Colo. **Contact:** Joe Havrilla, 1208 Margaret St., Munhall, Pa. 15120. Phone: (412) 461-6373.

485th Bomb Group, 15th AF
The 485th Bomb Group will hold its reunion on August 1–2, 1981, in Louisville, Ky. **Contact:** E. L. Bundy, 5773 Middlefield Dr., Columbus, Ohio 43220.

709th Bomb Sqdn., 447th Bomb Gp.
A reunion for the 709th Bomb Sqdn. and the 447th Bomb Group will be held on July 17–19, 1981, in St. Louis, Mo. **Contact:** Myron P. Schreiber, 21302 Park Wick La., Katy, Tex. 77450.

6147th Tac Con Group
The 6147th Tac Con "Mosquitos" will be holding their reunion on July 17–19, 1981, at the Ramada Inn, Colorado Springs, Colo. **Contact:** Ed Damico, 2408 Cabot Ave., Erie, Pa. 16511. Phone: (804) 456-9922.

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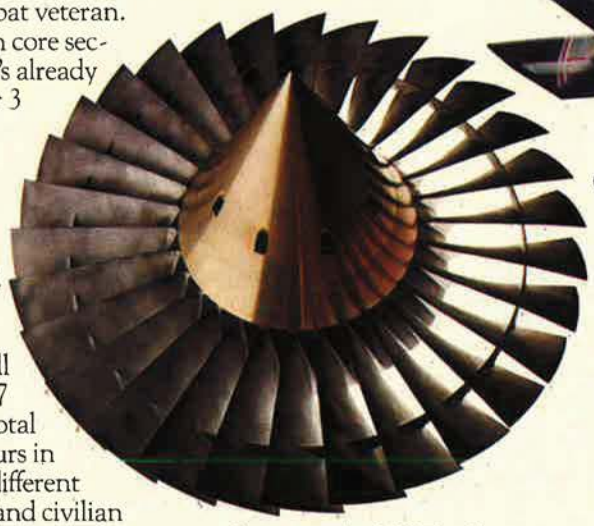

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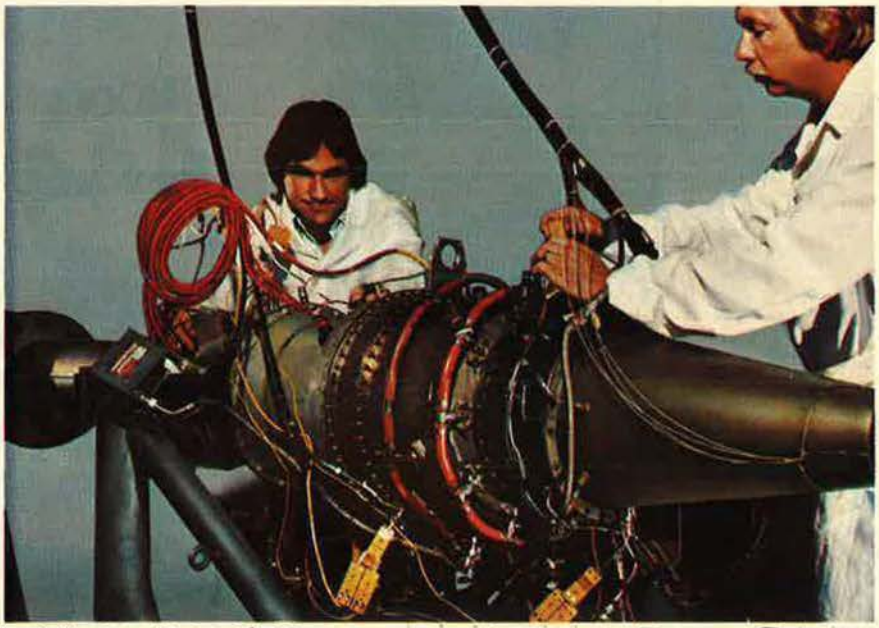

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IN FOCUS...

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

Washington, D. C., April 6

MX Basing Mode Again Under Review

After fifteen years of review and redesign of the MX system, particularly so far as basing mode is concerned, the Administration has convened a panel of fifteen nongovernmental experts to look once again at the question of how to configure and deploy the weapon with the highest survivability, at the least cost, and with minimal political and environmental ramifications.

The panel, chaired by Dr. Charles Townes, a Nobel Prize-winning physicist from the University of California at Berkeley, is to make specific recommendations concerning the MX basing mode to Secretary of Defense Caspar W. Weinberger by July 1, 1981. This review, the thirty-sixth since the launching of the program, Secretary Weinberger told this column, probably will not cause delays in the MX deployment schedule. Although deeply concerned about drastic slippage in the delivery schedule of the Navy's Trident submarine program, Secretary Weinberger asserted that this circumstance in no way militates against deploying MX on submarines. Stressing that he, as yet, had made no "decision whatever" about any specific basing mode for the system either on land or at sea, the Secretary said he expected to "utilize" the recommendations of the review panel. Contrasting the Trident program's problems with the fact that General Dynamics's "Electric Boat [Division] is building perfectly good attack submarines," such as the SSN 688s, he saw no reason why, given "sufficient impetus," the US could not build the number of submarines required for a sea-based MX system.

At a breakfast meeting with Pentagon reporters, Secretary Weinberger confirmed that the first of the Trident SSBNs, known also as the Ohio class, is now scheduled to be delivered by General Dynamics in October of this year, or about two and a half years behind schedule. Yet, he added, there is reason to fear that even this stretched-out schedule might slip further. The Administration, he pointed out, is taking firm steps to correct the Trident problem because "I don't want to be told in two . . . years, 'We are sorry but number two [the second Trident submarine to come off the ways] will be three years late.' " Terming Trident an "extremely important part" of the effort to strengthen US strategic capabilities, he said, "we finally seem to have General Dynamics's attention, which we didn't seem to have for a couple of years" on this matter.

Implying deficient quality control as well as flawed management and internal procedures on the part of GD's Trident program, he vented his frustration over the fact that the government did not have immediate access to a "second source" on submarines. That is the reason why the Defense Department, over the longer term, does not rule out procurement "from any sources, including overseas sources. . . . I think the situation is serious enough that we should get additional, competitive bidding."

He stressed that if the decision were made to build Trident in overseas yards, the consequences of doing so, including the security of the yards involved, "would be looked at very carefully." Although willing to consider the option of building Trident in Navy yards—as opposed to private contractors—Secretary Weinberger cautioned that "we can't do this overnight, and I don't want to expand government activities" if there are other choices.

The difficulties of the Trident program, he said, provide a "very unfortunate demonstration of the lack of industrial strength at a time when we need to be much stronger. I regard this as part of the revitalization process" advocated by the Reagan Administration and senior military leaders.

One of the more drastic although not unprecedented steps the new Administration is weighing in the military manpower sector, according to Secretary Weinberger, involves a personal tax exemption of $20,000 per year for active-duty personnel. This "very good proposal," he explained, "could substitute for a portion of the nine percent [pay raise] that we are talking about in October [1981], and it might be more effective." The reason he ranked such an arrangement as more effective than a pay raise producing similar average benefits for military personnel is that it signals the esteem and appreciation of the American people for the men and women serving in the armed forces, which is "fully as important as a pay increase." He rejected the notion that preferential tax treatment of military personnel would trigger resentment by the public at large, stressing that such a measure did not constitute a "bonanza," but a previously used means for offsetting the inadequacy of military pay.

Asked by this writer about the new Administration's position on SALT, Secretary Weinberger said that on the one hand, current US plans for shoring up the nation's strategic capabilities do not conflict with the provisions of SALT II as drafted by the previous Administration and the Soviets, but that, on the other hand, he knew of no formal agreement that obligates the US to abide by the terms of the as-yet-unratified accord.

Although favoring strategic and related arms control in principle, Secretary Weinberger said he opposed SALT II in its present form because it legalized the current Soviet advantages in strategic capability. He added that there was no point in resuming SALT until the Soviets abandon their stance of using the talks to cement their present advantages and until the US had redressed the current imbalances. The Secretary acknowledged disagreement with senior military leaders who under certain conditions favored SALT II, saying that the accord "leaves us weaker than we should be."

Senator Tower Favors "Middle East" Command

The Chairman of the powerful Senate Armed Services Committee, Sen. John G. Tower (R-Tex.), believes that the Rapid Deployment Force should

become a "separate command" headquartered at Diego Garcia, aboard ship, or in a Middle East country that is not one of the Arabian Gulf states. Stressing that he was expressing his own rather than the committee's views, he said that he favors the creation of a Middle East Command that would be one and the same as the RDF.

Speaking at a meeting of Pentagon reporters, Senator Tower also said that he favored deploying MX in the MPS basing mode recommended by the Air Force without delay, rather than launch another basing mode study. At the same time he "recognized" the Administration's "right to review" and make its own decision on the weapon system that will give "us our urgent hard-target kill capability for the foreseeable future."

He said the Administration's decision to review the MX basing plan could cause some delays—depending on the basing mode that is ultimately decided on—and will make it difficult to include the program in the FY '82 authorization bill. It might become necessary to "fence"—meaning allow for but not actually allocate—the needed funds if the Administration's decision on MX is delayed beyond the congressional deadlines.

Chairman Tower believes the President has not yet made up his mind concerning MX and that he is "going on advice that he got last year. I don't believe the matter has been discussed with him [in depth] since he [assumed] office." Senator Tower was referring to a recent interview of the President by the Washington *Post* in which he expressed criticism of the extreme complexity of the "rail" system. The most recent MX proposals use roads rather than rails to shunt the missile from shelter to shelter.

Expressing disagreement with Secretary Weinberger on the latter's apprehension that MX/MPS could be delayed over long periods of time by frivolous lawsuits by opponents, Senator Tower said the "courts have not been disposed [in the recent past] to permit considerable delays in litigation affecting national security." Also, he said, Congress probably would be willing, if necessary, "to cure some of this by statute," as was done in the case of the Alaska pipeline.

So far as a new penetrating strategic bomber, or long-range combat aircraft (LRCA), is concerned, Chairman Tower said he favored development of both an "interim design, probably a derivative of the B-1 [to serve] as a platform that can function as a penetrator as well as an ALCM carrier" and of an advanced technology, or Stealth aircraft. Once the latter achieves operational status, it will "prolong the life of the interim system, and complicate Soviet air defense." Senator Tower said, however, that he was skeptical about claims that a Stealth bomber could be produced by 1987, suggesting that its gestation period might be somewhat longer.

At this time, Senator Tower said, he and the majority of the Senate Armed Services Committee favor tentative Administration plans for a $20,000-a-year tax write-off for military personnel, but pointed out the initiative for doing so has to come from the House Ways and Means Committee or that such a measure could be added by the Senate to a Finance Committee bill coming over from the House.

IN FOCUS...

Pay Cap Impact Widening

For the time being, the Executive Pay Cap (at Executive Level V) is costing some 550 general and flag-rank officers of the O-8 rank and above anywhere between $2,782 to $23,260 annually. Assuming that on October 1 of this year a pay raise of some nine percent goes into effect, the number of officers affected by the pay cap will increase sharply to include about 560 brigadier generals.

This progression can be expected to reach more massive proportions in 1982 if no corrective action is taken in the interim. Otherwise, about 7,250 officers of the O-6 rank (colonels and Navy captains) with more than twenty-six years of service will run up against the pay cap next year. By 1984, all O-6s with more than twenty years of service (about 14,400 officers) will be affected. So will about 140,000 civilian government employees in the grade GS-13, Step 10, and above. This means that the salary of the Chairman of the Joint Chiefs of Staff would be the same as that of a base-level Chief of Supply (GS-13).

The inequity of the situation is being exacerbated by the erosive effect of inflation on the purchasing power of top federal salaries. During the past eleven years, the consumer price index rose by more than 140 percent; Level V increased by a mere thirty-nine percent, from $36,000 to $50,112.50. Put another way, measured in 1960 dollars, the purchasing power of salaries for Level V executives has declined to $20,760; conversely, in terms of 1969 dollars, personnel at that level should be earning $86,900, if full effects of inflation are allowed for.

By way of a benchmark, a survey by a national magazine two years ago that covered some 1,000 top officials of almost 400 large US companies established that only twelve made less than $100,000 annually. The median pay of industry executives with responsibilities comparable to senior military leaders was then $301,000. Present compensation of company executives is presumably significantly higher.

Yet another factor comes into play and provides a formidable incentive for "getting out." Had a Senior Executive Service employee—at the GS-17 level—elected to retire on February 28, 1977, his annuity increase between then and now would have been well in excess of $10,000. Had he or she stayed on, the salary increase would have been only $2,612.50.

The consequence of the widening effect of the pay cap is evident already and will intensify as more military and Civil Service personnel are affected. Retirement rates among government civilians at the affected levels, for instance, jumped by more than 100 percent within less than a year, between 1979 and 1980. Clearly, it is penny-wise and pound-foolish to depress the pay of the people that the country depends on for running the armed services and the government. Whatever savings are being realized by the pay cap will probably turn out to be illusory as more and more qualified officers and government executives are impelled to retire and seek employment in the private sector.

At the root of the problem is that congressional salary increases determine federal and military pay ceilings and that concern about negative reaction to congressional pay hikes on the part of voters has precluded any recent increases. The logical way out of the dilemma would seem to be an arrangement that frees federal executive-level pay from linkage with congressional salary boosts yet permits pay scales for senior military and federal personnel that fairly reflect the responsibilities and trust associated with these positions.

Navy Sec'y Skeptical of "Hydra," Other Sea-basing of MX

Navy Secretary Dr. John Lehman told this column recently that the so-called Hydra concept for basing MX

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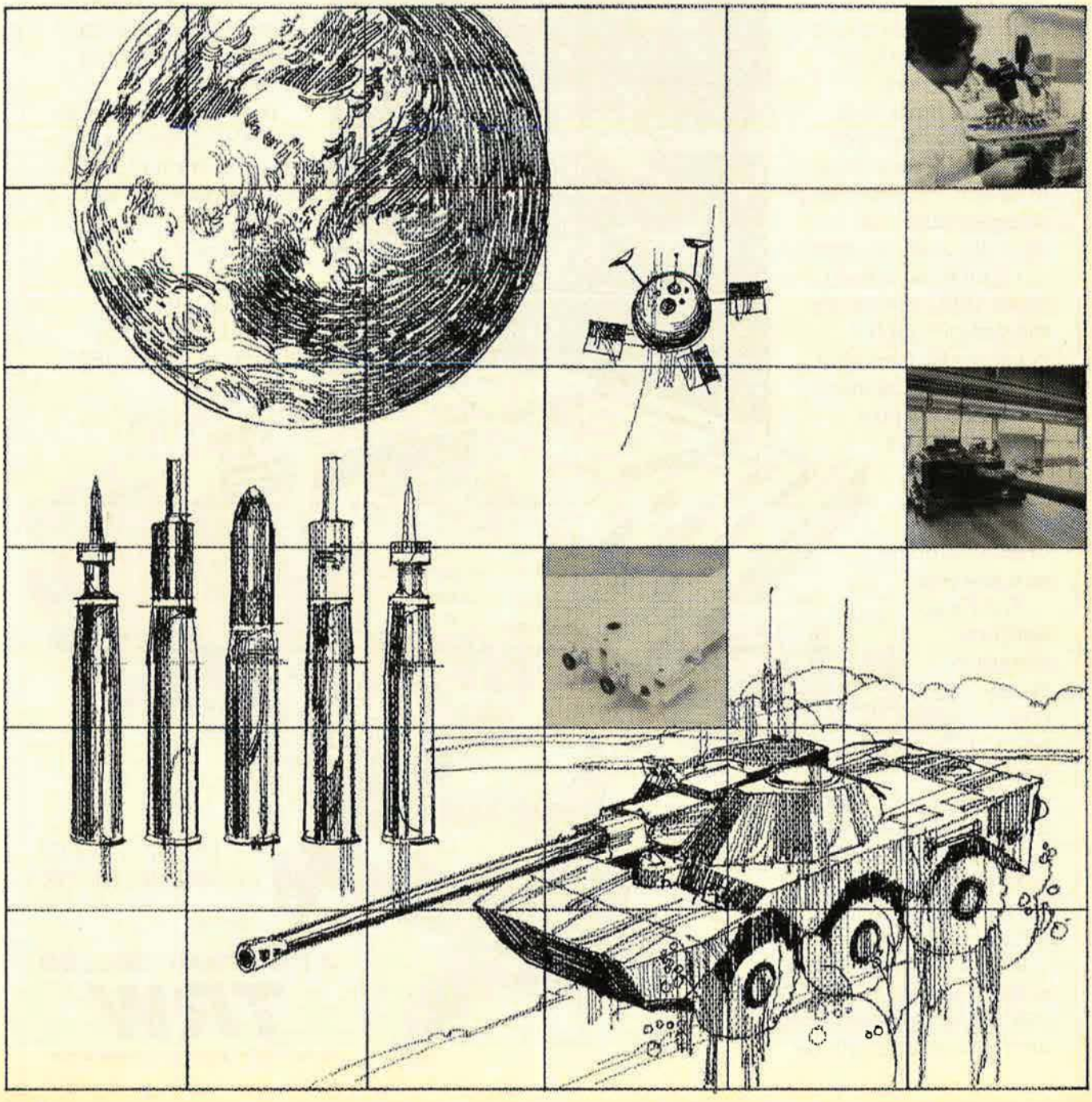

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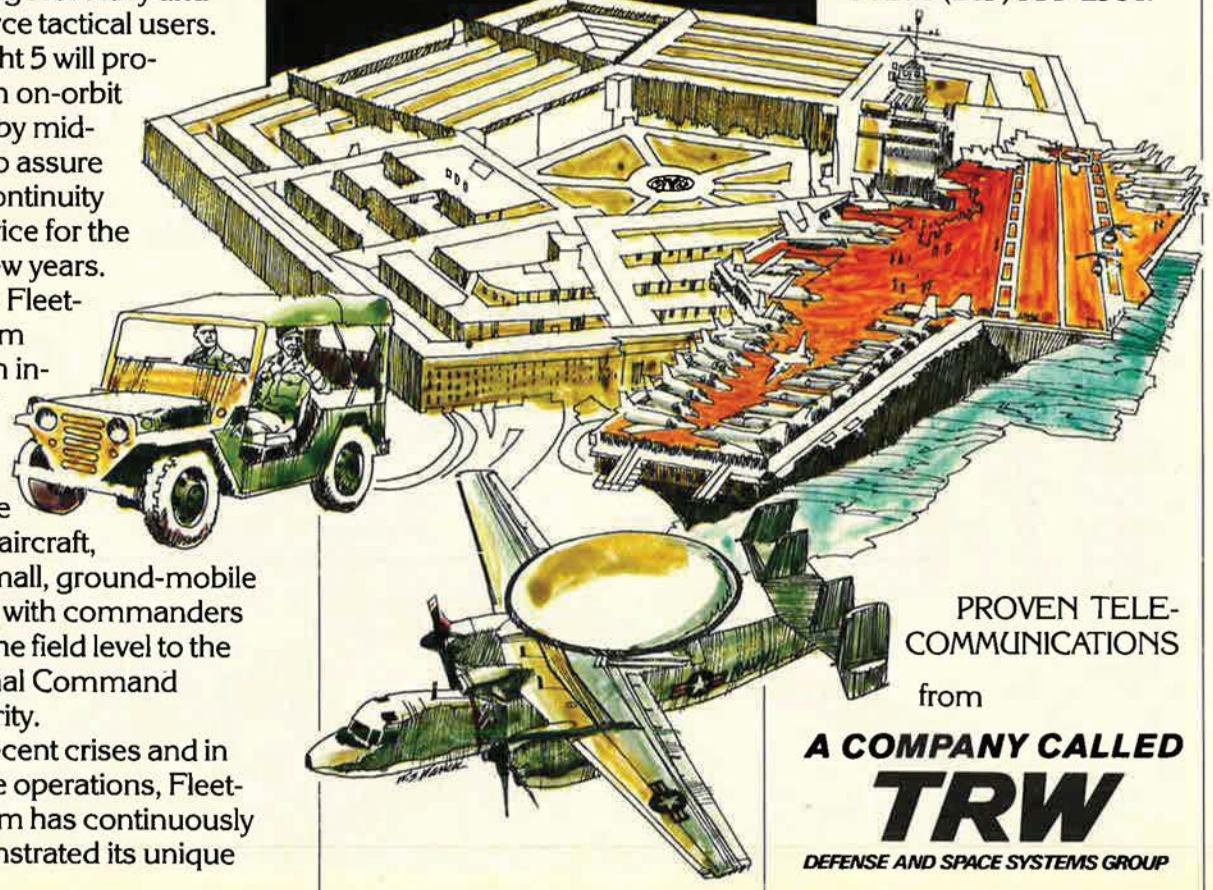

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or other ICBMs at sea doesn't "make sense." He was also "highly skeptical" of other schemes for putting ICBMs and other strategic assets—except for sea-launched cruise missiles (SLCMs)—on surface ships. The reason for opposition to schemes of this sort, he said, is the poor survivability of the carrying ships: "A surface ship is vulnerable and its location exactly known." Several members of a blue-ribbon panel convened by the Defense Department to restudy basing modes schemes for the MX are known to favor various forms of sea-basing over the land-based MPS (multiple protective shelters) approach favored by the Air Force and most technical experts.

Hydra, Dr. Lehman explained, is feasible although there remain significant technical problems: "It is not as easy as it sounds." The underlying concept is for capital ships cruising the oceans to drop encapsulated MX missiles equipped with flotation collars over the side, after the system is ordered to enter a "generated alert" posture. If the alert is terminated, the capital ships retrieve the missiles. If not, the missiles can be launched by remote control. The principal problem of Hydra, in the view of Navy Secretary Lehman, is the "vulnerability of the ship before you go on alert."

By contrast, Dr. Lehman advocated putting SLCMs on large numbers of surface ships as "a strategic reserve force, not as theater nuclear weapons." Vertical launchers protected by armor will be put on "virtually all surface ships in the future" to permit carriage of Tomahawk SLCMs, he said. These combatants will include cruisers and destroyers as well as some attack submarines. "This gives us a widely dispersed base for putting low-cost SLCMs [out over vast ocean areas]. But putting high-cost ICBMs or SLBMs on surface ships just doesn't make sense," the Navy Secretary suggested.

Although the Administration has not yet reached a decision on whether or not eight Polaris submarines—decommissioned as SSBNs (SLBM launchers) by the Carter Administration because of SALT II considerations—should serve as SLCM launchers, Dr. Lehman told this column that he has put all further dismantling of Polaris boats "on hold." The previous Administration had ordered the "chopping up" of these submarines to meet "the two to three ratio of Soviet superiority in SLBMs and ICBMs" stipulated by SALT II, he said. The Reagan Administration is considering—but no National Security Council decision to do so has been made—to deploy SLCMs on Polaris boats to enhance the nation's strategic nuclear capabilities. Of the original ten boats, eight remain available for such a conversion, he said.

He also said that the Carter Administration's adherence to the SALT I limits on strategic weapons, in his view, constituted an illegal act that violated the 1961 Arms Control Act. That act requires either the advice and consent of the US Senate or relevant legislation by both Houses of Congress before the Executive Branch can enforce arms-limitation agreements. The SALT I agreement on strategic weapons was an interim arrangement with a five-year lifespan. Dr. Lehman contended that observation of the lopsided limits after expiration of the accord in 1977 is "illegal."

The various cruise missiles, whether air-, sea-, or ground-launched, he said, would represent a "valuable augmentation of [other hard-target-killing weapons] because they are good counterforce weapons, but unfortunately we still don't have them deployed." He recommended equipping all B-52G and H models for air-launched cruise missile carriage without "SALT restraint."

Turning to naval strategies, he said the Reagan Administration was effecting "major changes" by abandoning the previous Administration's "low-threat, pulled-back strategy [and going] back into the high-threat area and restoring naval superiority, in simple terms to defeat the Soviet combined-arms threat against our access" to areas of the world of vital interest to the US.

Two essential steps here, he said, were creation of a fifteen-battlegroup navy, meaning autonomous forces built around nuclear- or conventional-powered carriers or possibly even recommissioned battleships, and building up to a 600-ship navy. The former step, he suggested, could be accomplished within eight years; the latter might take somewhat longer.

IN FOCUS...

CIA Assessment of Soviet Defense Spending

The Central Intelligence Agency's annual comparison of Soviet and US defense spending—measured in dollars—concludes that Russia outspent this country by about fifty percent last year and predicts a steady growth in Moscow's military expenditures over the next five years at an annual rate of more than three percent. (In the opinion of some congressional analysts, the CIA estimates are too conservative. They hold that the increases in Soviet military investments proceed at an annual rate of at least five percent.)

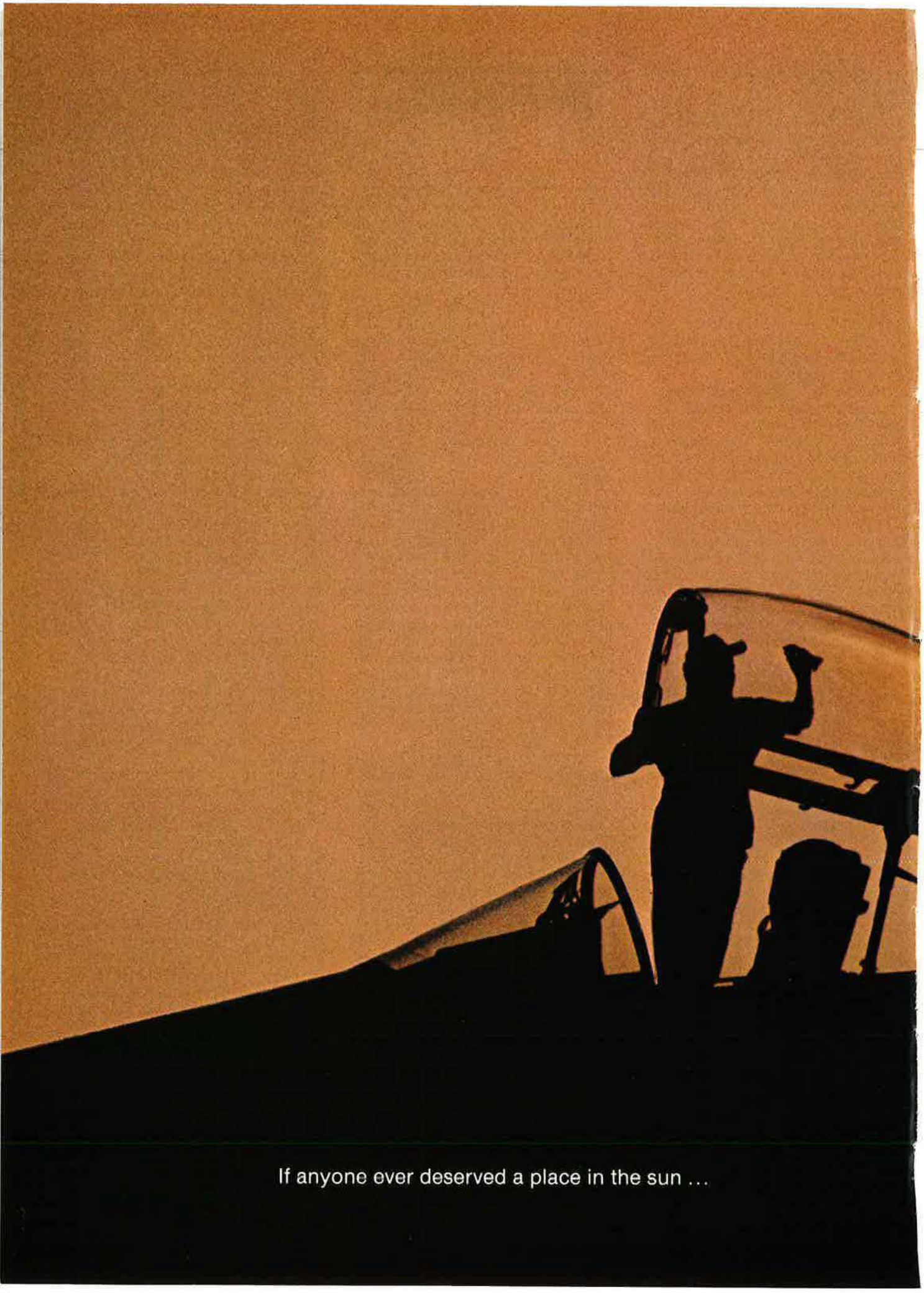
The CIA's latest dollar cost comparison, covering the period 1971–80, finds that in the investment sector—meaning procurement of equipment and major spare parts as well as construction of facilities—the USSR outspent the US by seventy-five percent. In the field of research, development, test and evaluation (RDT&E), Soviet spending averaged half again as much as US outlays over the same period, but climbed to about twice as much in the late 1970s.

In the field of strategic forces, including in the case of the Soviet Union peripheral attack forces, the USSR's investment over the past decade was about three times that of the US, according to the CIA.

There were pronounced swings in Soviet spending in the strategic sector during the period covered by the assessment, with spending on intercontinental attack forces dipping in the early 1970s after the completion of third-generation ICBM deployments, then rising sharply in the mid-1970s as deployment of fourth-generation ICBMs crested, only to fall again upon completion of that program.

A steep rise might occur in the mid-1980s if the Soviets decide to deploy a new generation of ICBMs that is under development. Soviet investments in defensive capabilities account for about forty percent of all strategic spending, according to the CIA estimate. Cumulative Soviet investments in strategic capability during the past decade amounted to about $145 billion, compared to about $50 billion by the US.

Soviet general-purpose forces—defined for the purposes of the CIA assessment as including all land, tactical air, naval and air- and sealift forces—were funded over the past decade at a level about sixty percent above that of the US. In terms of tactical airpower, Soviet investments increased in a cyclical fashion in step with the procurement cycles of aircraft. Disregarding carrier-based aircraft, Soviet investments in tactical airpower were fifty-five percent higher than comparable US spending over the past decade, according to the CIA. ■



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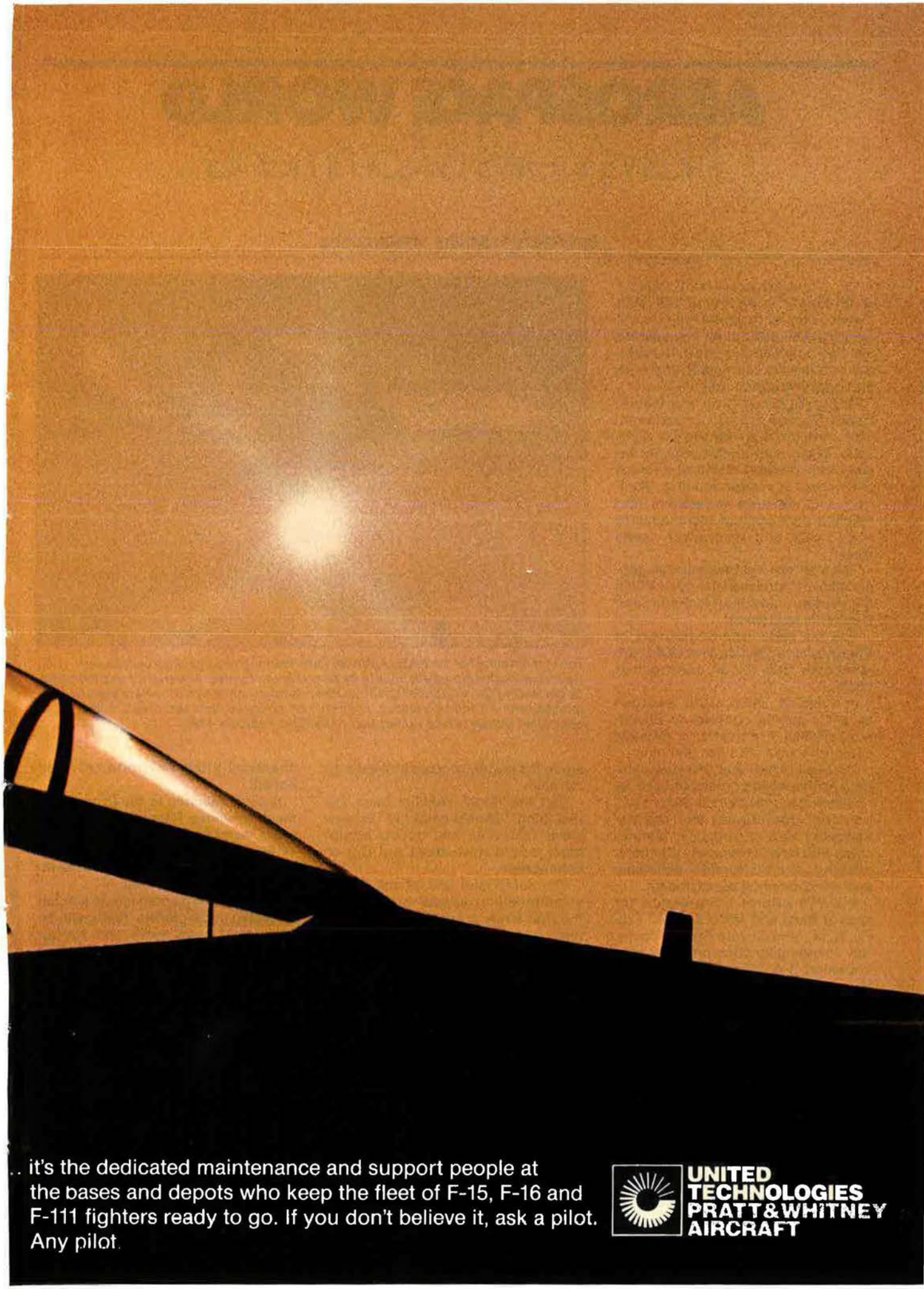

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AEROSPACE WORLD
News, Views & Comments

By William P. Schlitz, SENIOR EDITOR

Washington, D. C., April 7

★ In June, the Air Force will start construction of fourteen full-size MX horizontal shelters at an engineering test bed near Mercury, Nev., to evaluate specialized equipment and concrete-casting techniques.

Under $12.9 million contracts, Ralph M. Parsons Co., Pasadena, Calif., and the R. A. Hanson Co., Spokane, Wash., are to demonstrate respectively pre-cast and cast-in-place techniques of shelter building. USAF hopes to develop innovative and efficient construction techniques to keep costs and manpower needs down.

The shelters will be similar in general design to those of the operational MX system, but without hydraulic and electronic equipment.

The test bed is at a Department of Energy site in Nevada and USAF will reimburse DoE for all construction costs.

In a related action, USAF awarded an $11.9 million contract to EDAW, Inc., of San Francisco to oversee comprehensive MX base planning.

It's a tall order, and involves planning for the development of base facilities and functions including roads, housing, operational and maintenance facilities, and utilities; relationships with local community planners; phasing of construction activities; and environmental assessments.

EDAW's efforts have begun for sites at Beryl and Milford, Utah; Clovis, N. M.; and Coyote Spring Valley, Nev. Planning for other potential sites at Dalhart, Tex., Delta, Utah, and Ely, Nev., will be undertaken later. EDAW will be assisted by a number of local (southwest) and other subcontractors.

USAF is to coordinate its efforts with local and state authorities to assure maximum participation, and the comprehensive planning program will serve as an integral part of the environmental impact analysis process, officials said.

★ In mid-March, a Soviet hunter satellite stalking a target satellite exploded its warhead, apparently damaging the target, sources in Washington said.

Had the target satellite been the real thing, "almost certainly" its sensitive electronic and optical equipment would have been put out of commission.

The successful test of the Soviet satellite-killing space weapon was the first since a series of test intercepts with so-so results late in 1977.

The intercept, which occurred over Eastern Europe, was probably made possible through the operation of a radar homing device, it is believed.

The first airframe for the NATO Airborne Early Warning program flies over Mount Rainier in Washington state prior to its ferry flight to Europe. The aircraft was delivered by the Boeing Co. to Dornier GmbH in West Germany on March 31, where systems mission avionics will be installed. Following an extensive flight test program, the completed system will be turned over to NATO in February 1982.

★ A new chemical warfare suit designed for aircrews has been subjected to tests by the 459th Tactical Airlift Wing's 756th Tactical Airlift Squadron, Andrews AFB, Md.

"The suit is designed to protect against blood, nerve, and blistering agents," said TSgt. Harold Countee, AFRES life-support technician. "It's lighter and less bulky than the regular ground crew chemical warfare suits, so aircrews can fly 'in comfort' in a chemical-filled environment," he added.

A pack attached to the front of the mask provides filtered air until the crew member reaches the cockpit, where the mask hoses then plug into the aircraft oxygen system and the filter pack can be removed.

The entire outfit consists of specially treated underclothes, flight suit, air filter pack, gas mask and rubber hood, gloves, combat boots, and plastic overshoes. A large plastic bag would be worn over all until a crew member reaches his aircraft.

★ USAF has announced plans to establish a Consolidated Space Operations Center near Peterson AFB, Colo.

At the CSOC will be combined two major Air Force missions: satellite control and DoD Space Shuttle flight planning, readiness, and command control.

Construction of the CSOC facility is expected to begin in FY '83 on land acquired from the state about ten

miles east of Peterson. The site edged out other candidate locations because, among other things, of its proximity to the Space Defense Operations Center at the Cheyenne Mountain Complex. Said Air Force officials: "As our dependence on space for national security increases, a joining of the capability to control our satellites with the ability to detect hostile actions against them will become increasingly important."

When fully operational, the CSOC is to be operated by about 1,800 people—one-third military and the rest Air Force civilians and contractor representatives.

"The Center will enhance operational control and increase the survivability of satellite operations by providing a second national resource capable of performing the functions currently accomplished by the Air Force's Satellite Control Facility at Sunnyvale AFS, Calif.," spokesmen said.

"The CSOC will provide direct mission authority over DoD Shuttle missions, be responsive to national priorities, and enhance the protection of national security information," the spokesmen added.

★ The Reagan Administration's "military quality of life compensation plan" for service members and their families is now in the hands of Congress.

The legislative package includes a July 1, 1981, pay raise of 5.3 percent for all military in addition to the 9.1 percent pay raise funded for October 1 of this year.

The plan also budgets an additional $280 million in FY '81 and $760 million in FY '82 to provide:

- Improvements in family housing, barracks, commissaries, and related facilities.
- Construction of seven dependents' schools in Germany, Japan, and Korea.
- Higher moving-cost reimbursements of sixteen cents per mile/$50

USAF Aircraft, Unit Realignments Planned for CONUS; Alaskan Radar Sites to be Modernized

The Air Force announced a host of aircraft and unit realignments to take place over the next several years, involving TAC, SAC, ANG, and AFRES aircraft and people in the continental US and designed "to strengthen and enhance tactical fighter and air defense forces," officials said.

In Alaska, the objective is "improved surveillance with fewer people" through the modernization of thirteen radar sites. Known as Minimally Attended Radar (MAR), the project is scheduled to be operational by 1984. Thirteen aircraft control and warning squadrons are to be deactivated and replaced by a like number of operating locations (OLs) under the 531st ACW Group. MAR is to provide improved long-range detection of aircraft despite heavy ground, sea, and/or weather clutter; altitude information on all friendly, hostile, or unidentified aircraft; routine and emergency navigational aid to military and civil aircraft; and track data for interceptors.

Under the plan to realign TAC fighter and air defense forces in CONUS:

- **Castle AFB, Calif.**, will inactivate a squadron of eighteen F-106s and activate a two-aircraft F-106 alert detachment from McChord AFB, Wash.
- **Davis-Monthan AFB, Ariz.** The 23d Tactical Air Support Squadron will transition from twenty-four O-2s to a like number of OA-37s, starting in early 1982.
- **Eglin AFB, Fla.**, will receive a squadron of F-15s by early 1983, increasing the force to seventy-two.
- **George AFB, Calif.**, will inactivate an F-106 alert detachment in mid-1981; ANG will assume the alert mission with a detachment of F-106s.
- **Homestead AFB, Fla.**, will cancel plans to convert to F-15s from F-4s and instead increase the current force of F-4s from ninety-six to 102 in early 1983.
- **Kingsley Field, Ore.**, will transfer its alert function from active to ANG and convert from two F-106s to a similar number of F-4s in late 1981.
- **Langley AFB, Va.**, will transition from eighteen F-106s to eighteen F-15s by 1982 (with the 48th FIS's Charleston AFB, S. C., alert detachment receiving two of the Eagles for its two F-106s).
- **Luke AFB, Ariz.**, will transfer fifty-five F-4s from active service to AFRES, replacing them with an F-16 tactical fighter wing beginning early in 1983 and an F-15 tactical fighter training squadron this year.
- **Moody AFB, Ga.**, will increase its three F-4 squadrons from eighteen to twenty-four F-4 aircraft in late 1982.
- **Seymour Johnson AFB, N. C.**, will activate a squadron of twenty-four F-4s in mid-1982 to bring the force to ninety-six aircraft.

SAC plans for FY '82 and FY '83:

- **Blytheville AFB, Ark., Carswell AFB, Tex.**, and **Fairchild AFB, Wash.**, will become follow-on sites for air-launched cruise missiles, with Carswell also receiving SRAM and losing about 160 manning slots.
- **Carswell AFB, Tex.**, is to convert from thirty-three B-52Ds to thirty B-52Gs in 1983.
- **Dyess AFB, Tex.**, will convert from fourteen B-52Ds to seventeen B-52Hs.
- **Grand Forks AFB, N. D.**, from seventeen B-52Hs to sixteen B-52Gs.
- **Loring AFB, Me.**, from fourteen B-52Gs to a like number of B-52Ds.
- **March AFB, Calif.**, will receive a B-52D combat crew training squadron from Carswell and pick up about 500 military manning slots.
- **Mather AFB, Calif.**, will convert from fifteen B-52Gs to fourteen B-52Ds.
- **Robins AFB, Ga.**, will transition from fifteen B-52Gs to fourteen B-52Ds.
- **Seymour Johnson AFB, N. C.**, will inactivate the 51st Bomb Squadron, transferring fourteen B-52s to other SAC bases.

ANG actions, beginning in 1981:

- The 194th Fighter Interceptor Squadron, **Fresno Air Terminal, Calif.**, will increase from fifteen to eighteen F-106s, with two at George AFB assuming the air defense alert role.
- The 169th Tactical Air Support Squadron, **Greater Peoria Airport, Ill.**, will increase from eighteen to twenty-four OA-37s.
- The 111th FIS, **Ellington AFB, Tex.**, will convert from eighteen F-101s to eighteen F-4Cs, and the 122d TFS, **New Orleans NAS**, with F-4Cs will take on air defense alert duties with deactivation of the 111th's Det. 1.
- The 158th Tactical Airlift Squadron, **Savannah, Ga., Airport**, will switch from eight C-130Es to a like number of new C-130Hs.
- The 109th TAS, **Minneapolis-St. Paul Airport, Minn.**, will replace eight C-130As with eight C-130Es. The As will be distributed among AFRES units.

AFRES actions, beginning this year:

- The 442d TAW, **Richards-Gebaur AFB, Mo.**, will be inactivated late in 1982 but will be replaced by a tactical fighter group of eighteen A-10s.
- The 439th TAW, **Westover AFB, Mass.**, to switch to sixteen C-130Es from eight C-130Bs. The 731st TAS's sixteen C-123s will be retired late in 1982, with the unit possibly transferring to Peterson AFB, Colo., and equipped with eight C-130s. (Plans incomplete.)
- The 926th TFG, **New Orleans NAS, La.**, will convert from eighteen A-37s to nineteen A-10s in 1982.
- The 917th TFG, **Barksdale AFB, La.**, to assume duties as an A-10 AFRES training site.

per day effective July 1 instead of in October.

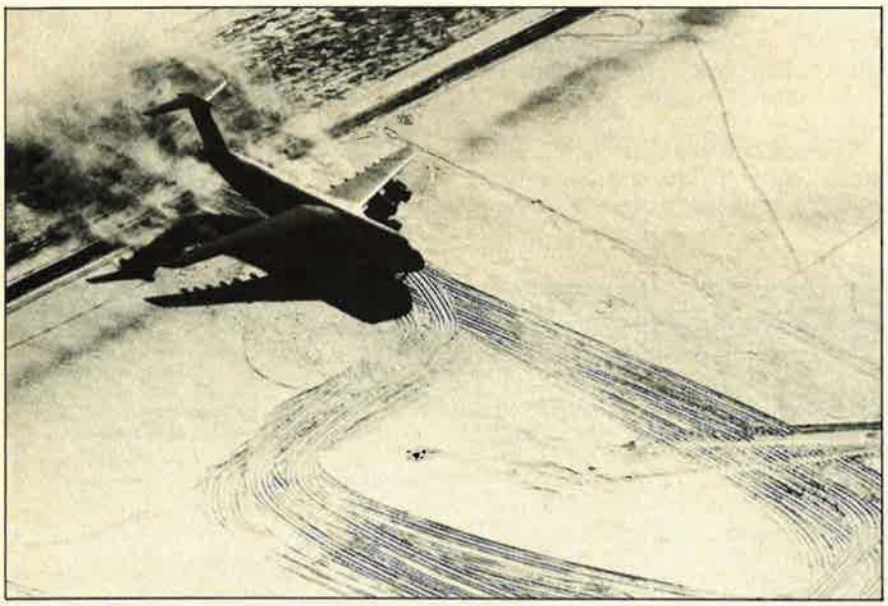
- Cost-of-living allowances for single/unaccompanied members overseas who are provided quarters and subsistence in kind.

These improvements are in addition to the Fair Benefits Package enacted by the Ninety-sixth Congress that included $2.1 billion in FY '81 and $2.5 billion in FY '82 to provide:

- Increased allowances for subsistence and family separation.
- Improved bonuses for enlistment, reenlistment, and aviator continuation programs.
- A series of special pays for flight, sea, sub, and extended duty abroad.
- Increased reimbursements for travel in connection with duty reassignments.
- A new variable housing allowance.

DoD officials are optimistic that the new program—and other steps being taken—will lead to greater retention and increased morale among the armed forces. *(For additional benefits USAF is advocating, see p. 195.)*

AEROSPACE WORLD



A C-5 Galaxy rolls off the runway at Griffiss AFB, N. Y., on to a snow-packed unprepared surface as part of a test to evaluate the aircraft's ability to operate from rugged off-runway areas. See item.

★ A Piper Super Cub fueled only by alcohol recently completed a transcontinental flight from Los Angeles to Washington, D. C., in seven days. The aircraft was paced by four modified Ford cars, also alcohol-powered, that rendezvoused with it at various cities during the journey.

The plane's two-man crew—William Paynter and former astronaut L. Gordon Cooper, Jr.—appeared subsequently before the Synthetic Fuels Subcommittee of the House Energy and Commerce Committee to extol the virtues of methanol over conventional petroleum-derived fuels.

Paynter is a former Air Force pilot who provides private flight service out of Sacramento, Calif., for corporations and individuals. (He served as pilot for then-Gov. Ronald Reagan.) Cooper, a retired Air Force colonel, has had considerable experience in the development of alcohol fuel for aircraft and autos.

The two claim that at 18,000 feet the aircraft turns in better mileage on alcohol fuel than aviation fuel. The aircraft, which has 250 hours of flight time on methanol, also exhibited greatly reduced exhaust temperatures, good combustion efficiency, and potentially longer engine life, according to Paynter and Cooper.

Awarded a National Aeronautic Association certificate for their feat, Paynter declared, "After all, alcohol fuel is the coming thing. We're running out of the other kind."

★ At Griffiss AFB, N. Y., this past winter, an Air Force C-5 transport performed "exhaustive" ground maneuvers on unprepared, snow-covered "off-runway" surfaces.

The tests included taxiing and towing, as well as cargo offloading of gross weights from 425,000 to 665,000 pounds.

These ground maneuvers represent a follow-on to last summer's off-runway evaluations conducted by Air Force Test and Evaluation Center personnel at Shaw AFB, S. C., Altus AFB, Okla., and Eglin AFB, Fla.

According to C-5 manufacturer Lockheed-Georgia Co., the tests were undertaken in response to congressional queries in April 1980 regarding the aircraft's ability to operate in an off-pavement environment and to provide such verification.

Along with the ground maneuvers in subfreezing temperatures at Grif-

This is probably the last place you'd look to cut program costs.

Somehow a wiring system never seems to get all the attention that's paid to other major subsystems in today's aircraft, missiles, surface vehicles, and weapons systems.

In fact, many wiring systems look like after-thoughts, thrown together with a lot of different connectors and wire termination methods.

There had to be a simpler, more cost-effective way. And Deutsch found it.

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We're currently developing a surveillance radar jamming module for the U.S. Air Force's AN/ALQ-131 ECM pod. And we're applying our advanced synthesizer technology to future EW systems and simulators.

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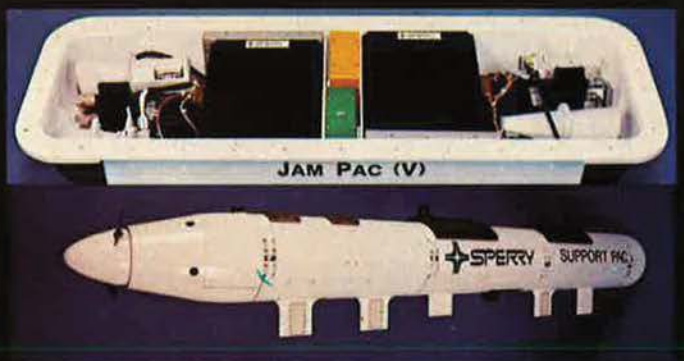

SPERRY

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fiss, materials handling equipment, support equipment, foreign-object damage, jet blast effects, and maintainability were also evaluated.

The result, according to Lockheed, may be that USAF will ease some of the restrictions on the plane in operating from forward-area airfields, depending on conclusive analysis of the ground tests.

★ USAF recently ordered an additional 1,211 jam-resistant voice communications systems built by Magnavox of Fort Wayne, Ind., to bring the total buy of such equipment to 2,000.

The systems will be used to modify TAC aircraft "to enable pilots to talk to each other and to ground-based controllers more reliably despite enemy jamming attempts."

Of the most recent order under the nearly $16 million contract, 926 of the systems will be installed aboard aircraft and the remaining 285 will equip communication jeeps that control TAC's close air support missions.

★ The Collier Trophy, oldest US aviation award, established in 1912, goes this year to the Voyager Mission Team represented by chief scientist Dr. Edward C. Stone. The spectacular success of the interplanetary venture, including fly-bys of both Jupiter and Saturn and the return of masses of

AEROSPACE WORLD

basic new knowledge about the solar system were cited as reasons for the selection.

Also, Dr. Jerome P. Keuper, founder and president of the Florida Institute of Technology, and the Institute are to receive the Frank G. Brewer Trophy in July. The award is the nation's highest for aviation and space education.

Both awards are sponsored by the National Aeronautic Association, Washington, D. C.

★ Certain retired regular USAF members have received a survey from the Air Reserve Personnel Center to update their records in the event of future mobilizations.

The retirees are being contacted because the current size of the active Air Reserve may not meet manpower needs in an emergency. Recall is not imminent or even anticipated, ARPC officials declare, and the survey is simply a precautionary move to ensure that accurate information is available. Recall authority resides in Title 10 of the United States Code.

While surveys have gone to those in the thirteenth and thirty-seventh months of retirement, all future retirees can expect them at those phase points, ARPC said.

The Center points out that in 1970 the Individual Ready Reserve stood at 211,000; today, the number is 44,000. The Standby Reserve has dwindled from 88,000 to 41,000 in the same period.

This is the Air Force's first survey of its retirees, made necessary by a DoD directive that all services establish a system to recall retired regulars.

★ NASA has initiated an assault on one of the last frontiers of all-weather general aviation: icing protection for small aircraft and helicopters.

The reasons: The general aviation sector in the US alone contains some 200,000 aircraft flown by 800,000 private pilots. Also, in the case of the nation's rapidly expanding helicopter industry, no US-built craft is FAA-certified to fly into predicted icing conditions, which can occur from ground level to 20,000 feet (6,100 m).

The anti-icing program is under way at the space agency's Lewis Research Center in Cleveland, Ohio, where the largest refrigerated wind tunnel in North America is located. In

INDEX TO ADVERTISERS

Lewis's Icing Research Tunnel precise in-flight conditions for the study of factors that cause aircraft icing can be duplicated and proposed anti-icing and de-icing systems can be tested.

Three general methods are currently under study at Lewis:

- The ice phobic; an agent that has an aversion to ice in much the manner Teflon and silicones repel various substances.
- Electro-thermal; a network of heat-generating wires imbedded in the leading edges of the rotor blades of a helicopter, for example. (Rotor blades are an especially fitting example of the difficulties facing Lewis. While rugged, they are carefully balanced and must be de-iced symmetrically. To wire the blades to supply sufficient heat would require the generation of twenty-five watts of electricity per square inch of surface.)
- Pneumatic boots; these are inflated in the area of ice formation to break it up once formed.

Lewis will also be studying such other possibilities as mechanical vibrators, oscillators, microwaves, and electromagnetic impact in scientific fields involving everything from metallurgy to meteorology.

★ Judging took place earlier this spring to whittle down the 1,500 entries in NASA's first national Space Shuttle Student Involvement Project to ten winners.

AEROSPACE WORLD

Based on geographical region, the entries were first reduced to 200 semifinalists. All entrants will receive a certificate of participation.

Objective of the project is to stimulate interest in science and technology in grades nine through twelve by engaging the students in a competition to develop payload experiments suitable for flight aboard the Shuttle.

The National Science Teachers Association, Washington, D. C., conducted the contest under NASA contract.

The ten national winners and their teachers are to attend a special educational conference at the Kennedy Space Center in Florida late this summer. According to the space agency, winning student experiments "will be assigned to specific Shuttle flights as the experiments are ready, as Shuttle payload space is available, and as future Shuttle flights are confirmed."

A second student involvement contest is to open in September, with judging at the ten regional conferences to take place in March 1982 and finalists selected in May. NASA plans to increase the number of winners to twenty.

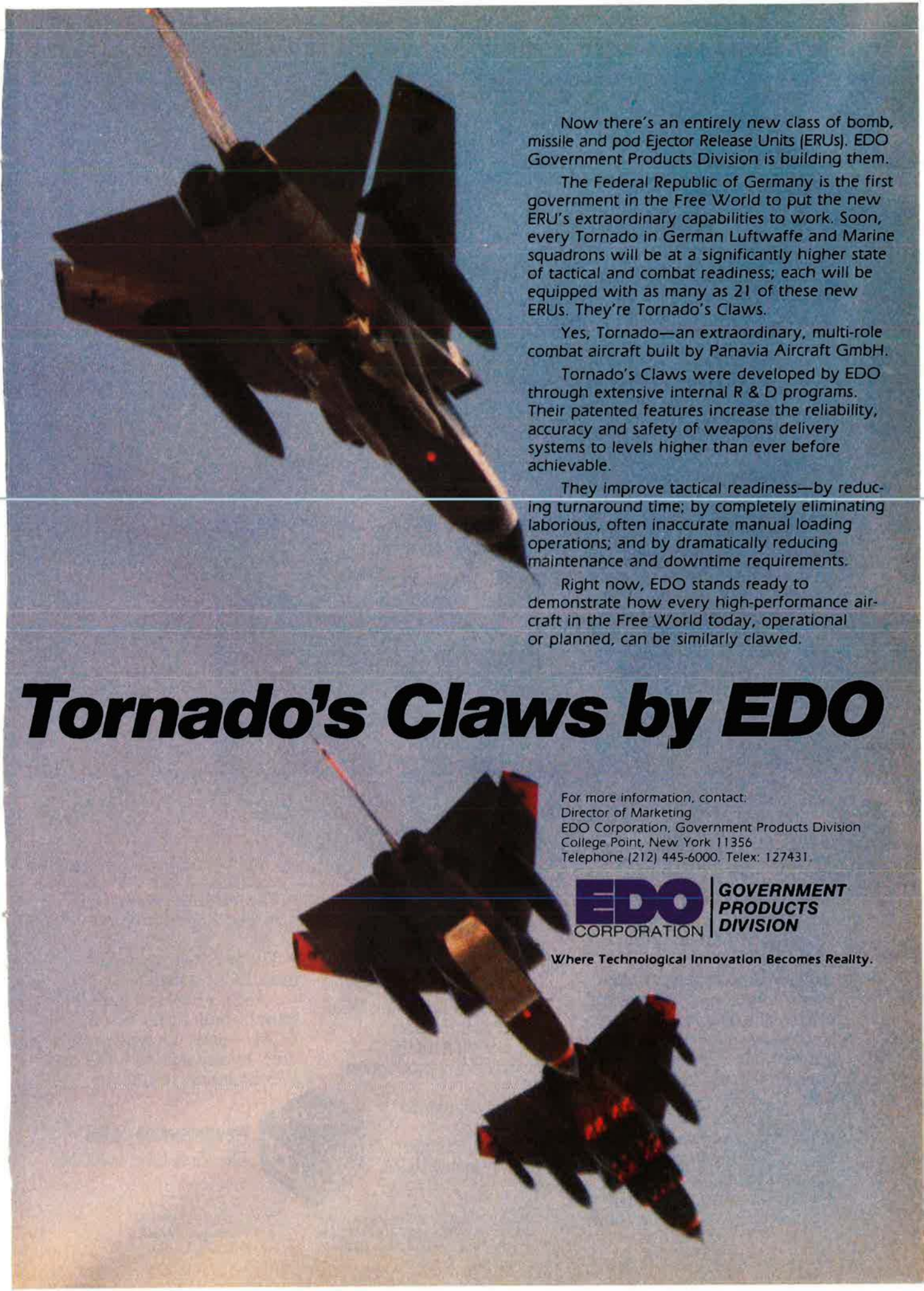
To broaden participation, NASA is encouraging industry and other groups to sponsor student winners and assist in developing their experiments for flight and post-flight analysis and reporting.

The arrival of this Boeing B-50D at Castle AFB, Calif., marked the last flight of the aircraft. Piloted by SAC Chief of Staff Maj. Gen. Andrew Pringle, Jr., who first flew the bomber as a second lieutenant stationed at Castle AFB, the B-50 is destined for display at the Castle AFB Air Museum. The Museum is scheduled to be opened this summer. (Photo by S. Samuel Boghosian)

★ Embry-Riddle Aeronautical University will conduct an aircraft crash specialist course in Los Angeles, Calif., September 15–19 and in Daytona Beach, Fla., December 7–11. Fire fighters, emergency medical technicians, law enforcement officers, and Red Cross, civil defense, rescue, and airport management personnel are encouraged to attend. Contact Robert Whempner, (904) 673-3180.

★ **NEWS NOTES—Australia** has agreed **to allow the use of its air base at Darwin** as the jumping-off point for American B-52s undertaking surveillance flights over the Indian Ocean.

The **US State Department** in mid-March announced that the Administration has given the green light for



Now there's an entirely new class of bomb, missile and pod Ejector Release Units (ERUs). EDO Government Products Division is building them.

The Federal Republic of Germany is the first government in the Free World to put the new ERU's extraordinary capabilities to work. Soon, every Tornado in German Luftwaffe and Marine squadrons will be at a significantly higher state of tactical and combat readiness; each will be equipped with as many as 21 of these new ERUs. They're Tornado's Claws.

Yes, Tornado—an extraordinary, multi-role combat aircraft built by Panavia Aircraft GmbH.

Tornado's Claws were developed by EDO through extensive internal R & D programs. Their patented features increase the reliability, accuracy and safety of weapons delivery systems to levels higher than ever before achievable.

They improve tactical readiness—by reducing turnaround time; by completely eliminating laborious, often inaccurate manual loading operations; and by dramatically reducing maintenance and downtime requirements.

Right now, EDO stands ready to demonstrate how every high-performance aircraft in the Free World today, operational or planned, can be similarly clawed.

Tornado's Claws by EDO

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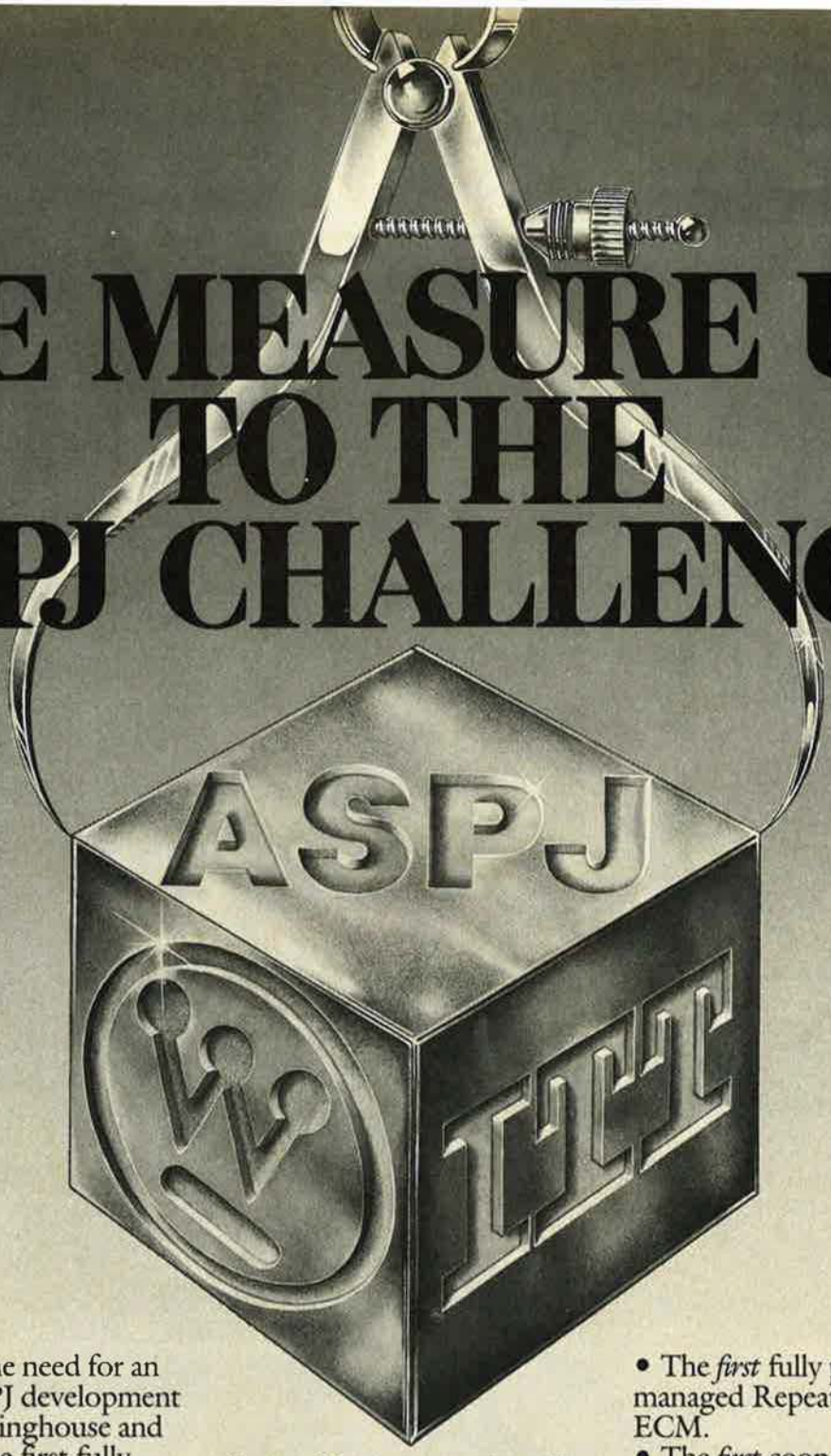

Anticipating the need for an integrated ASPJ development program, Westinghouse and ITT formed the first fully integrated, joint venture team nearly 4 years ago. A team that has remained intact and grown stronger as development progressed. But teamwork is only one of the many "firsts" we bring to ASPJ.

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ASPJ, a new first in ECM, must be built by the best in ECM — and built right the first time. By any standard, ITT and Westinghouse measure up.

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the sale of an unspecified number of General Dynamics-built F-16s to South Korea. The Asian nation's air force is currently equipped with some sixty aging F-4s and 220 relatively unsophisticated F-5s. And in March, **the one hundredth F-16 produced in Europe** was delivered to the **Royal Netherlands Air Force.** It is the 365th built on three production lines—at Gosselies, Belgium; Amsterdam, the Netherlands; and Fort Worth, Tex.

In one of two manned launches in March, the USSR's **Soyuz-39 flown by Soviet commander Vladimir Dzhanibekov and the first Mongolian in space, Jugderdemidiyn Gurragcha,** linked up with orbiting space station Salyut-6. They joined Vladimir Kovalyonok and Viktor Savinykh, who had boarded the station from Soyuz-T-4 ten days earlier.

This past winter, **the Army tested parachuting troops dressed in chemical protective gear** at Fort Devens, Mass. Ninety members of a New England Special Forces group simulated an exercise following the jump. Results will be used to plan chemical warfare training for airborne units, officials said. A potentially serious problem: heat buildup under the protective gear.

Because of extensive fire damage last October, the **Air Force Historical Foundation** has relocated to Building 361, Rm. 2113, Bolling AFB, D. C. 20332.

Approval has been given for the **construction of a US Navy Memorial,** honoring the past and continuing service of Navy military and civilians, as part of the redevelopment program for Pennsylvania Ave. in the nation's capital. The memorial will feature **an amphitheater and stage** that will be a permanent performance home for the Navy Band and provide facilities for other concert organizations, military and civilian.

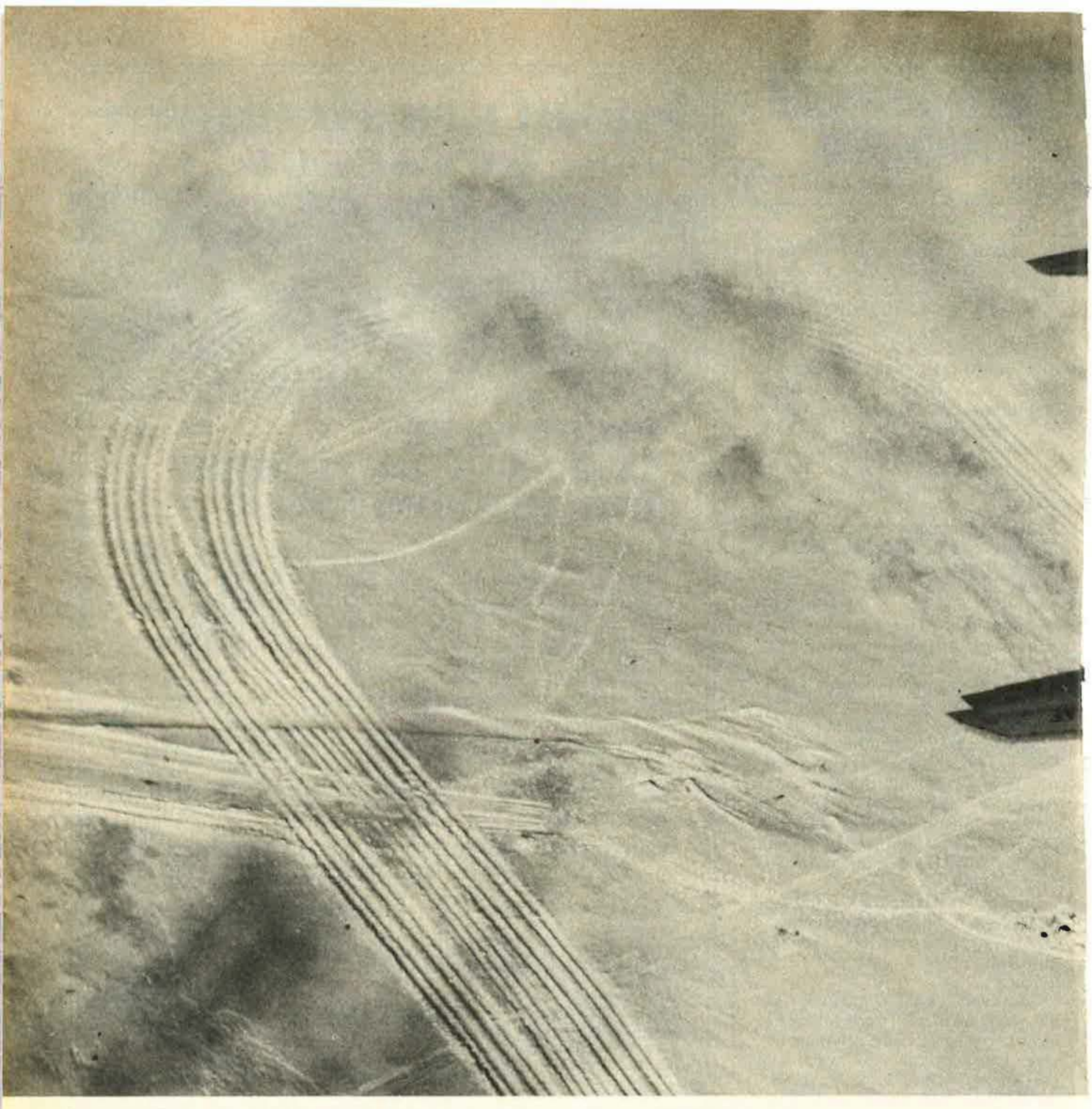
The North American Air Defense Command will be retitled **the North American Aerospace Defense Command** on May 12, reflecting its aerospace surveillance and missile warning-related responsibilities.

Died: Aviation pioneer **Frederick A. Hoover,** who in 1911 qualified for Pilot's License No. 100, rose to Senior Civilian Flying Instructor during World War I, and was a test pilot and prominent member of the Early Birds of Aviation, at his home in La Mesa, Calif., in late February. He was ninety-three.

Died: Brig. Gen. Benjamin S. Kelsey, USAF (Ret.), famed test pilot and aeronautical engineer who helped develop Allied fighter tactics during World War II, of cancer at Stevensburg, Va., in March. He was seventy-four.

Died: Adm. John S. McCain, Jr., USN (Ret.), outspoken foe of Communist aggression and CINCPAC at the height of the war in SEA, of a heart attack while returning from a European vacation. He was seventy.

Died: Conservationist and businessman **Stanley Switlik,** who helped perfect the parachute, founded an early Caterpillar Club (members have made at least one emergency jump), and who ran the first jump school for US paratroopers in World War II, of heart trouble in Marathon, Fla., in March. He was ninety. His company, the Switlik Parachute Co., Trenton, N. J., in recent times developed and produced specialized safety equipment for high-altitude flights. ■



How to pirouette with a half-

Good footwork is a must for a big airlifter, especially when it's packing a heavy load.

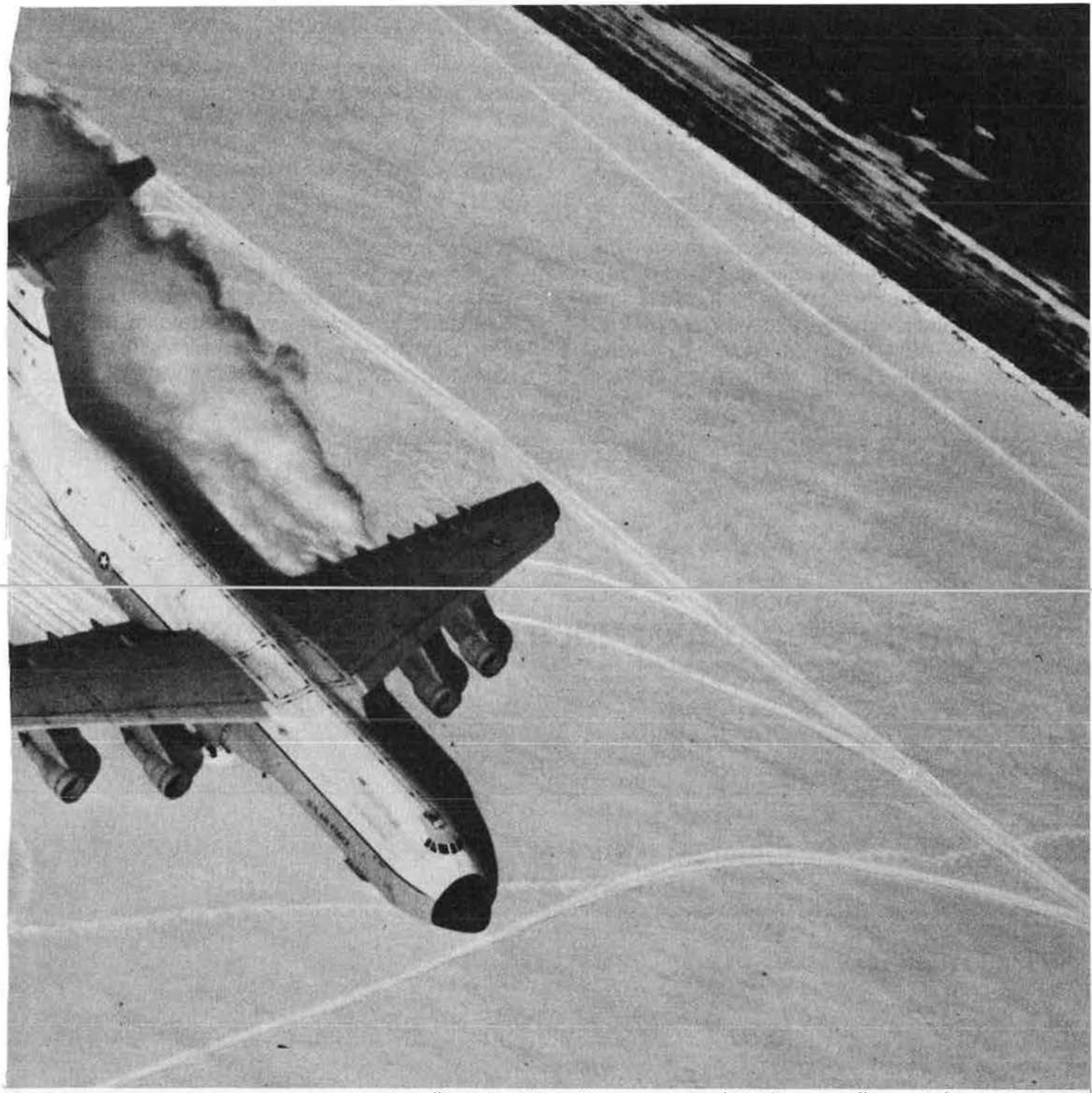
And the giant C-5, in tough, operational evaluations on four different off-runway terrains, has proved it can perform as intended... able to taxi, load and unload, and maneuver on various unpaved surfaces, like the snowy one you see here.

In a recent series of evaluations, the Lockheed C-5 went through its paces on snow-covered ground at Griffiss Air Force Base in upstate New York. The huge airlifter handled the mushy surface without any maneuvering problems.

Proving a soft touch.

Earlier evaluations at Shaw Air Force Base in South Carolina were made on dry, unpaved terrain, and the C-5 passed them handily. With no rutting, no skidding on turns, and with great ease of cargo-handling operations.

There were maneuvers on softer ground, too. At Altus Air Force Base, Oklahoma, the terrain was about the consistency of a natural-turf football field. There, in simulated combat conditions, loading and unloading on unprepared terrain was conducted without any problems. And on sandy



At Griffiss Air Force Base, a C-5 executes a smooth 180-degree turn off-runway in foot-deep snow.

million pounds on your back.

soil at Eglin Air Force Base in Florida, the C-5 again successfully demonstrated its unusual maneuvering capability.

In all the demonstrations, the C-5's gross weight reached up to 665,000 pounds. That equals carrying two 60-ton M-1 main battle tanks in the cargo hold.

New wings, new life.

In short, the C-5 has proved its off-runway ability on surfaces it might have to use in faraway places... places it can reach because of its inflight refueling and worldwide range. Furthermore, because of improved wings, the C-5's life-span will help keep America's airlift capability strong and global in range well into the 21st century.

Considering the C-5's size, range, capacity, and unmatched cargo-handling speed, you might wonder how it can be so light on its "feet."

It's because the engineers and craftsmen at Lockheed-Georgia designed it that way. They have more experience designing and building airlifters, by far, than anyone else in the world.

Lockheed-Georgia

The machine is the Air Force's new, supersonic, tactical jamming aircraft, the EF-111. And inside its lean frame is the ALQ-99E Jamming Subsystem, an electronic powerhouse that will help the EF-111 perform virtually any ECM mission.

The ALQ-99E—fully integrated into the EF-111 aircraft soon to be delivered to the Air Force—uses key equipment from Raytheon. This includes one RF calibrator and multiple transmitters and exciters per aircraft. Within each exciter, interchangeable and programmed technique cards, in combination with software, enable the EF-111 to react to diverse and rapidly changing threat conditions. In addition, the equipment's frequency coverage, reliability, and effective use of available jamming power give the aircraft its ECM punch.

This all adds up to the kind of flexible capability the EF-111 needs to increase the effectiveness of any strike force—whether in its role as standoff jammer, in penetrating the world's densest electronic defenses, or in providing close air support. Small wonder that such versatility makes the EF-111 a critical element in the U.S. Tactical Air Forces.

And, taking advantage of advancing technology, Raytheon is already working with the Air Force to develop components that will extend the

We put the electronic punch in the Air Force's supersonic

life of the EF-111 well into the 21st century.

Raytheon... helping the supersonic EW machine meet any threat—today and tomorrow.

For details on Raytheon's airborne ECM capabilities, write on your letterhead to Raytheon Company, Government Marketing, 141 Spring Street, Lexington, Massachusetts 02173.

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EW machine.

An industry-funded project demonstrates feasibility of enhancing the F-15 proven airframe-engine combination, the project provides USAF

LAMBERT Tower says, "MAC Green 71, take position and hold, Runway Two-Four. You are next after the Ozark DC-9 on Three-Zero." Pat Henry, McDonnell Aircraft's Chief Experimental Test Pilot, acknowledges the instruction. He taxis his F-15B Eagle (tail number 710291, but using radio call sign MAC Green 71 for this mission) into position on the threshold of Runway Two-Four at St. Louis's Lambert International Airport.

In the back seat, where a weapon systems officer would normally be, is an observer from AIR FORCE Magazine, along to see the capabilities of this enhanced air-to-ground version of the F-15. Pat Henry has requested clearance for a "Viking departure," the fastest possible climb out of the St. Louis terminal control area, and it has been approved.

Under the clean canopy, which doesn't seem to be there, the loudest sound is the observer's breathing through the oxygen system. The aircraft's two F100 engines are at idle, unheard beneath the noise of Lambert's controllers coping with the flow of traffic at this busy midday period. Ozark reports he is rolling on Three-Zero. A look to the left front, and there he is, accelerating, then rotating as he passes the intersection with Two-Four. He climbs at a modest pitch attitude, building up airspeed.

Lambert Tower addresses Pat Henry: "MAC Green 71, cleared for Viking departure. Maintain runway heading." Henry acknowledges, adds power, kicks in afterburners, and the 53,700-pound aircraft begins to roll. As the observer estimates the first thousand feet of roll, the indicated airspeed reaches 140 knots, and Pat Henry lifts the plane off the runway, pitching up to a sixty-degree attitude for the Viking climb. Before the aircraft can pass over the departure end of Runway Two-Four, the Eagle is at 11,500 feet, out of the terminal control area through the top, en route to Washington, Mo., to begin the technical tasks of the day's mission.

On this day, the aircraft left the McDonnell Aircraft ramp at a weight of 53,724 pounds. It is carrying four AIM-9 Sidewinder missiles and is fitted with conformal fuel tanks at sixty percent of capacity, or about 6,000 pounds. If desired, the full external capacity of the plane's MER-200 ordnance racks could be fitted with up to 12,000 pounds of bombs and guided weapons. That is not the purpose of today's mission. However, later in this account the results of air-to-ground ordnance delivery will be related.

Begin Radar Scan

Pat Henry brings up the Hughes APG-63 radar while the observer scans the four main displays in the aft cockpit. The preflight briefing and an extensive orientation on the controls and displays created enough familiarity to build confidence. The main confidence-builder, though, is the simplicity of the aft cockpit compared with the F-4's various versions, or other aircraft of the last generation.

Directly in front of the observer are four video display terminals.

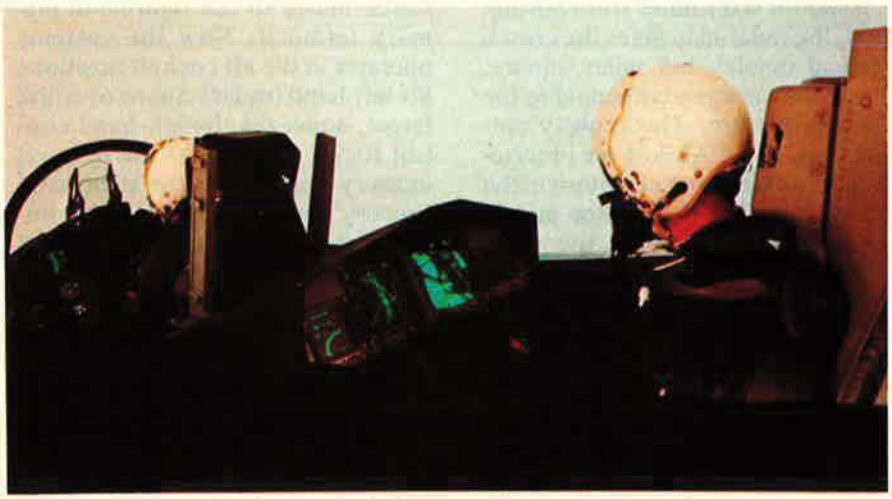
ir-to-ground attack in night and all weathers. Using existing technology and a
ption for meeting night and weather attack requirement in the near term.

FLYING IN THE ENHANCED EAGLE

BY F. CLIFTON BERRY, JR., EDITOR IN CHIEF

From left to right, the first two are the Configuration Menu and the Tactical Situation Display (TSD). Actions and activities on those terminals are handled by the back-seater through the left-hand controller, a joystick mounted on the console that fits comfortably into one's left hand for manipulations.

A matching controller is on the right-hand console. Through it the back-seater manipulates displays on the two right-hand terminals. Each controller stick has two transducers on top that are activated by the thumb. Each has four switches with two or three positions. It's like playing the clarinet or saxophone. Instead of music, the finger work results in changing displays on the four screens.



Working with the F-15B's displays builds confidence in the back-seater because of the simplicity of the aft cockpit compared with various versions of last-generation aircraft.

On this mission, the left-hand terminal displays an initial menu. It offers a choice among Initial, Configuration, Built-in-Test, and Nav. Configuration is selected, and the Tactical Situation Display option appears on the second screen. It shows the aircraft location via a symbol centered about one-fourth of the way from the bottom of the screen. The screen shows graphically the key landmarks ahead of the aircraft, major obstacles along the way, primary natural features (the Missouri River), waypoints for this flight, and a cursor that the operator can move via a transducer resting under his left thumb. Also displayed: altitude, true airspeed, groundspeed, and heading, or ground track, plus geographic coordinates of present position. For those variables and others, the operator has choices for displays, essentially being able to command the system to display more or less information (via low and high edit-

ing choices), range scales, magnetic or ground-track heading, and the like.

The operator's first reaction is pleasure at knowing where the aircraft is. A peek out left and right sides, correlated with a glance at the chart, confirms the TSD position display: a few miles east of Washington, Mo., south of the bend in the Missouri River, on a heading of 270 degrees magnetic. Back to the display, airspeed is shown as 380 knots, altitude 12,500.

Pat Henry has the APG-63 radar humming now, and has made the necessary calls to Kansas City regional air traffic center. He has the radar display up on the terminal in his cockpit; then it appears for the observer on the primary right-hand terminal in the aft cockpit. The bridge over the Missouri River at Washington is clear; so are the river and the city. The map being painted on the terminal is ten miles square. Pat Henry changes the scale to 4.7 miles on a side, and the bridge and town grow in size on the terminal. The detail also increases, because the APG-63, acting in the synthetic aperture mode, is providing a vertical overhead view of the scene some miles ahead, with a fifty-nine-foot resolution. That is, objects separated by fifty-nine feet or more are clearly shown.

On this mission, the radar map is updating every six seconds. To give more time for study, the picture can be frozen at will, and is while the observer practices moving the cursor over the scene with the right-hand controller transducer button under his thumb.

Long-Distance Mapping

Turning to a magnetic heading slightly east of north, Pat Henry climbs to 13,500 feet. He moves the radar cursor over the location for Winfield Dam on the Mississippi River, then calls up a patch map over the dam itself. In real time, the right-hand primary screen displays the dam area in a ten-mile-square image, then enlarges to the 4.7-mile image. At a range of twenty-six miles and thirty degrees off the nose, the dam is a clear target, easily found.

Cloud cover is beneath the aircraft now, prohibiting navigation by pilotage; that is, visual reference with landmarks. No problem; the tactical situation display (TSD) shows the aircraft location, and the radar output is moved to paint an image of the route ahead. If desired, the APG-63 could reach out 150 nautical miles or so to give the aircrew a ten-mile-square vertical map of the scene below. Today's mission does not demand that range, but we do go out more than eighty miles to pick up Springfield, Ill., a turning point on the mission profile.

It's easily seen, checked, and then ignored for a few minutes while the radar works with picking up targets around Meredosia, Ill., on the Illinois River, and the route between it and Springfield. At ranges around thirty miles, the radar is clearly showing fence lines and field boundaries on the large-scale imagery. Rivers, dams, locks, power lines, and highways are as clear as the chart on the kneeboard, although they are hidden by the solid cloud layer below.

Springfield is eighty nautical miles distant, but it is immediately recognizable on the screen when Pat Henry demands the image. Meanwhile, the observer has managed to call up too much information on the Tactical Situation Display, cluttering up the left primary screen with excess information. The solution: recycle the buttons on the left controller, start over with a simple display of the navigation situation, and resume comparing the radar imagery with the graphic display. Cloud cover below gives only a cotton-wool picture to the eye, but the screens are full of information for the crew.

At about sixty miles from Springfield, the radar map gives the crew a vertical display ten miles square, then enlarges upon command to the 4.7-mile picture. The runway patterns at Capital Airport are precisely seen, as is the street pattern in the Illinois capital. The cursor moves the imaginary "eye in the sky" south of the city, picking up the radio towers and lake with ease, then settling on Highway I-55 in the center, as it strikes straight south toward St. Louis.

The Tactical Situation Display shows the exact moment the aircraft is over Springfield's Capital Airport, where Pat Henry turns south (and slightly west), then climbs to 14,500 feet. The confluence of the Illinois and Mississippi Rivers is clearly mapped at a distance of sixty-five miles; so is the barge traffic. The cursor moves eastward while the plane holds its heading, and picks up the distinctive pair of Chain of Rocks Bridges at St. Louis over the Mississippi. The beam angle is less than three degrees, but the synthetic aperture radar image appears to the observer as if he is directly over the bridges.

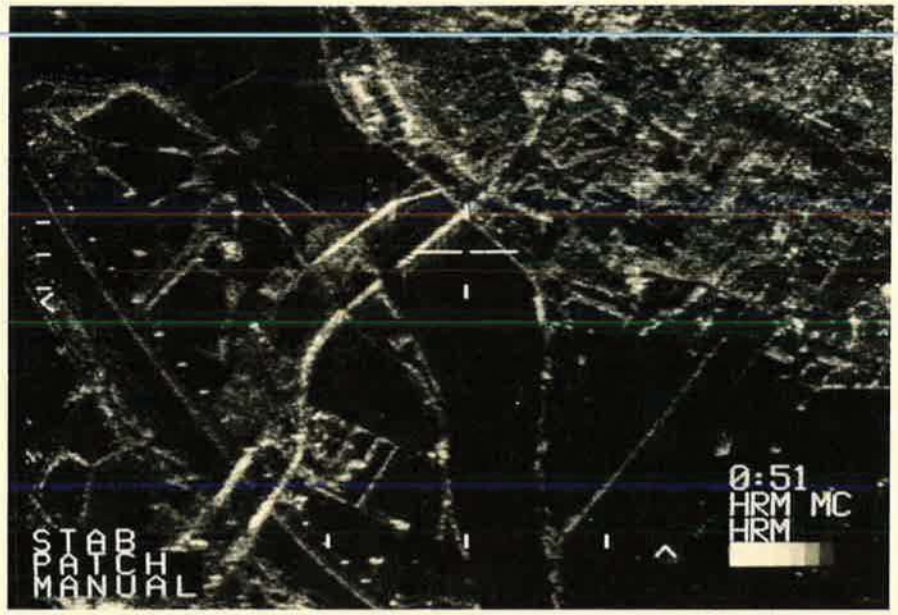
If the bridges were a tactical target, the plane could drop to low treetop altitude, navigating via the TSD, and popping up only occasionally to update the radar image. By linking the aim point with the F-15's navigation systems, the pilot could head right for the target without looking out of the cockpit. He has an all-weather, night-attack system built into the F-15 as configured for this mission.

Not aboard this time, but installed by the time you read this: the PAVE TACK infrared sensors that complement the APG-63 radar and add the additional enhancements for night, all-weather attack.

Using All Systems

For example, as is being tested this summer, once the aircrew have acquired the target on radar, they can drop below the radar horizon to avoid detection. Occasional, seconds-long popups update the radar image from scores of miles from target. As the enhanced F-15 approaches nearer the target, the TSD display can be moved left to the configuration screen, the radar map to the left-hand primary, and the infrared image to the right-hand primary terminal. Now the systems operator in the aft cockpit positions his left-hand (radar) cursor over the target, squeezes the left-hand control stick's trigger, and the infrared imagery appears on the right-hand primary terminal. Center of the image is the spot under the left-hand cursor. If that is malpositioned, the systems operator moves his right-hand cursor to the precise location desired—say center-span of the Chain of Rocks Bridges—and calls up a new infrared image that is right.

The pilot, meanwhile, is following the action on his front-seat terminal, linking the imagery with his navigation sytems and ordnance



Top, aft cockpit of enhanced air-to-ground F-15. Video display terminals show (left to right) the configuration menu, tactical situation display, sensor display, and head-up display. Through use of controller joysticks (the right-hand controller appears at lower right), the displays can be manipulated, changed, and moved from screen to screen as aircrew desires. Above, a radar map frozen in flight shows the Mississippi River at St. Louis, with the Chain of Rocks Bridges clearly depicted in center. Canal and power line towers are obvious in lower left.

menu. Nearing the target (eight to ten miles, for instance), the aircraft can be virtually on the deck, emitting no radar signals, yet aiming straight for the target. For now, the PAVE TACK infrared system is being used on the test-enhanced F-15, but the LANTIRN infrared system can be fitted aboard when it is ready.

To an untrained observer, the routine seems easy to comprehend and even easier to operate: decide on the target, fly within a hundred miles or so, acquire it, make the approach (high or low depending on the enemy threat), update en route, activate infrared, link the systems together (including the pilot's displays), and bore on into the target to release ordnance. The Tactical Situation Display can show the crew as much or as little information as they desire or can absorb. The APG-63 radar can function in target-tracking or navigation modes then display the target imagery to the crew. All the time, the aircraft is ready and able to perform its air-to-air role while carrying a 12,000-pound load of ordnance toward the ground target ahead.

The pilot looks ahead through his HUD (Head-Up Display), directly in front of him at eye level. It carries the necessary flight and target information projected on a clear screen so that he never has to look away from the target to get needed data. In the aft cockpit, the right-hand secondary screen (at far right on the panel) displays for the systems operator the same HUD image the pilot sees.

Low-Level Flying

For an appreciation of the F-15's low-level flight characteristics, Pat Henry checks with air traffic control, then enters the maneuvering area, an unpopulated region in southern Illinois southeast of St. Louis.

At 500 knots indicated airspeed and 500 feet above the unpopulated area, navigation seems impossible to the neophyte. This is the realm of the RF-4C aircrews, who fly this way routinely. Without their kind of experience (or Pat Henry's), it is hard to keep track of position. Not to worry—the Tactical Situation Display is doing the work. A glance at it confirms position, obstacles ahead, and other essential information. It is a cross-check with the HUD display on the right-hand terminal, carrying airspeed, altitude, aircraft attitude, heading, and precise pitch angle. Once that pattern of cross-checking is established, a feeling of confidence and orientation returns, permitting consideration of the ground-attack mission possibilities.

Now the aircraft has slowed below 300 knots, and Pat Henry rolls into a tight 360-degree turn. At an eighty-degree bank, the turn's radius is about 1,200 feet, keeping the aircraft in position near an imaginary ground target. Pat Henry rolls out of the turn and accelerates. In ten seconds, the aircraft is streaking across the river-bottom land at 475 knots indicated airspeed. Evasive maneuvers, rolls, and speed changes demonstrate

how the Eagle is an elusive target. Although no more than five Gs are incurred in these maneuvers, the Eagle's new over-G-warning system permits up to nine Gs.

Will the Eagle stall in the low and slow gyrations that could be needed for ground attack? Probably not, as Pat Henry demonstrates. Up at 6,000 feet, he slows the aircraft to 150 knots, then eases the control stick full aft. Airspeed falls off to 110 knots, and the angle of attack indicator pegs at forty-five units. But the aircraft holds wings level and barely indicates any buffeting. It begins losing altitude, but the attitude is stable. As back pressure is released, the angle of attack indicator unwinds, the nose falls through smoothly, airspeed accelerates, and as power is applied the Eagle leaps back up to 14,500 feet for return to St. Louis.

Kansas City Center is contacted, then St. Louis Departure Control, clearing MAC Green 71 for immediate descent for landing on Runway Three-Zero at Lambert. En route, the radar maps the Mississippi River bridges again, and Busch Stadium in downtown St. Louis. On final approach to Runway 30R, the Tactical Situation Display clearly shows on the video terminal screen the aircraft symbol converging on the Lambert Field symbology. At touchdown at 130 knots, the two symbols merge into one, and the enhanced Eagle is down and rolling nose-high for aerodynamic braking. The nose gear touches, Lambert Tower clears Green 71 to cross Runway Two-Four, contact Ground Control, and taxi to the McDonnell Aircraft ramp.

There, the final data checks are made with the monitoring flight test engineers, postflight routine completed, and engines shut down. After almost two hours' flying, the inertial navigation system is checked: the accumulated error in that time and through dozens of course and altitude changes is less than eight-tenths of a mile.

Rationale for Enhanced F-15

The rationale for developing an enhanced air-to-ground F-15 is very simple: The Air Force needs a night, all-weather ground-attack aircraft, and does not have one. Beyond that oversimplification are more considerations.

Here, the F-15B delivers two types of ordnance: firing its 30-mm guns, above, and dropping bombs, left. One feature McDonnell Douglas is testing aboard the enhanced Eagle is a maneuvering attack system that will allow bomb drops in attitudes other than wings level.

The enhanced air-to-ground F-15 program, an industry-funded effort, evolved from an appreciation of the several constants and variables in the tactical situations facing Air Force planners in the mid- and late-1980s.

The constants include recognition of the high probability of night or foul-weather conditions for a conflict in Europe. Much has been made of the fact that darkness or poor weather are more likely to prevail than are clear skies and bright sunshine, allowing VFR attacks. Another constant: The Soviet and Warsaw Pact doctrinal leanings toward round-the-clock warfare, including night and bad weather. Still another: The certainty that USAF attack aircraft will have to travel long distances—including transoceanic flights—to reach the scenes of conflict.

The variables include dwindling numbers of US bases abroad, additional missions being laid on a finite tanker force, accelerated Soviet progress in qualitative improvements to their aerial strike forces, and shrinking USAF purchases of modern aircraft, to name just a few.

These considerations are strong enough to validate a requirement for night, all-weather attack aircraft capability. But there is more. The conditions of darkness and bad weather are certainly not unique to Central Europe, although commentators seem to fix on it. Airmen who fought in Korea or Southeast Asia can testify that night and poor weather conditions abound in those locales. It is the same in Southwest Asia, Latin America, Africa, the Middle East, or anywhere air forces might be committed. There still is a requirement to attack the enemy from the air at night and in weather, and that capability has been neglected.

The Air Force's near- and long-

term research and development programs aim to redress the balance, and overcome the neglect. But years will pass before the advanced concepts now under consideration can take to the air in squadron strength in combat. Meanwhile, the requirements exist to be able to fight and win in the "Dangerous Decade" of the '80s. Thus, the enhanced F-15 program.

McDonnell Aircraft and its partners in the enhancement (nicknamed "Strike Eagle") have spent something like $40 to $50 million over four years. The major partners are Hughes Aircraft (APG-63 radar), Sperry Flight (controls and displays), IBM (flight controls system on main central computer), Litton (inertial navigation system), Ford Aerospace (PAVE TACK FLIR), and GE (30-mm gun pod). The object of the program has been to demonstrate that the enhanced F-15 meets the night, all-weather attack need with remarkable results achievable with existing technology exploiting a tried and proven engine-airframe combination. In effect a low-risk, high-technology system available almost at once.

Heart of the system is the Hughes Aircraft AN/APG-63 radar, with an advanced fifth-generation programmable signal processor. This enables incorporation of synthetic aperture radar capability into the F-15, allowing mapping of small targets (ten feet or larger) or at very long distances (more than 100 nautical miles) and at low slant angles (less than three degrees).

By integrating the new radar capabilities into the standardized avionics multiplex data bus of production F-15s, these additional capabilities are a bonus, giving air-to-ground attack capabilities while retaining all the air-to-air capabilities. Actually, thanks to the programmable signal processor, any F-15C and F-15D Eagles now in production have the ability to change or add radar modes simply via software reprogramming rather than by extensive hardware retrofit.

At the same time, through incorporation of the displays and controls in the aft cockpit into the standardized avionics bus, the Strike Eagle crew can exploit the remarkable abilities of the radar's programmable signal processor, integrate its work with low-light-level television and infrared sensors (PAVE TACK or LANTIRN), and link all of that sensibly with the aircraft's navigation and guidance systems.

The result is a synergistic effect, getting more from the same package. It is done by changing the innards and displays, while retaining all the former capabilities of the aircraft. Externally, the addition of conformal fuel tanks with the MER-200 bomb racks, PAVE TACK sensors, or a 30-mm gun pod add range and ordnance-carrying capacity.

Air-to-Ground Attack Tests

The radar resolution is fifty-nine feet for the mission now. By the time this reaches print, resolution of the radar will have been improved to approach the design goal of ten feet. While the radar improvements were being achieved (mainly through software development), tests of ordnance compatibility and drop characteristics were conducted last autumn by McDonnell Aircraft on the range at Volk Field, Camp Douglas, Wis. Gary L. Jennings, McDonnell Aircraft experimental test pilot, flew all nine sorties, releasing ordnance or firing weapons on each. Also on all flights, AIM-9 missiles and launchers for air-to-air combat were installed.

First test flight carried sixteen Mk-82 500-pound bombs and the GE 30-mm gun pod (GEPOD). The gun pod was fired in a fifteen-round burst, while all Mk-82s were separated cleanly on one pass while the Eagle was in a thirty-degree dive.

Second flight was accomplished with release of twelve Mk-82s, firing the GEPOD again, while carrying a dummy PAVE TACK pod for aerodynamic evaluation. Six thirty-round bursts were fired from the GEPOD, while all bombs were released in a single ripple.

In subsequent flights, Jennings carried various combinations of Mk-82 bombs, GEPOD, and external fuel tanks before completing the test series with Mk-84 2,000-pound bombs. On the last flight, a deep interdiction potential was demonstrated. The Eagle carried three 600-gallon fuel tanks on the primary stores stations and two Mk-84s on the conformal fuel tank stations already mounted on the aircraft.

All of the bomb passes were single-ripple releases using the standard F-15 air-to-ground delivery modes. All performed as specified. For example, twenty-two Mk-82 500-pound bombs hit in a pattern 200 feet wide and 600 feet long. The five Mk-84 2,000-pound bombs were set for fifty-foot intervals, and actually hit in a pattern measuring 205 feet long (a fifty-one-foot interval).

In June, blind weapon drops will occur at Volk Field, using the ten-foot resolution radar. Also expected in June or July: demonstrations of the APG-63 capability to detect moving targets and display them to the aircrew. Later in the summer, PAVE TACK systems will be installed, and forward-looking infrared tests will take place on the instrumented range at Eglin AFB, Fla. Meanwhile, the terrain-following capabilities of the radar will be demonstrated, so that at summer's end a complete air-to-ground, night, all-weather attack system will have been proved out.

McDonnell Aircraft officials are confident that, if the Air Force decided to order the enhanced F-15, production models could be delivered beginning in 1985 from a production line parallel to the ones producing F-15Cs and F-15Ds.

Next steps are up to the Air Force. It wants to retain the option of enhancing the F-15 for the air-to-ground role, while at the same time not ruling out other enhancement possibilities on the A-10 and F-16 aircraft. Air Staff planners point out that it will be necessary to validate the results achieved by McDonnell Aircraft and its partners through engineering and operational testing. That could cost more than $200 million and require up to a year. The cost in time and money is, however, minor when compared with full-scale development of totally new systems that could not be fielded until the late '80s or early '90s.

A final observation: operating in the aft cockpit of the enhanced F-15 is very similar to having a miniature E-3A AWACS of your very own, right in front of you. It engenders a feeling of confidence when you know your own location, the targets', and how to navigate through or around threats to reach them to deliver the steel. It is a good feeling. ■

The Pentagon Is Gearing Up for the '80s

The nation's senior military leader, in an exclusive interview with AIR FORCE Magazine, takes a broad look at topics extending from the relationship between the Pentagon and the intelligence community to prospective changes in the JCS organization.

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

"DIRECT intervention by the Soviets or their proxies in strategically vital areas of Southwest Asia has the potential for bringing the industrial world to its knees without a single Soviet soldier having to cross a Western border."

This is how Gen. David C. Jones, Chairman of the Joint Chiefs of Staff, assesses the geostrategic volatility of the Arabian Gulf region. By extension, this dire prospect spells out the need for effective US counteractions of various kinds. The most concrete response to the Soviet threat in that region—and possibly similar ones that might crop up elsewhere—is the Rapid Deployment Joint Task Force. The makeup, organization, size, and location of that force are under close review by Congress. In the course of hearings, the impression was created of parochial infighting over this issue among the services and their constituencies. General Jones, in a wide-ranging AIR FORCE Magazine interview, challenged the notion of RDJTF causing, and being caught up in, a serious interservice rivalry.

The Joint Chiefs of Staff, he said, favor some adjustments in the current arrangement, but recognize the importance of retaining the composite character of RDJTF. As General Jones told Congress, "We have solicited advice from major commanders, including the CINCs [commanders in chief] who would be involved in RDJTF operations and the commander of the RDJTF; all believe that each of our four services—Army, Navy, Air Force, and Marines—provides unique capabilities that are essential to the proper function of the RDJTF. We do not want to handcuff our field commanders by seeking a simple solution to a complex problem and in the process denying them the kinds of forces they may well need in a crisis."

The notion that the only force needed in Southwest Asia should be maritime and that, therefore, the RDJTF's dominant role ought to be maritime runs counter to the Chairman's thinking: "We can't keep thousands of Marines afloat out there all the time. We *can* preposition a lot of equipment aboard ships, and we *can* put limited amphibious capabilities out there but in any circumstance we need land-based facilities to marry up the people with the equipment." Further, General Jones stressed the importance of countering Soviet threats rapidly with the unique capabilities of the Air Force involving in particular interdiction and air defense by employing in a matter of hours AWACS and F-15s. General Jones cited in this context the experience in Saudi Arabia following the outbreak of the Iran/Iraq war where he helped negotiate the entry of USAF E-3A AWACS aircraft into that country to provide essential reconnaissance and command and control capabilities for Saudi air defense and other missions.

Equally vital, General Jones pointed out, is the Army's role within RDJTF, involving such unique contributions as airborne, air assault, and mechanized forces to provide sustaining power. The same goes for the Marines, regardless of whether amphibious landings are involved or not, and the Navy, which is vital to clearing the seas and keeping the sea lanes open and providing other support.

In short, the JCS Chairman said, "Each service has unique capabilities and can make unique contributions. The idea that one service should dominate [the force projection mission]—or that we should confine ourselves to a predominantly maritime strategy—is in my view absolutely the wrong approach and a step backward."

General Jones acknowledged that differences among members of different services about who can do what job best "are not unusual. Commanders in the field normally feel that their units are the best, and that they can do almost anything. This kind of confidence builds esprit de corps and is not in itself unhealthy. But to categorize this as serious interservice rivalry is not only wrong, it is a disservice."

So far as the idea of moving the joint task force's headquarters from MacDill AFB, Fla., to Europe or elsewhere is concerned, General Jones said, "We don't intend to locate the force in Europe; that's a misunderstanding. We are thinking about locating some RDJTF supervision and surveillance functions in Stuttgart [at the US European Command] but not stationing the organization itself over there."

With the exception of small, forward-deployed Marine Corps elements, essentially all the RDJTF's combat forces, whether Army, Air Force, or Marines, are located in the US. Moving these troops overseas on a permanent basis is neither prudent nor feasible at this time, General Jones suggested. Separating the task force commanders from their troops by moving the RDJTF headquarters overseas would have adverse effects in terms of training, command and control, and in other ways, in General Jones's view. The likely outcome of the current debate, he predicted, "will be some changes to the present arrangement, with retention of the headquarters at MacDill."

The Need for Better Linkage

For the RDJTF to perform effectively in the Arabian Gulf region, linkage with the countries in the region must be improved both to increase their confidence in this country's commitment to their defense and to facilitate US access, according to General Jones. Progress in that regard has been remarkable in the past year, espe-

JCS Chairman Gen. David C. Jones is opposed to assigning the Rapid Deployment Force mission to a single service—and thus lose its composite character. He also favors retention of the RDF headquarters in the United States to avoid adverse effects in terms of training and command and control.

cially so far as Oman, Kenya, Somalia, and Egypt are concerned. The current budget, he said, allocates sizable funds for improving facilities in those countries, even though the US does not plan to build major facilities in the sense of bases of our own populated by large and permanent US forces.

The preference, General Jones said, is "for multiple facilities arrangements [rather] than to have a few large fixed bases" because of the uncertainty of where conflict might occur within the region. The area involved is about half the size of the United States, he explained. The distance from the periphery of the Gulf of Oman to the northwestern border between Iran and the Soviet Union—where some twenty-five Soviet divisions are deployed—is about the same as from Maine to Florida, with terrain that might provide the backdrop for conflict ranging from coastal plains to extremely rugged mountains.

The greatest single problem facing the RDJTF in Southwest Asia, General Jones pointed out, stems from the need to "quickly augment our present forces and to sustain whatever force we deploy." He added that, "whatever the contingency, the strategic imperative will be speed. This need places a substantial premium on enhanced airlift, sealift, and prepositioning—which is reflected in President Reagan's budget adjustments" for FY '81 and '82.

Although he appeared sanguine in terms of the Administration's support of RDJTF and global mobility, the Chairman of the Joint Chiefs expressed concern about some lack of support on Capitol Hill for fundamental mobility requirements: "There is widespread misunderstanding about airlift and sealift being competitive and representing an either/or relationship when in fact they are interdependent, with one enhancing the other." Explaining that prepositioned sealift is dependent on substantial airlift capabilities to achieve combat utility by bringing in resources that range from people to helicopters, he warned of lack of understanding of that symbiotic relationship by some people.

Upping the Soviet Ante

One of the most attention-getting signals the US is sending to Moscow with the urging of the Joint Chiefs of Staff is that any Soviet move against areas of vital interest to this country—such as the Arabian Gulf—will not only be countered locally, but is likely to trigger US countermoves elsewhere. The Soviets, General Jones said, must be put on notice that any military move against US or allied interests risks a conflict that could be wider in geography, scope, or violence than they wish to deal with. While for obvious reasons the JCS Chairman was disinclined to tip the US hand, he hinted that in case of Soviet aggression in Southwest Asia the US response, in addition to local action, might include naval forays to "clean out the Soviet fleet in the Indian Ocean. In broad terms, we want to keep them off balance" through the prospect of unpredictable and unacceptable retaliation.

So far as US allies are concerned, General Jones did not anticipate major contributions of military forces in Southwest Asia, but said "we would like to see greater political cohesiveness and recognition of the threat to the West." He expressed the hope that Western Europe and Japan will increase their share of the burden of providing for their own defense while the US takes on a greater burden in Southwest Asia. Similarly, the allies should assist countries whose economic difficulties hinder modernization of their military forces, he suggested.

General Jones underscored the long-term importance of the Rapid Deployment Force and similar military capabilities by stressing that the decade of the 1980s, in his view, will turn out to be a period of "turmoil and instability." The cause for this turbulence, he suggested, is a combination of factors and trends that extends from organized terrorism and a resurgence of nationalism to global economic pressures and mounting internal problems within the Soviet bloc. The Soviet Union faces a host of difficulties that, General Jones warned, may increase its bellicosity and feed its propensity for inter-

fering directly or indirectly in the affairs of other countries.

In order to improve this country's ability to cope with international terrorism, the military services have taken forceful action during the past year "to develop capabilities far beyond what we had before," the JCS Chairman told AIR FORCE Magazine. The Defense Department, he said, has been successful in preventing detailed information concerning these new capabilities from leaking out. At the same time, he was not averse to publicizing the fact that the US has at its disposal highly effective antiterrorist strike forces because dissemination of that information might help deter would-be terrorists. He said that an interagency working group was coordinating antiterrorist activities on a government-wide basis.

Adjusting the Intelligence Function

The relationship between national intelligence and national security is of critical importance in shaping a global strategy. The current diverse system involving the Central Intelligence Agency, the separate Defense Intelligence Agency, and the coordinating function provided by the Director of Central Intelligence (DCI), is "fundamentally the right arrangement," in General Jones's view. There is a categoric need for independent voices within the intelligence community even though all national intelligence efforts are coordinated by the DCI, he said. The intelligence community must guard against coalescing into a monolithic organization that presents only a single set of views, General Jones added. While he saw no need for a major reorganization of the national intelligence structure, he stressed that "a lot needs to be done in the intelligence business" to increase its utility to the Defense Department and other government agencies. For one, he said "we have let our Humint [human intelligence, meaning mainly intelligence agents operating abroad] capabilities atrophy because some felt that technology in the form of a host of fancy gadgets could solve all our problems. Our technical intelligence indeed has done very well, but that did not justify the neglect of other areas."

One of the key challenges confronting the intelligence community and the military services, General Jones said, is how to sort out from the plethora of data that are being gathered centrally that information relevant to field commanders and furnish it in real time. "There is a problem in establishing priorities of national vs. tactical intelligence. Over the years, the emphasis has shifted toward national intelligence that is being fed into Washington and away from military commanders in the field. Yet, in a conflict the most important user of intelligence is the field commander," according to the JCS Chairman.

A secondary problem with intelligence data involves the choice between inundating military users with torrents of raw information and collating and filtering the intelligence to the point where it becomes so homogeneous that differing views are suppressed and field commanders can no longer draw their own conclusions, he pointed out. The answer, not always easy to find, lies somewhere between two extremes, in General Jones's view.

One key concern within the Defense Department over intelligence functions involves an analytical process known as net assessment. Its purpose is to relate discrete aspects of the threat to US capabilities and requirements down to the determination of how and how many US weapon systems ought to be built. General Jones wants to "keep the intelligence function just as pure as can be. Intelligence ought to look at other countries, especially the Soviet Union, and not get into net assessment of US weapon systems."

One reason he gets alarmed when intelligence people get into "the extremely important net assessment business," he told this writer, is the resultant tendency to shape over time intelligence findings to the relative conclusions of these assessments: "Human nature tends to validate what you have assessed. It has happened, and I mean without malice aforethought, simply because people who have made assessments of relative capabilities subconsciously look for intelligence that confirms their conclusions." That is why the Chairman suggested that the intelligence community stay out of the net assessment business. (As reported in previous issues of AIR FORCE Magazine, net assessments by the Carter Administration's DCI were used to lobby against the MX/MPS ICBM in the National Security Council and elsewhere.)

Changing the Joint Chiefs of Staff Organization?

Last summer, while testifying before Congress during confirmation hearings involving his second term as JCS Chairman, General Jones advocated that the role of the nation's senior military leader be strengthened. Pointing out that this was no exercise in "self-aggrandizement—because I will be retired before such a change could take effect," General Jones said that "in the two and a half years on this job, I had more influence individually than institutionally." The reason, not widely understood, he said, is that the US, in setting up the organization of the Joint Chiefs of Staff more than three decades ago, decided on a "compromise system. The choice then was between separate services and a highly integrated organization, not necessarily patterned after the German General Staff, but a straight-line system. A compromise evolved whereby we run the joint operation by committee action. And clearly we are a committee of five with an essentially equal voice on the issues. In so doing we have gained some strengths, but also encouraged the intrinsic weaknesses of a committee system."

General Jones, who by virtue of his four-year term as USAF's Chief of Staff and two two-year terms as Chairman of the Joint Chiefs will have served longer on the JCS upon expiration of his tenure than any of his predecessors, told this writer that "in the last few months of my time as Chairman I plan to think through and initiate specific actions to resolve some of the difficulties plaguing the JCS organization at present. I do believe we need to strengthen the joint operation. A Chairman, in order to be effective, has to work with lots and lots of different people—including his colleagues, the Chiefs—and it is difficult to be a crusader for change while at the same time trying to coalesce a consensus on specific issues. Under present circumstances this makes for a

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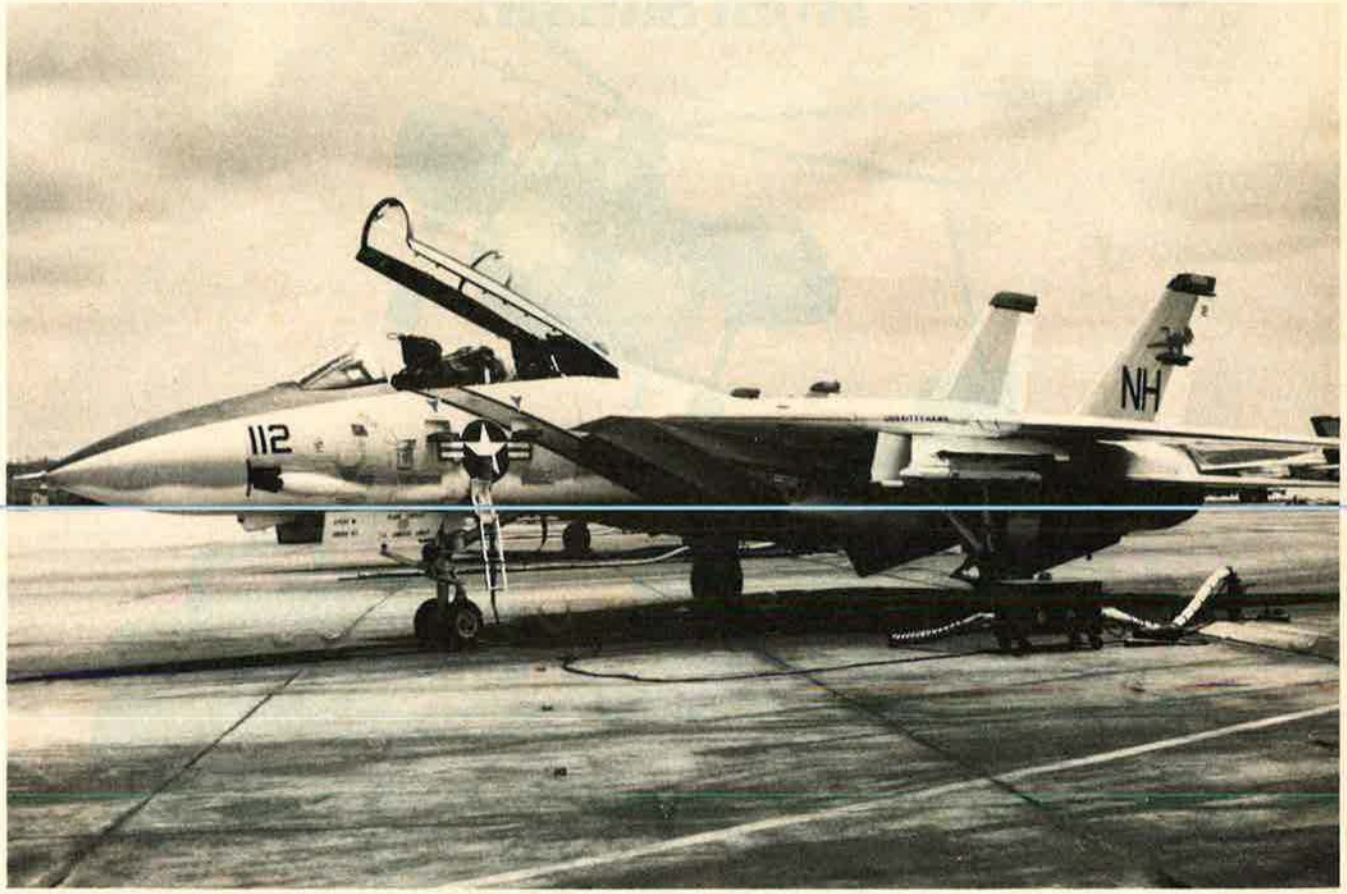

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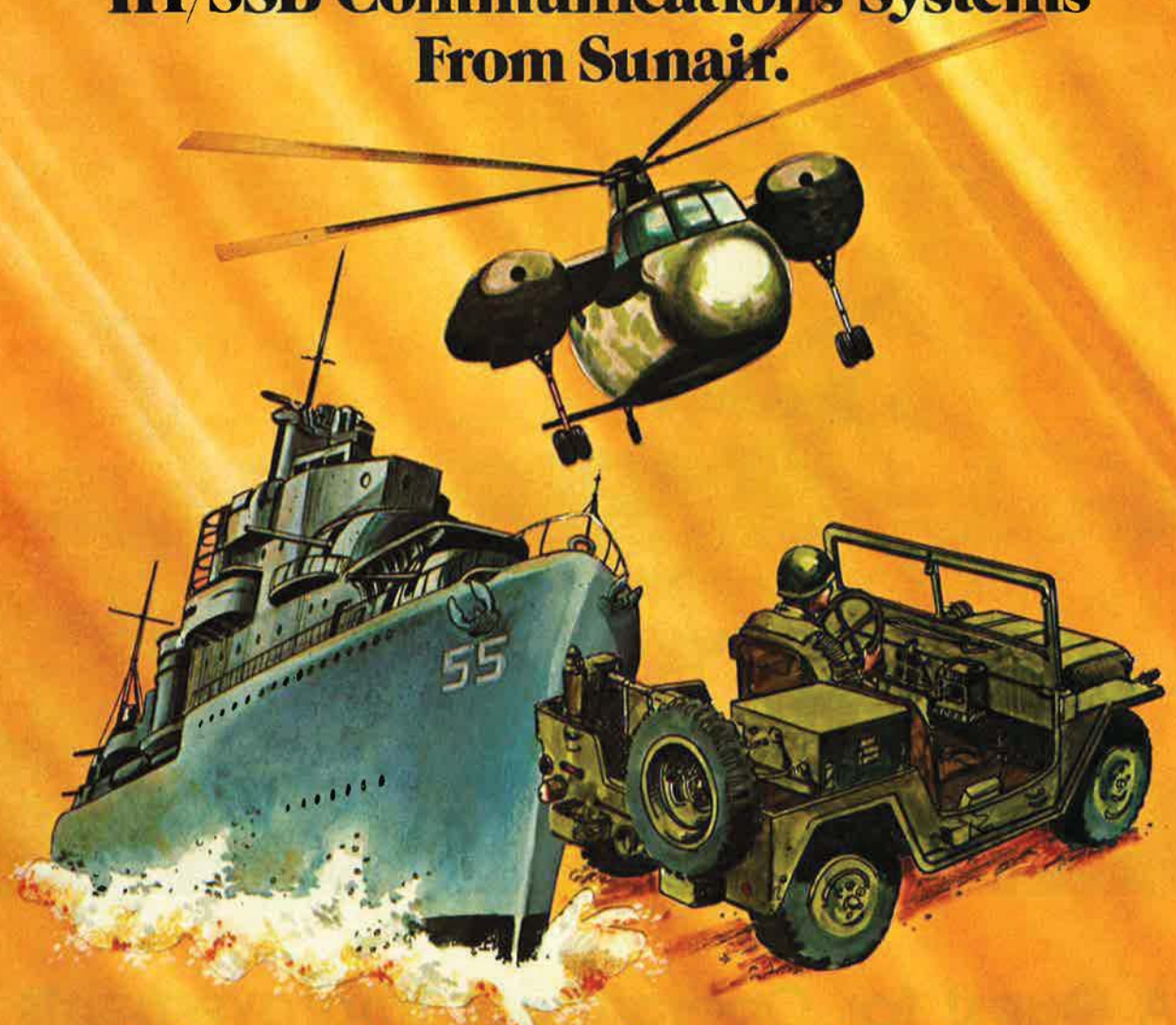

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difficult if not impossible situation." He declined to discuss what specific recommendations he might offer before his second term as Chairman expires.

Strategic Nuclear Requirements

In terms of most static measures, the USSR's strategic nuclear capabilities have advantages over those of the US. "We are not dealing with a problem of vulnerability of the whole strategic force, but under any set of circumstances we have a vulnerability problem so far as the Minuteman force is concerned," General Jones said. He didn't suggest that this condition "makes nuclear war likely or a Soviet first strike more probable." Yet he warned that it will take a great deal of courage and resolve during this period of ICBM vulnerability "to keep the Soviets from intimidating us, our allies, and the Third World" since they seemingly feel that they have an overall advantage that can be exploited.

The dilemma of the present situation is caused by the need to close the so-called window of vulnerability as quickly as possible and the fact that the means are not available for doing so as quickly as some would like. Although various "quick fixes" have been suggested by various experts, General Jones remains skeptical about the efficacy of most of them and is worried that they would impede those programs that can correct the current deficiency over the longer term.

The option to commit the nation to a declaratory policy of launch on warning or launch under attack, in General Jones's view, does not constitute a "quick fix." Terming such a launch posture a capability rather than a policy, he pointed out that "we developed the means for doing so when quick-reaction ICBMs came into the inventory. Even though it can be done—with some difficulty—saying that you can always launch Minuteman on warning and that the ICBMs therefore are not vulnerable doesn't cure the problem. Nevertheless, this capability has to be taken into consideration by the Soviets and indeed they can't be sure that our ICBMs would still be in their holes by the time the Soviet warheads arrive."

The JCS Chairman also saw only limited merit in such measures as increasing the number of forward-based nuclear weapons—such as redeploying the FB-111s—or stepping up the alert level of the B-52 force. In the case of the former approach, he questioned whether forward basing—beyond the present level—"really makes much difference." He expressed reservations about upping B-52 alert rates on a day-to-day basis and thus to lose in time of crisis the option to do so. Under the latter condition, stepping up alert rates not only increases capability when it is needed most but also sends an unambiguous signal to the adversary, he said. Additionally, the cost of maintaining the B-52 force at a higher alert status on a continuous basis is quite high.

The Chairman's prescription for solving deficiencies in this country's strategic offensive capabilities is to go ahead "without further delay with MX, to continue expeditiously the Trident and ALCM programs, and to proceed with a new bomber." Convinced that the flexibility and survivability inherent in the strategic triad concept have stood the test of time, he views the land-based ICBM force as the "key contributor to our time-urgent hard-target capability," which when coupled with the survivability of MX provides a degree of precisely controllable deterrence and crisis stability not attainable by other means.

In the Chairman's own view, basing MX at sea in whatever arrangement would result in a loss of diversity that is the triad's great strength. Command and control, he said, is substantially more difficult in the case of sea-based strategic systems, and "there is good reason for keeping MX on land in a survivable basing mode. I am optimistic that we will be successful in getting these points across."

MX, General Jones suggested, should be protected through special legislation by Congress against "frivolous court suits" that cause disruption for disruption's sake. At the same time, he urged that such a measure should "protect the rights of people who are legitimately concerned about the environment. It is vital that the public understand that we don't plan to ride roughshod over environmental issues but instead plan to deal with such matters in a responsible, nonfrivolous way."

Although MX won't require backup by its own Anti-ballistic Missile (ABM) defense system unless there is a fundamental change in the Soviet threat, the JCS favor a vigorous research and development program involving such weapons. If the Soviets were to break out from the currently observed stricture against deploying more than ten reentry vehicles on a single SS-18 ICBM—it is technically feasible to increase that number to twenty or more—an ABM would be useful, General Jones said. An ABM capability would provide "great insurance in case of a Soviet breakout from the current MIRV limits," he stressed, adding that the new defense budget funds ABM R&D.

Modernizing the Air-Breathing Systems

The strategic bomber force constitutes the "most obsolescent" element of the triad, even though the ALCM program is "proceeding well and shows great promise as a near-term extension of the striking power of our current bombers," General Jones warned. Pointing out that ALCM is at best a partial solution to correcting the limitations and vulnerabilities of the aging B-52 force, he said that "only a manned penetrating aircraft combines all the necessary characteristics—such as speed, stealth, range, payload, offensive and defensive countermeasures, target discrimination, post-launch control, and reusability—to assure our capability for global nuclear and nonnuclear applications across the spectrum of potential conflict." Deployment of such a weapon system that can perform both the nuclear or SIOP (single integrated operational plan) role as well as the conventional role rates top priority among new strategic initiatives, he stressed.

In the realm of sea-based strategic capability, the JCS Chairman urged continuation of the D-5, also known as Trident II, development program. The decision on whether or not to build this SLBM, which might include a substantial hard-target kill capability, is yet to be made. General Jones suggested that "ultimately we will have a system that exploits fully the large launch tubes of the Trident submarine, but the determination

whether that should be D-5 or some other design has not been made as yet."

Just as vital and urgent as modernization of strategic nuclear weapon systems are improvements in the survivability, reliability, redundancy, and flexibility of the strategic warning and control systems supporting the National Command Authorities, General Jones said. Generally referred to by the catchall term of "connectivity," this combination of facilities, systems, communications, and procedures, he said, must be made essentially invulnerable to surprise knockout blows in order to preclude a break between the command authorities and the nation's surviving retaliatory capabilities.

The requirement is for "full connectivity initially and adequate command and control" during the trans- and postattack phases of nuclear war so that even if Washington is destroyed "we can continue to operate for hours and days and beyond. Although we have made some progress, a great deal more remains to be done in terms of EMP [electromagnetic pulse or nuclear] hardening, redundancy, dispersal, E-4A deployments, and improvements of various command links," General Jones said.

A critical element of strategic command and control is attack assessment. The increasing number of MIRVs (multiple independently targetable reentry vehicles) available to the Soviets has made accurate attack assessment much more difficult, the JCS Chairman said. The difficulty stems from the fact that once the US detects an approaching ballistic missile and its "bus," which carries several individual reentry vehicle warheads and establishes their approximate heading, it is difficult to determine the exact target under attack. General Jones pointed out the reason is that the SS-18 and other advanced Soviet ICBMs can disperse individual warheads over large areas—known as the ballistic missile's footprint—thus making attack assessment extremely difficult.

Shortly after the Reagan Administration took office, Secretary of Defense Caspar Weinberger announced that deployment of the so-called neutron bomb—more properly called the enhanced-radiation, reduced-blast type of nuclear weapons and shelved by the Carter Administration—would be reconsidered. General Jones told AIR FORCE Magazine that the Joint Chiefs of Staff remain convinced "that there is military utility to enhanced-radiation weapons. We have also stated that the highest priority is completion of the long-range theater nuclear forces plan. We would not want to take any action that jeopardizes deployment of long-range theater nuclear forces." Progress regarding deployment of long-range theater nuclear forces has been satisfactory, he said: "I think we will be able to deploy these systems in the not-too-distant future."

The Military Manpower Challenge

There is a categorical need to take a fundamental look at the entire military personnel system "from the bottom up. For nearly eight years, the US has been enjoying the political benefits of an All-Volunteer Force without being willing to pay the price to make it succeed. The question is, 'Are we willing to pay as needed or should we go to some form of involuntary service, universal service, or conscription for the IRR [individual ready reserve] only?' " General Jones asked.

An even more fundamental aspect of the military manpower problem—and one that affects all others—involves incentives to retain "good people and to encourage them to really lead and manage well." The current system, he said, is hamstrung by "disincentives. The after-tax financial value of a promotion today, for any service member, is much less than it was ten to fifteen years ago. What's worse, over the next five to ten years, the prospects for any real adjustments are minimal."

The result is constant turnover and turbulence which makes it difficult to develop morale, efficiency, and esprit de corps, he suggested. These inequities, he warned, "are permeating the system. I see very good people getting out, even though they leave reluctantly. But they are aware of the mismatch; their prospects are going down while their living costs are going up."

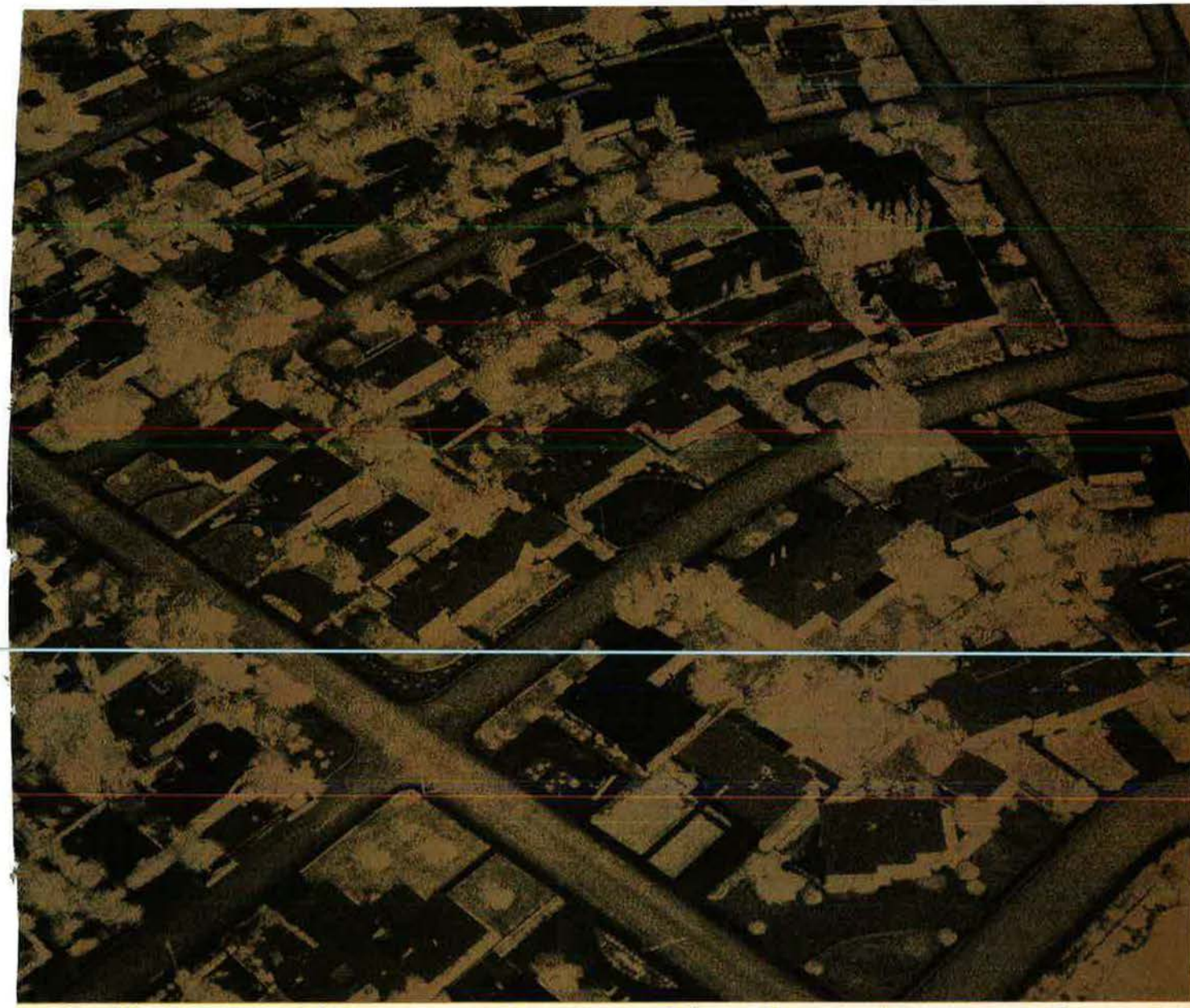
So far as the GI Bill issue is concerned, General Jones stressed that the original GI Bill was useful in recruiting people, but it also served as an incentive to get out. "With retention of experienced personnel our principal personnel issue today, we are looking for benefits that make it attractive to enlist and to remain in the military. A modified version of the GI Bill may be the answer, but we need to examine the idea further to fully understand all of its implications. One provision that may hold promise is to allow the earned rights to be transferred to one's children. Another provision with promise is that any person using any part of the GI Bill must be in the Reserve Forces, the IRR, or selective Reserve." The Chairman advocated further that any person benefiting from the GI Bill should "have really earned those benefits." He explained that because it is "so difficult to give nonhonorable discharges, some persons with honorable discharges may not have performed too well."

The notion of tailoring the GI Bill to differing needs of the four services, General Jones said, "is probably less effective than coping with retention problems through bonus arrangements and in similar ways. I feel the same way about proposals to change the entire pay system to attract hard-to-get skills. Marketplace incentives are not workable directly in the military. We ought to make this a special profession, in some ways different from society as a whole."

Consequently, benefits are of vital importance, including possibly special "income tax allowances. I don't mean that military people should pay no taxes at all, but some special provisions are in order," General Jones pointed out.

Part of the "from-the-bottom-up" look at the military personnel system should include a review of the military judicial system. Some rulings by the Court of Military Appeals in the past "simply tied our commanders' hands," he said.

Overall, the Chairman expressed concern "that, without a broad commitment to a national cross section in uniform, economic and demographic pressures could produce a 'volunteer' armed forces peopled by economic conscripts—and one without the discipline, aptitudes, and cohesiveness needed for a modern global strategy." ■



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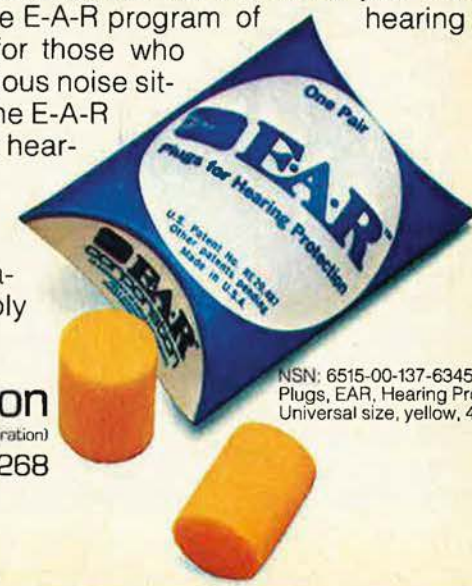

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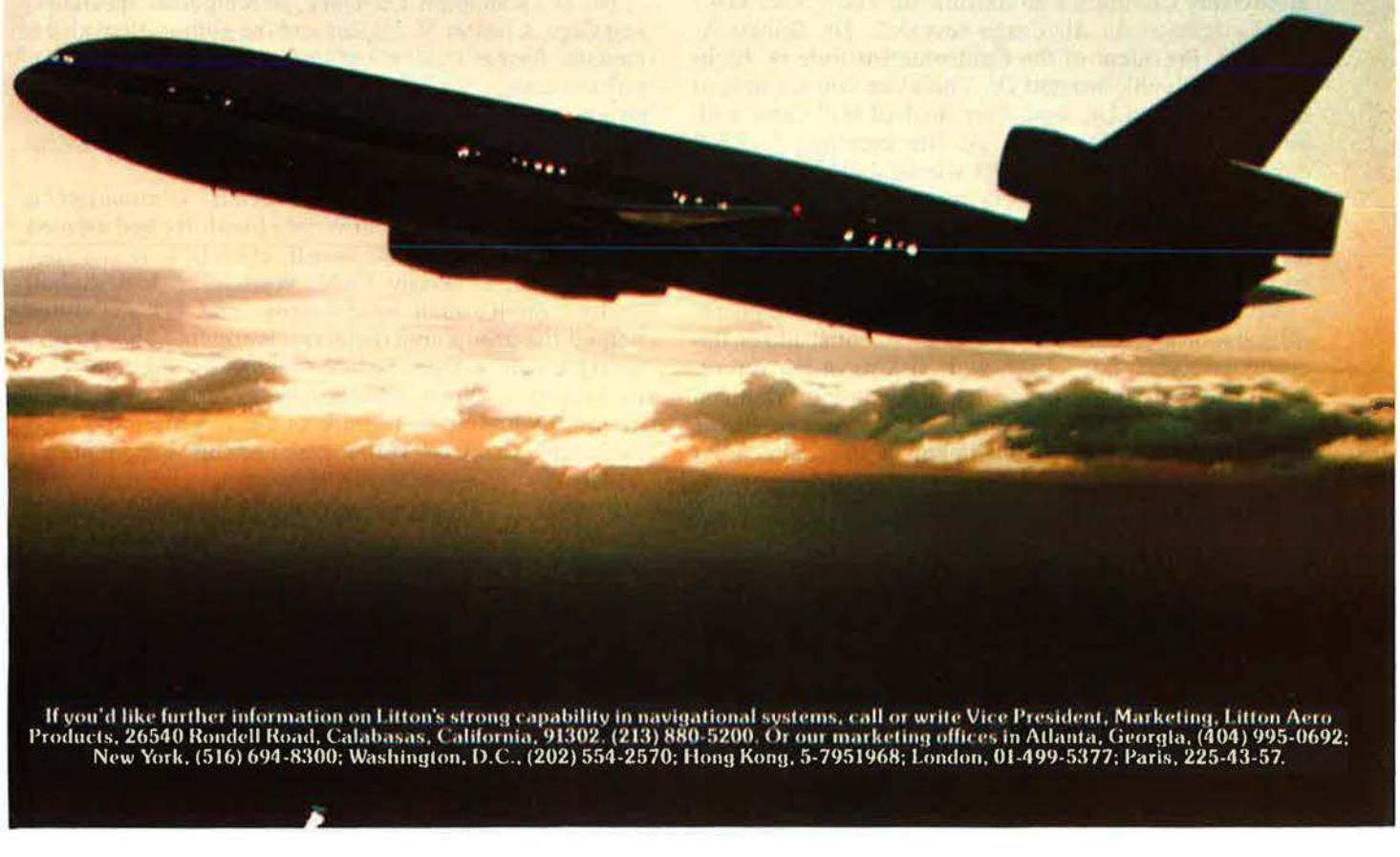

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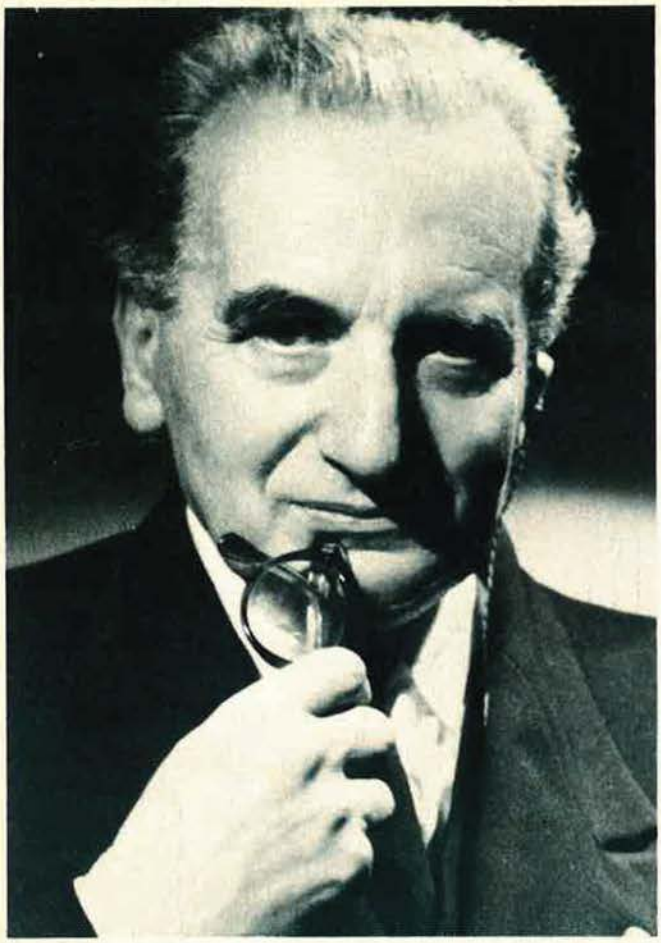
In this centennial year of the birth of Dr. Theodore von Kármán, one of his former students at Caltech, an original member of the Scientific Advisory Group, recalls . . .

Von Kármán's Singular Contributions to US Aerospace Power

BY T. F. WALKOWICZ



A visionary without peer, Dr. Theodore von Kármán was to the modern US Air Force what Billy Mitchell was to the fledgling airpower of an earlier time.

In 1939, Maj. Gen. H. H. Arnold called on the National Advisory Committee on Aeronautics (now NASA) for more emphasis on Air Corps research. Dr. Robert A. Millikan, President of the California Institute of Technology (Caltech), brought Dr. Theodore von Kármán to the meeting, and Dr. Vannevar Bush of MIT came with Dr. Jerome C. Hunsaker. At the meeting, General Arnold stated that de-icing of windshields and rocket-assisted takeoff for bombers were areas needing emphasis. The reply: "MIT will de-ice your windshields; let von Kármán fool around with that Buck Rogers stuff."

Von Kármán and Arnold thus began a singularly fruitful collaboration between an applied scientist and an operational commander, both with visions of the future. This meeting between the two, and the support that von Kármán subsequently received, led eventually to the JATO program, the establishment of the Caltech Jet Propulsion Laboratory, and the founding of the Aerojet-General Corp.

Deterring World War III

In 1944, en route to Cairo, Arnold landed his B-25 at New York City's La Guardia Airport and had von Kármán, who was then in a hospital, brought to him in an ambulance. The General told the scientist that World War I had been a war of brawn; World War II, clearly drawing to an end, was a war of logistics; and World War III, if it occurred, would be a war of brains. Arnold, who knew of the Manhattan Project to develop the atomic bomb, told von Kármán that World War III must never happen. Technical surprise would be decisive in future wars, and research and development could help US airpower deter such a war.

Arnold asked von Kármán to establish a Scientific Advisory Group (SAG) involving leaders from every field of science impacting on airpower. In the early winter of 1944, they began to gather—Hugh L. Dryden as deputy, DuBridge, Zworykin, Zwicky, Tsien, Krick, Pickering, Sears, Markham, Newmark, Drs. Shields Warren and Detlev Bronk, and many others.

Dr. W. Randolph Lovelace, aeromedical specialist, and Capt. Chester N. Hasert and the author, then also a captain, former students of von Kármán's first jet propulsion course at Caltech, were the group's "scientists in uniform." Col. Fritz Glantzberg, MIT graduate, and Lt. Col. Godfrey T. McHugh provided the administrative backup.

Among the group was Dr. Frank L. Wattendorf, a propulsion specialist from Wright Field. He had worked with von Kármán on the construction of a twenty-foot wind tunnel at Wright Field. Wattendorf had studied under von Kármán in Germany, and his anecdotes helped the group anticipate von Kármán's unorthodox working habits. One anecdote involved a streetcar stop in Aachen, at which von Kármán wrote the solution to a complex equation on the side of a car. Wattendorf then had to ride to the car barn in order to copy the equation.

Any discussion with von Kármán was frequently interrupted by "Pardon!" upon which he would write on his sleeve the solution to some equation he had been solving in his head. Following this, he would resume what was usually a complex discussion.

The younger members found that working with the original SAG group amounted to the equivalent of a semester of graduate school each day. Inspiring, too, was the twenty- to thirty-page summary sent to General Arnold each month that was returned—edited—the

following morning. The marginal notes spoke eloquently of Arnold's vision: A suggested fighter speed of 600 mph would be scratched out and Arnold would ask: "Why not 1,000–2,000 miles per hour?" Meetings between the two would be marked by Arnold's cries for less conservatism and von Kármán's plea that competent scientists have to be able to deliver what they promise.

By way of contrast, the meetings von Kármán had with some members of the air staff had a different tone. Some senior military man present would insist that a project couldn't be done. Then von Kármán would plead and explain patiently and finally would say: "See here, I was a lieutenant in the Austro-Hungarian general staff, and it was always the same. The problems were different, the times were different, the music was different, but the melody, the melody, it was always the same."

The Impact of Sweepback

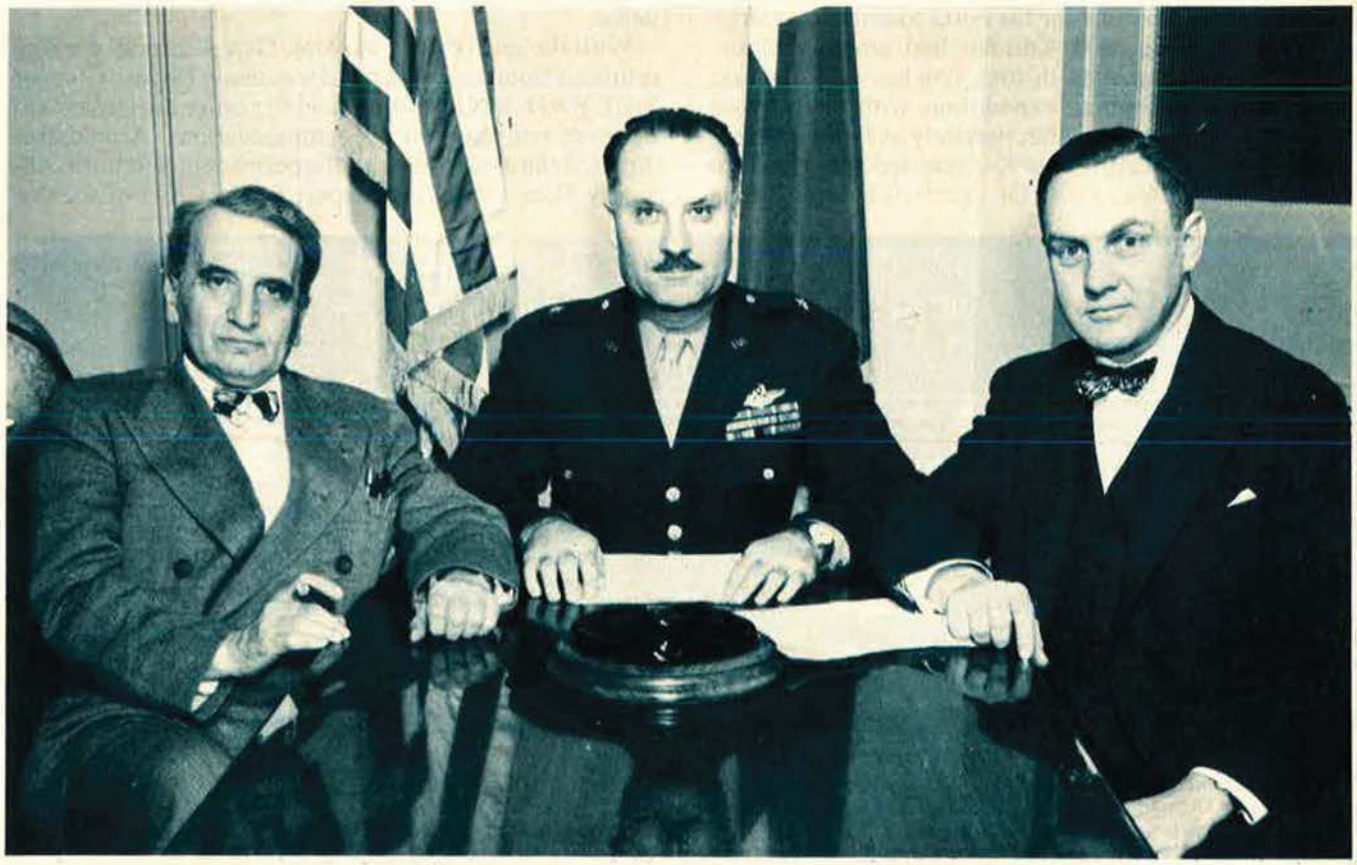
With V-E Day approaching, von Kármán took part of the SAG to Europe, to assimilate the astounding German aeronautical developments. At Braunschweig, for example, there was a complex of supersonic wind tunnels and related work. The aerodynamics of the Messerschmitt Me 262's swept wings (the first operational jet fighter) were explained. The SAG members learned that an accident during initial tests, in which the first Me 262 stalled and landed on the second test aircraft, had delayed the plane's operational introduction by many months. That, plus Hitler's stupid, intuitive decision to use the Me 262 as a fighter-bomber kept the Me 262 from decimating the Allied bomber fleets, which would have significantly prolonged the war.

The importance of sweepback was quickly transmitted to the United States. George S. Schairer soon persuaded the Boeing Co. to redesign the wings of the B-47, making it the first successful jet bomber. And North American (now part of Rockwell International) redesigned the F-86 Sabrejet, making it the first successful US jet fighter.

In addition, the SAG members found all of the designs, engineering calculations, and wind-tunnel tests for the A-10 rocket, a transoceanic V-2 that was to be aimed at the US.

The SAG members also noted with considerable interest that a large cadre of German engineers had been taken to Russia from Peenemünde, site of V-2 rocket development work.

Von Kármán and his colleagues had no illusions about the quality of Soviet scientists. After V-E Day, in May 1945, von Kármán and several Western scientists were invited to Moscow for the 270th anniversary of the Soviet Academy of Sciences. During a dinner in the Kremlin with the entire Politburo present, von Kármán was asked his views about the "relative contribution of the glorious Soviet forces and the Allied powers to the defeat of Nazi hordes." Glancing at Stalin, Molotov, Beria, and others nearby, von Kármán replied, "I think it was perhaps fifty-fifty." The reply was greeted with hilarious laughter, and he was corrected by a Soviet "academician" who said, "Colleague, it was at least ninety percent Soviet and maybe ten percent Allied."



Three of the top scientific advisors of the newly formed USAF, from left, Dr. Theodore von Kármán, Chairman of USAF's Scientific Advisory Group; Brig. Gen. Donald L. Putt, Director of R&D in the Office of the Deputy Chief of Staff, Materiel, Hq. USAF; and Dr. Albert E. Lombard, Jr., head of the Research Division under General Putt.

With a shrug of his shoulders, von Kármán said, "You might be right, but don't you think the Americans and the British will have trouble dividing the ten percent?"

During his stay in Moscow, von Kármán kept asking the lovely KGB lady who had been assigned to him for permission to return to the US via his beloved Budapest. Each day the lady advised that the permission had not yet arrived. Upon departure, von Kármán, in his uniform as an assimilated Air Force major general, limped out onto the Moscow Airport, dragging his B-4 bag and asking various Soviet crew members whether they were going to Budapest. One finally replied yes. Von Kármán climbed aboard, the doors closed, and off to Budapest they flew, from whence he had to be rescued by Glantzberg and McHugh.

Upon the group's return to the US, the SAG submitted to General Arnold its first report, "Where We Stand." The submittal had been preceded by spirited debate about the captured data on long-range rocketry. But the firm conclusion was reached that, although guidance and warheads needed further work, engineering ICBMs was possible and their era was at hand.

After V-J Day, von Kármán again led a contingent to Europe, with instructions to complete their work there, and then go on to China and Japan. President Roosevelt had given the original *Sacred Cow* C-54C VIP aircraft back to General Arnold, who in turn assigned it to von Kármán for the trip. It was equipped with double-decker beds, a full kitchen, and a large living room-dining room, where von Kármán and McHugh played continual chess. Soon after arrival in Wiesbaden, it was learned that General Arnold had suffered a mild heart attack and was anxious for the SAG to finish its work.

During this trip, von Kármán had grown progressively quieter, engaging in long lunches and dinners, punctuated by shopping expeditions with his beloved sister Josephine, known affectionately as Pipö, who had gone over separately. Von Kármán led the group to Zurich for conferences with Dr. Jacob Ackerett, leading supersonic expert, who had wind-tunnel facilities far surpassing at that time anything that existed in the US. There he also met Engineer Pfeninger, who was doing advanced work in boundary layer control. Von Kármán promptly arranged an assignment for Pfeninger at Northrop where, with his friend Jack Northrop, he hoped to apply BLC to advanced flying wing transports.

Von Kármán now sent the group on, returning himself to two months' seclusion in Paris. Minus von Kármán, the group went on to China and then to Tokyo and to Hiroshima and Nagasaki, which provided awesome motivation for General Arnold's determination to do whatever possible to prevent World War III.

Soon after the group returned to Washington, von Kármán arrived from Paris with the first draft of *Science, the Key to Air Supremacy*. He had written it in longhand at a library in the Sorbonne. Classified data had been left blank, to be filled in later by experts, but the essence of the report, as finally submitted, was there.

Toward New Horizons

On December 19, 1945, this summary volume, together with some twenty supplementary volumes on various fields, entitled *Toward New Horizons*, was presented to General Arnold. Arnold was elated and directed that copies be sent immediately to all deputy chiefs of staff.

As the SAG's reports were being received by General Arnold, Dr. Vannevar Bush was testifying before Congress that the idea of rockets with intercontinental ranges was absurd and work on them should be curtailed.

With the end of the war, Maj. Gen. Curtis E. LeMay returned from the Pacific and was made Deputy Chief of Staff, R&D, by General Arnold to ensure the implementation of von Kármán's recommendations. Arnold also directed the establishment of a permanent Scientific Advisory Board (SAB), to report to the Chief of the Air

First full meeting of the Scientific Advisory Board, in June 1946, at the Pentagon. Seated, from left: Dr. George E. Valley, Jr., Dr. Frank L. Wattendorf, Dr. George A. Morton, Dr. Nathan M. Newmark, Dr. Walter S. Hunter, Dr. Lee A. DuBridge, Dr. Detlev Bronk, Dr. Theodore von Kármán, Dr. Charles W. Bray, Dr. C. Richard Soderberg, Dr. Courtland D. Perkins, Dr. Charles S. Draper, Dr. Harold T. Friis, Dr. William R. Sears. Standing, from left: Dr. Pol E. Duwez, Dr. Hsue-shen Tsien, Dr. William H. Pickering, Dr. Ivan A. Getting, Dr. W. J. Sweeney, Dr. W. Randolph Lovelace II, Dr. Julius A. Stratton, Dr. Duncan P. MacDougall, Dr. Edward M. Purcell, Dr. Vladimir K. Zworykin, Dr. Fritz Zwicky, Dr. Robert H. Kent, Col. William S. Stone, and Col. Roscoe C. Wilson. The SAB members not present at this meeting were Prof. Enrico Fermi, Dr. George Gamow, Dr. Hugh L. Dryden, Dr. Walter A. MacNair, and Col. Benjamin C. Holzman.

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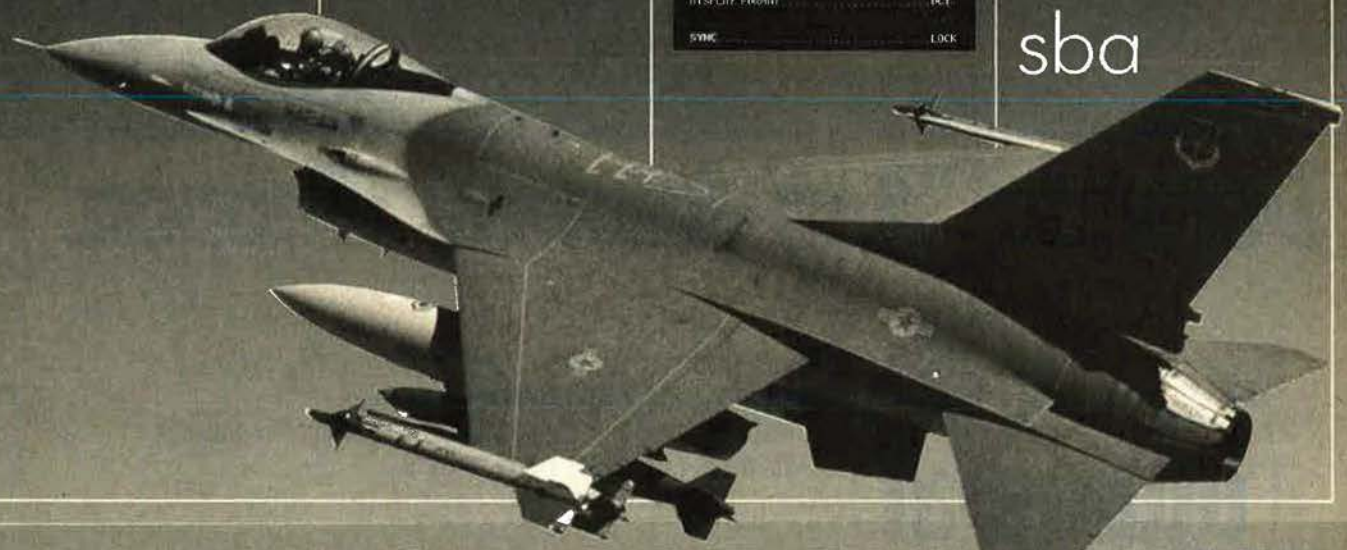

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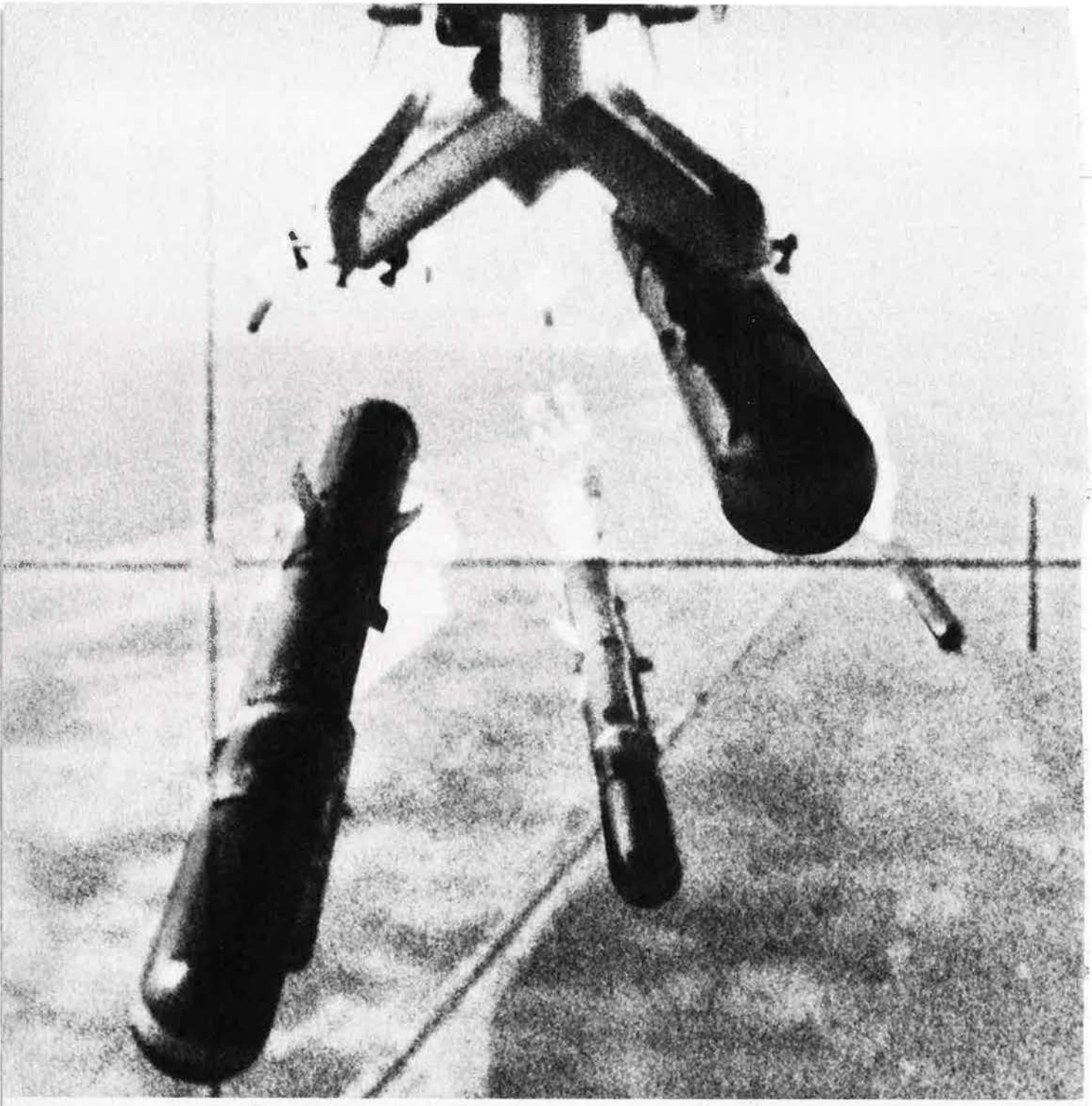

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Dr. von Kármán with the 1950 AFA Airpower Award for distinguished service in the field of science. After his death, the trophy was renamed in his honor.

Force. At one meeting, LeMay demurred at undertaking the assignment, because he was only a civil engineer. Von Kármán muttered, "But I hear you are not civil, and you can't be to implement these reports."

The R&D budget for defense was arbitrarily set at $500 million because "there was a shortage of engineers for converting the economy to peacetime." In aeronautics and astronautics, several scientific revolutions in weapon systems were to be exploited: supersonic flight, jet propulsion, electronics and communication, navigation, guidance, radar for detection and early warning, advanced gun and bombsights, and the lure of spaceflight. But, because of limited budgets, outstanding aeronautical design teams had to be dismantled.

The nation's leadership forebade public discussion of space satellites. One congressman, seeing the astounding display of captured German equipment at Wright Field, called for literally "*hundreds* of dollars" to be spent on this kind of research.

Retardation and Delay

One of the first SAG projects that LeMay tried to implement was the establishment of what is now the Arnold Engineering Development Center at Tullahoma, Tenn. This proposal was some two years being reviewed by two committees, several subcommittees, and scores of panels and subpanels of the Research and Development Board, which had now become laughingly known as the "Retardation and Delay Board."

The permanent SAB became totally demoralized when their recommendations continued to be unheeded. Nobody even responded with thoughts about the SAB's recommendations. Thus, toward the end of 1948 and in early 1949, many members began to consider resignation.

However, in 1948, then Brig. Gen. Donald L. Putt, a former Caltech student of von Kármán's, became Director of R&D in the air staff. The writer had returned from graduate school and was reassigned as von Kármán and Putt's executive with the SAB.

Putt was clearly determined not to allow further deterioration, and sought help and support. His leader in this effort was Col. B. A. Schriever who, together with Capts. V. T. Ford and R. J. Nunziato, formed the Legislative Liaison Section of R&D. Ford, injured in a midair collision in the 1930s, had worked for several years as a congressional aide. Returned to active duty during World War II, he stayed on.

With Putt's tacit approval, initiatives were taken to end run the RDB with the Congress. Col. Godfrey McHugh was now executive to Chief of Staff Gen. Hoyt S. Vandenberg, and his advice was sought on gaining the Chief's support. Dr. Bush suffered a heart attack and was replaced by Dr. Karl T. Compton, who immediately began agitating for a greater R&D budget. But Dr. Compton, too, soon became ill and was replaced by Dr. Walt Whitman of MIT, who also took up the fight.

McHugh at first showed little interest, although he was forced to concede that the R&D situation had deteriorated. McHugh eventually came around, urging Putt and his colleagues to contact staunch airpower advocate Lt. Gen. James H. "Jimmy" Doolittle, who listened patiently to a long monologue by the writer one afternoon, smiled, placed a call to General Vandenberg, and said: "Count on me for help."

The Chief had signed a directive, requiring all commands affected by SAB recommendations either to implement them, or to say why they couldn't or wouldn't, specifying when R&D budgets were inadequate. In addition, with the strong support of Gen. K. B. Wolfe, then Deputy Chief of Staff for Materiel, Putt got the entire air staff to coordinate a message from the Chief to the SAB, calling for an overall study of R&D programs and activities in USAF.

Gen. Muir S. Fairchild, the Vice Chief of Staff, delivered the message in the spring of 1949. An SAB committee was formed to look into USAF R&D, with Louis N. Ridenour, then Dean of the Graduate School at the University of Illinois, as Chairman and Jimmy Doolittle as a member. Ridenour would laughingly refer to himself as the "Chairman of the Doolittle Committee."

First Soviet Nuclear Test

The hopeful view of Soviet intentions among liberal scientists, led by Dr. Robert Oppenheimer and his many friends, exercised a strong influence on US policies. Maj. Gen. John A. "Sammy" Samford, Chief of Air Force Intelligence, had been lambasted for suggesting the Soviets might explode an A-bomb as early as 1951. Dr. Bush, in *Modern Arms and Free Men,* published in August 1949, wrote that it might be twenty years before the Soviets built an A-bomb. Then the radioactive debris from the first Soviet nuclear detonation swept out of Siberia and over the northern continent. The presses were stopped to update Dr. Bush's book.

T. F. Walkowicz was a student in Dr. von Kármán's first jet propulsion course at Caltech. He earned a doctorate in aeronautical engineering at MIT during Air Force service, 1941–52. He worked for Gen. H. H. "Hap" Arnold during the war years, and for Dr. von Kármán on the USAF Scientific Advisory Board when it was established. He has been a contributor to AIR FORCE Magazine and a member of the AFA Board of Directors. Dr. Walkowicz is President of National Aviation and Technology Corporation in New York.

Von Kármán was very troubled during this period for still another reason. His views on the nature of a consultant's responsibilities were strongly held. He believed that scientists as consultants should limit themselves to answering questions in their fields of competence. He said that until recently the SAB was being ignored even in this role. Now, he felt it was being asked to do too much.

Von Kármán's belief was that scientists were only human, endowed with no greater political wisdom or judgment than others. He strongly resented scientists who gave various leaders unfounded, unsound political advice, instead of limiting themselves to sound advice on scientific questions in *their fields of competence.*

The SAB report on "R&D Activities in the USAF" was submitted in the fall of 1949, together with a military counterpart by the Air War College under the leadership of Maj. Gen. Orvil A. Anderson. The latter was a milestone. For the first time since the end of World War II, leading operational men such as Joe Holzapple, Jim "Whis" Whisenand, Perry Hoisington, Mike Ingelido, and David Burchinal joined in the call for a revival of the USAF R&D effort.

The two reports sparked a bitter controversy within the Air Force, culminating in a decision announced to the air staff on January 3, 1950, by Generals Vandenberg and Fairchild to give R&D autonomy to fight for their own programs and budgets, with the establishment of a Deputy Chief of Staff for Development and the Air Research and Development Command. Jimmy Doolittle, along with Maj. Gens. William F. McKee and Gordon P. Saville, in the Air Staff, played crucial roles in carrying the argument. As the Air Materiel Command then fought a rear-guard action to thwart the Chief of Staff's decision, Doolittle was brought in to become a full-time special assistant to the Chief of Staff for R&D. He sought the collaboration of Louis Ridenour, by now USAF's first Chief Scientist.

With the establishment of Doolittle's separate office, von Kármán tried to return the SAB to its proper role as scientific advisor. Again, however, scientists who supplemented poor scientific advice with questionable political advice intruded themselves.

The USAF "overemphasis" on SAC was challenged in various ways: The US was goading the Soviets into an arms race and the removal of SAC might attenuate Soviet paranoia. Again, the USAF- and MIT-sponsored Charles River study on air defense had not gone far enough; a 100 percent perfect air defense system was possible; DEW/DAD—deep early warning, deep air defense—an idea founded on views expressed in Dr. Bush's book that the defense was gaining the ascendancy over the offense was widely heralded by the press, particularly the Washington *Post*.

A special "Summer Study Group," led by Dr. Mervin J. Kelly, President of Bell Telephone Laboratories, was convened to examine these ideas. It concluded that Distant Early Warning "DEW Line" merited implementation, and the Air Force immediately appropriated money for it.

NATO-Competing Systems

Von Kármán studiously avoided active participation in the emerging political brawl among the scientists. He had found a new friend in William A. M. Burden, an international statesman with long experience in aeronautical affairs beginning in the 1930s. Von Kármán had turned his interest to NATO. He worried greatly about the proliferation of competing weapon systems among the allies. He was hopeful that, in due course, this competition might be narrowed through active cooperation in R&D affairs long before specific weapon systems were developed.

Burden was now Special Assistant for R&D to Air Force Secretary Thomas K. Finletter. He helped von Kármán sponsor a proposal to form the Advisory Group for Aeronautical Research and Development (AGARD) in NATO. Alas, the proposal needed the approval of the JCS and the NATO standing group. Sitting in a senior position in both groups was a vice admiral who kept delaying approval. When the SAB Secretariat perceived what was going on, von Kármán decided to appeal to his Aerojet friend, Dan A. Kimball, who had become Secretary of the Navy.

Kimball's admiration for von Kármán was unbounded. Kimball spoke to the reluctant admiral a few days later. The admiral admitted his ploy and the reason for it: "Mr. Secretary, there are two possibilities: First, it may be a terrible failure, in which case why should we start? The other possibility is it could be a major success, in which case I can't let the Air Force do it." Soon thereafter, the proposal was approved, and the first AGARD meeting took place in Paris in mid-1952.

The meeting was marred for von Kármán by an irritating logistical snag. The US Air Attaché's Office in Paris, like all similar offices worldwide, has seemingly endless resources when junketing congressmen are in town. In this case, though, no car was available for Dr. von Kármán's use. But following several well-placed transatlantic calls, the Embassy suddenly discovered it not only had a car but a chauffeur as well for Dr. von Kármán. For USAF officers there, the sight of a man like von Kármán being shortchanged after his years of major contributions was too much to bear.

Now von Kármán was once again in his element—addressing scientific problems. Over the years, AGARD has made major contributions in scientific education and in bringing NATO weapon systems into closer operating harmony.

Establishment of AEDC

The summer of 1952 also saw the long overdue establishment of the Arnold Engineering Development Center (AEDC). President Truman dedicated the Center (actually then only a warehouse after seven years of fighting the political scientists) in memory of General Arnold on June 25, 1952, on the second anniversary of the Korean War. Mrs. Henry H. Arnold, General

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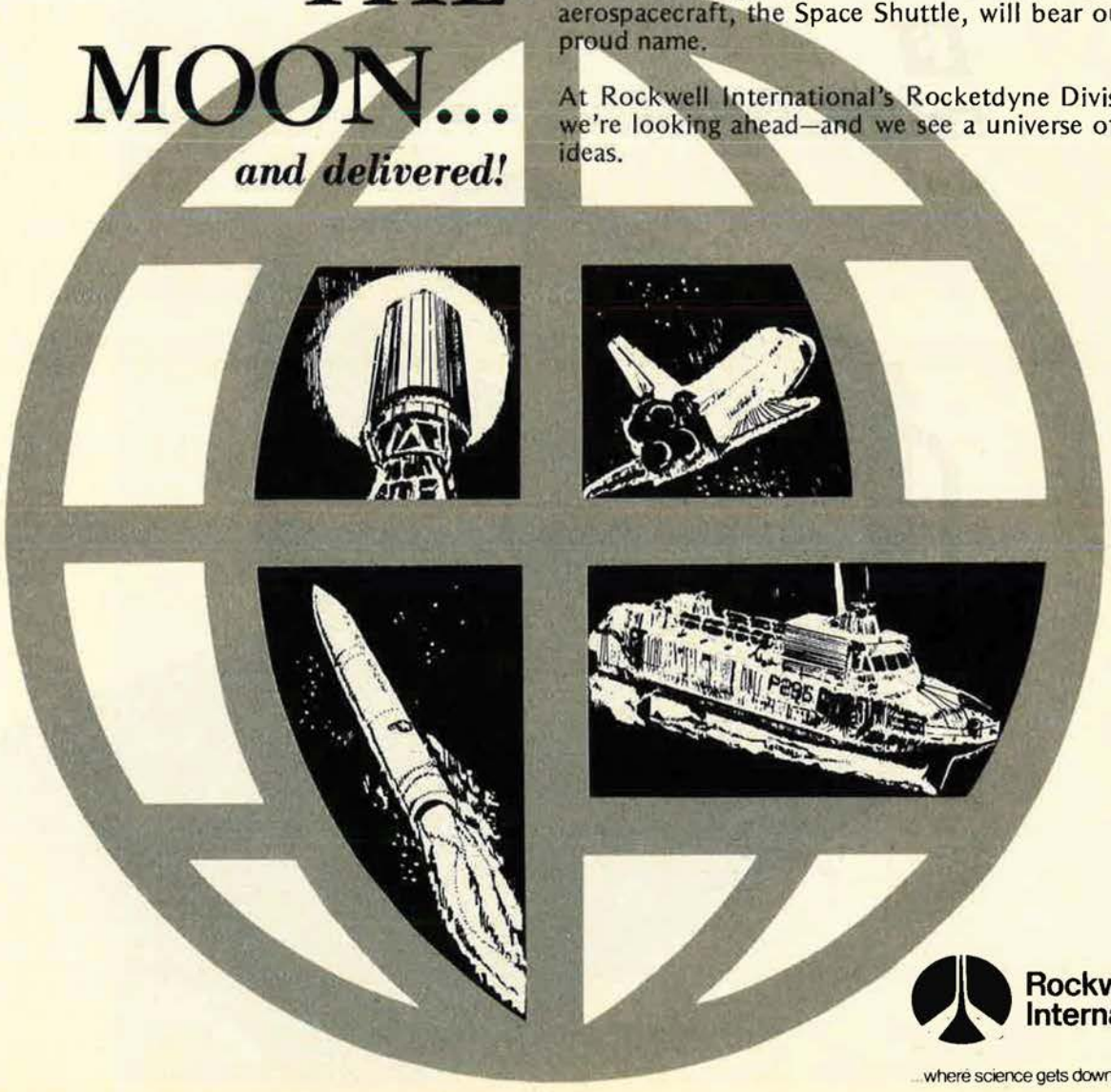

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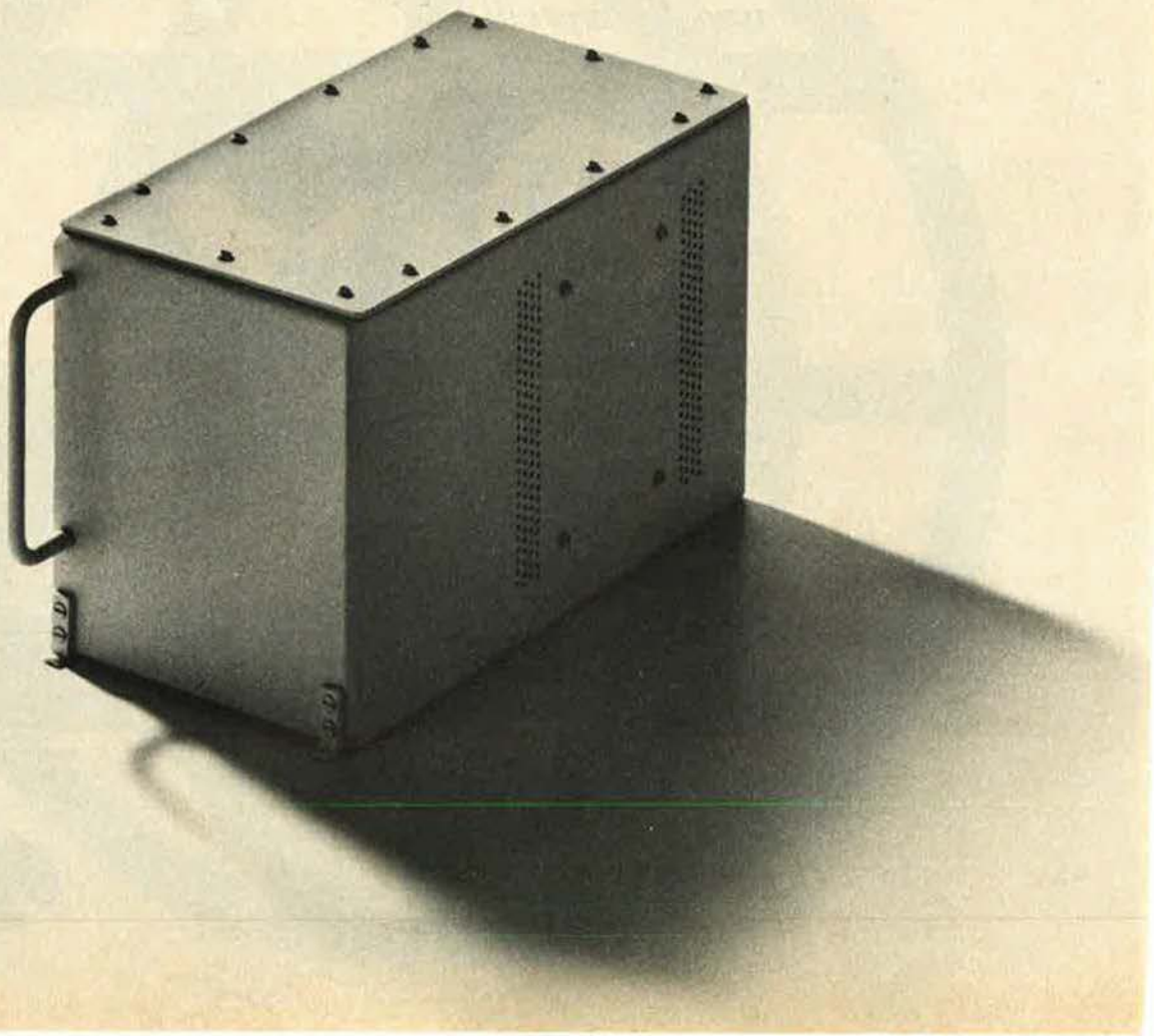

Arnold's widow, was there along with other members of the family. The AEDC, along with the von Kármán Gas Dynamics Laboratory, is a living tribute to the collaboration between these two great men. The Center has contributed much over the years, both in the field of supersonic propulsion and in the solution of several crucial problems in the ICBM program.

The New Air Force Lineup

With Eisenhower's Presidency, the new lineup in the Air Force included, as Assistant Secretary of R&D, Trevor Gardner, who was convinced that the Soviets were indeed trying to leapfrog the US in the ICBM field. He enlisted the help of Drs. John von Neumann (Princeton, soon to be an AEC Commissioner) and James R. Killian of MIT. Von Neumann was asked to form a committee to study the ICBM question. Killian and Rand Corp. chairman Rowan Gaither were asked to study means of augmenting and protecting SAC from surprise attack.

Von Kármán continued his work as Chairman of the SAB and AGARD. He had met Thomas G. Lanphier, a former Air Force P-38 pilot (famed for having shot down Admiral Yamamoto during World War II) and Floyd Odlum, Chairman of Convair, who kept the Atlas ICBM program alive with company money during the late 1940s when military R&D budgets were restrained. Von Kármán worked with them as a consultant.

Out of von Neumann's work, then-Col. B. A. Schriever was given top national priority to develop the ICBM. Schriever successfully ran a program many times greater than the World War II Manhattan District, and succeeded in checkmating the Soviets just in the nick of time. In fact, when John F. Kennedy began the campaign for the Presidency in 1959 claiming a "missile gap," Schriever had just closed it.

The real ICBM story has also never been told. Three immigrants, Gardner, von Neumann, and Schriever literally saved this country by maneuvering Eisenhower off the golf course and away from the bridge table to make one of his two greatest decisions as President. (The other was "open skies," the real key to disarmament inspection. It was ridiculed by the Soviets, as was the Baruch Plan [largely the brilliant work of Robert Oppenheimer] for international control of atomic energy.)

A strange schizophrenia characterized the country's leadership during the early Eisenhower years. With the advent of missiles, man's further thrust into space was clearly ahead. But R&D budgets were cut and, as the story went, any public mention of spaceflight by an Air Force officer led to further R&D budget reductions.

At the 1959 dedication of a facility at AEDC named for him are (from left) von Kármán; Lt. Gen. B. A. Schriever of ARDC; Dr. Hugh Dryden of NASA; Dr. J. V. Charyk, Ass't Sec'y for R&D; and Maj. Gen. Troup Miller, AEDC Commander.

The USAF turned to the National Academy of Sciences for a spaceflight study. Detlev Bronk and his successor, Frederick Seitz, as presidents of the National Academy, were strong supporters of the Air Force. Bronk had been a Navy flyer in World War I, and Seitz had been a colleague of Ridenour's at the University of Illinois. Both were admirers of von Kármán.

The NAS spaceflight study took two years, 1956–57, with summers spent by the group at Woods Hole. During August 1957, the Soviets announced that they had successfully test fired an ICBM.

Sometime before, Eisenhower had authorized V-2 flights, a decision leading to knowledge of Soviet ICBM progress that made the Soviet announcement a chilling one. Schriever was still years away from a successful ICBM test firing.

Von Kármán's spaceflight study was coming to an end just as the Soviets launched Sputnik, on October 4, 1957. Again von Kármán's foresight was vindicated, and a blueprint for the future was on hand. In the Senate Select Committee hearings on spaceflight that followed, Dr. Bush started his testimony with an acknowledgment that he was among those who had held the US back.

Except for his participation in AGARD, von Kármán became less active and lived quietly in Paris. Pipö had died a few years before, leaving him bereft.

His most notable return to this country occurred on February 18, 1963, when President Kennedy awarded him the first National Medal of Science. It was a beautiful sunny day in the Rose Garden, with the elderly intellectual giant and the young President, both soon to be dead.

Von Kármán and I met just once more, in one of his many favorite restaurants on the Left Bank, later that year. He started his lunch as usual with a double manhattan straight up with three cherries. Then he had two more. Following a delightful lunch with some Tavel rosé, he, June Merker (AGARD's secretary), Ralph Nunziato, and I strolled slowly a few blocks back to the hotel. He walked more steadily than we did. Tears glistened in his eyes when he said good-bye. We felt we would never see him alive again.

On May 6, 1963, there passed into history the intellectual giant of the past century in the applied sciences relating to aeronautics and astronautics. A man with humor and humility, who had a complete awareness of what he did not know, and who had the greatest respect for those in fields other than his, particularly great airmen.

Von Kármán's partnership with Arnold has been the driving spirit behind US airpower's quest for technical superiority. The vision of these two men largely accounts for the fact that, so far, there has been no *third* World War.

It falls upon us, scientists and airmen alike, who cherish freedom and who harbor no illusions—however hopefully motivated—about the ultimate objectives of the Soviets, to face the challenges of the period ahead in a manner that proves us worthy of their heritage. ■

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THE AIR FORCE FAMILY—OUR MOST ESSENTIAL RESOURCE

BY THE HON. VERNE ORR
SECRETARY OF THE AIR FORCE

I AM most pleased to have this opportunity, so soon after joining the Air Force family, to share with the large readership of AIR FORCE Magazine my thoughts and feelings on my new role as well as my very positive initial impressions of the people of the Air Force.

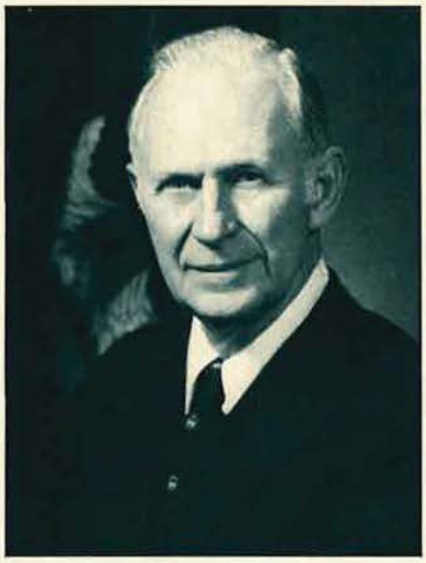
Let me start, however, by describing the concerns that led me to take on the responsibilities of Secretary. I have, like you, felt growing concern with the buildup of Soviet forces, ongoing for the last fifteen years. Moreover, like others entering government at this time, I feel strongly that our response to that buildup has been inadequate. The opportunity to work toward improving that situation was, therefore, most welcome, and I have accepted it enthusiastically. I feel that I, like everyone in the Air Force, have been called upon to serve at a critical point in our nation's history.

The actions of our major adversary are clear and foreboding. Only through an equally clear series of strengthening measures can we restore and maintain the military balance. It is my firm goal to do all that I can within the limitation of my authority and talents to ensure that the will of the American people, expressed so clearly last November, is translated into the Air Force capabilities this nation needs to defend itself and to maintain its interests in the world.

The significant upward revisions of the FY '81 and FY '82 Defense budgets are vital first steps in a responsible approach to the United States role in the world.

First Impressions

Those are the beliefs I bring along with me to the Air Force—essentially, that we need to do more. Nonetheless, my initial impression of the Air Force has been an intense appreciation of how much its members have been able to do within the increasingly stringent constraints that bind them. Indeed, I suppose it is inevitable for anyone new to the Air Force to be impressed deeply—almost awed—by the scale of its operations, and to be struck also by the capabilities of its equipment and the quality of its people. Those have certainly been my first impressions; and I retain them, even as each day I learn more about the specific problems facing us.



Secretary Orr: "Readiness is as much a state of mind as status of weapons."

I am happy to report that I have detected no reluctance on anyone's part in bringing those problems to my attention. I appreciate very much that kind of candor, as well as the warmth with which Mrs. Orr and I have been received into the Air Force family. I attribute those characteristics both to the nature of Air Force people and to the fact that I take up this position at a time when public consciousness of what needs to be done has finally crystallized.

My personal view—which I find fits closely with that of the Chief of Staff—is that the prerequisite for whatever else we do in improving our defense capabilities is to see to the needs of their common factor—the motivated, dedicated people who operate, maintain, support, and manage the Air Force. While the needs of those people and of their families have been matters for general discussion only in recent months, I appreciate the fact that Air Force leaders and AFA have been calling attention to them for several years. I agree with General Allen's assessment that recent increases in monetary compensation represent a significant step in the right direction.

I also agree with General Allen that more needs to be done along those lines. The new compensation proposals that have been submitted to the Congress show that Secretary Weinberger and the President also understand that point.

But, even as we acknowledge the vital role that adequate pay and allowances play in helping our people to maintain their commitment to the Air Force way of life, we must realize that we cannot concentrate our attention solely on this monetary issue.

The Need for Esteem

There is something else that Air Force people—in fact, military people in general—need, something that more profoundly affects their commitment. That is the esteem in which their lives of service are held by their countrymen. Secretary Weinberger made clear his (and the President's) view on this matter in his very first message to the men and women of the armed forces, in which he said:

> *The new President and I share a deep appreciation of the sacrifices you make and the skills with which you serve and defend all the people. One of my priorities is to be sure that our country fully recognizes and honors your great service at home and all over the world.*

As Air Force Secretary, I intend to

help sharpen that recognition on the part of our citizens.

To do that, I need to see as much as I can as soon as I can. Therefore, I shall be visiting bases throughout the Air Force. On those visits, I intend to find what I can do best to help work out problems, and I also want to talk with Air Force people of all ranks about their concerns. Mrs. Orr is looking forward to accompanying me on some of these visits, to inform herself about the conditions under which our people and their families live and work. With her help, I intend to pay particular attention to how well we are meeting family needs, and to learn where I can be useful in resolving issues concerning our people's quarters, medical and mental health services, child-care centers, and so on.

I regard those items as very clearly related to combat capability. A member who goes home night after night to a family whose basic needs are not being met simply cannot give that extra mile that the Air Force must so often of necessity ask of its people. Readiness—as Dr. Mark pointed out in AIR FORCE Magazine some months ago—is as much a state of mind as status of weapons. The mental concentration essential to readiness is virtually impossible for those whose normal family concerns are complicated by lack of adequate facilities and services.

Verne Orr is a former businessman and political associate of President Reagan who served in the California state government and during the Presidential campaign. Sixty-four, he holds a bachelor of arts degree from Pomona College and a master's in business administration from the Stanford Graduate School of Business. During World War II, Mr. Orr served in the Navy and was discharged from the Naval Reserve in 1951 as a lieutenant commander. A partner in the family auto dealership, Mr. Orr also was involved in the family investment firm and was president of Investors Savings and Loan, also in Pasadena. He has an outstanding civic service record.

A Family Concern

This is not the only reason I feel strongly on this subject. I referred in the opening of this piece to joining the Air Force family. My feeling about families is that they take care of their own. Obviously, I mean that word "family" quite literally. The Air Force is far more than a place to work. The newcomer notes, for example, that its swearing-in and retirement ceremonies have a quite different style and substance from the "hail-and-farewell" parties one finds in other walks of life. Our members' commitment is explicit and enduring. Their families' commitment is no less so, and we recognize that. The certificate presented to the spouse of a retiring member is an acknowledgment that the member's decisions for service have been ratified continually by the family that has shared in that service and borne much of the sacrifice involved.

Secretary Orr: "My feeling about families is that they take care of their own."

The mental concentration essential to readiness is impossible for those whose families lack adequate facilities and services, Secretary Orr believes.

I would hope from all that I have said on these subjects that you perceive a lively interest on my part in our people's welfare. My interest in ensuring that our people have the tools to do their job is no less lively, I assure you, and I shall be saying more on that subject in future contributions to this magazine. But I felt that in this, my first opportunity to address a large segment of the Air Force and its close friends, I should make crystal clear that, in making every decision my position entails, I will be looking at the ramifications those decisions will have on our most essential resource—the men, women, and families who *are* the Air Force. ■

THE MILITARY ROLE—A NEW AWARENESS

BY GEN. LEW ALLEN, JR.
CHIEF OF STAFF, UNITED STATES AIR FORCE

THE release in mid-January of the fifty-two Americans held hostage in Iran triggered an outpouring of public sentiment that surprised hostages and commentators alike. Clearly, this event touched a deeper nerve in the public mood than had been anticipated. Part of the explanation lies in the conjunction of their release with the inauguration of a new President, whose victory reflected a dramatic shift of public opinion. I believe that these two events are related, and that there are broader conclusions to be drawn with respect to changing public attitudes toward the value of national service and the necessity for increased military preparedness.

Value of National Service

Somewhat to their embarrassment, our fellow countrymen returning from Iran were hailed widely as heroes. Some of the hostages were quick to point out that the title of hero was better reserved for the brave men who gave their lives in the attempt to rescue them from their captors when the prospects for their release seemed desperately slim.

Others looked back further, to the Vietnam conflict, and compared their experience with that of the Americans whose captivity was considerably more arduous and, in many cases, lasted up to five times as long. This comparison was also drawn by several journalists and veterans of the Vietnam War, who noted the marked difference between the euphoric welcome accorded the fifty-two released from Iran and the reception that awaited thousands of young American servicemen who returned from Southeast Asia either unheralded or to mocking abuse.

As our nation continues to heal itself from the divisiveness generated by Vietnam, a serious scar remains, reflecting our collective neglect of the veterans of that conflict. I am hopeful that the exuberant response to the release of those Americans who endured

General Allen: "Renewed public recognition of the value of military service."

capture in Iran was, in some measure, intended as an atonement for the indifference shown to Vietnam veterans and to the suffering of families who lost loved ones there.

The nation has developed a renewed appreciation for the risks and the sacrifices that go hand in hand with representing and defending American interests around the globe. This understanding reflects growing awareness of the dangers posed by a heavily armed and increasingly assertive Soviet Union, the need for stronger defenses to protect our interests around the globe, and the essential contribution of those Americans who choose to serve their country. With this greater public appreciation should go an increased pride in service to America—pride in country and pride in uniform.

The serviceman's pride in his role of service to country was damaged seriously in recent years when antimilitary sentiments were widespread and insufficient pay caused economic hardships and demonstrated further that the American public no longer valued his service. Fortunately, and none too soon, there has been renewed public recognition of the value of military service, and actions to improve compensation have gained support in the Congress. The resulting legislation has done a great deal to restore a more equitable standard of living for military personnel.

Recognition and Leadership

There are two further points regarding military compensation. First, it is clear that the nation paid a severe price, in the form of losses of experienced personnel, for allowing military pay to erode to levels unacceptable for many career servicemen. I hope that this lesson has been well understood and that, in the future, the needs of military members and their families will be better tended.

Second, pay alone is not the answer to maintaining an adequate force of skilled career personnel. Even more important is public recognition of the worth of military service and the status that honorable service provides. Uniformed military service is not just a "job"—individual satisfaction and motivation must stem from patriotism and pride of service.

This point is well understood by Air Force men and women. It accounts for the fact that so many of our professionals have continued to stay and serve on cold flight lines and at lonely outposts, to endure alert duty and prolonged TDYs, and to carry the additional load created by undermanning and declining experience levels even when their monetary compensation was clearly inadequate. I am very proud of their performance. They prove that the attributes of pride, accomplishment, dedication to service, and simple love of country—patriotism—are still strong currents in the mainstream of Air Force life.

These priceless qualities must be preserved and nourished at every level of organization. The most important ingredient for a climate that fosters pro-

fessional, dedicated performance is good leadership. Given the current experience levels in the Air Force at large, whether on the flight line, in the laboratories or wing, or at higher headquarters, the need for responsible, competent leadership is even more compelling.

Young supervisors, NCO and officer alike, are shouldering responsibilities normally reserved for more senior, seasoned people who have profited from years of experience. Air Force leadership has been good traditionally, but the situation we face is demanding and requires renewed emphasis on better leadership at all levels.

Now is a time of testing for the Air Force, as it is for our country. The caliber of men and women in our ranks is adequate to the leadership and management challenges that lie ahead. And, based on the renewed public concern for military preparedness, I am confident that the nation is ready to step up to the serious challenge posed by the increasingly powerful military forces of the Soviet Union.

Air Force men and women must and will respond to these challenges—we have no place for those who will not. We must have an even better Air Force—improved performance, increased pride in uniform, better leadership, and a tighter, ready organization. We have the best people; we have no choice but to demand the most from them and give them the leadership and the opportunity to do the job.

Necessity for Military Preparedness

The growing awareness and concern for the status of military personnel has been but one facet of a broader public interest in the condition of the armed forces in general, and the US-Soviet military balance in particular. This interest was triggered by the mid-1979 Senate hearings on the proposed SALT II Treaty and was intensified by subsequent events in Southwest Asia.

The prospects and problems of conducting combat operations in the Persian Gulf region dominated the nation's attention as debate unfolded on such matters as the composition of the Rapid Deployment Force, access to facilities in Southwest Asia, and the readiness of US general-purpose forces to deploy and fight. The rising tide of national concern over military preparedness inevitably became a major political issue in the presidential and congressional election campaigns.

Reflecting this clear popular mandate to revitalize US military capability, the new President and the Congress are taking immediate steps to make large-scale improvements in the US military posture. The proposed FY '81 Supplemental and FY '82 Amendment to the Defense budget demonstrate the level of commitment felt by the new Administration to rebuild American defenses. In making its recommendations to the Secretary of Defense on these budget revisions, the Air Force established a clear set of priorities regarding what must be done to ensure strong, ready forces in the difficult years ahead.

First, we place primary emphasis on people programs. Our policies and actions must continue to be oriented toward attracting and retaining quality people. Dedicated and committed professionals are the essential foundation of a strong and ready combat force.

Second, we have concluded that despite urgent needs across all mission areas, our most important strategic nuclear modernization programs must be kept on track. Consequently, we have requested the funds necessary to meet planned initial operational capability dates for the MX missile and the air-launched cruise missile.

Next, in light of the growing potential for conflict that could embroil US military forces, especially in the vital Persian Gulf region, we have made a major shift in resources in the FY '82 budget. This shift is reflected in a major growth in readiness and sustainability accounts, a growth which, within the fiscal constraint of the Defense budget submitted on January 15, 1981, came at the expense of significant reductions in aircraft procurement.

We have requested funds to support substantial increases in spending for replenishment spares and operations and maintenance accounts, and significant increases in buying air-to-air and air-to-ground munitions. Undergraduate flight training will expand, operational crews will fly more frequently, and we will begin to make headway in reducing the large facility maintenance backlog.

Reflecting the new Administration's commitment to improve US defenses, President Reagan has asked the Congress to provide significant additional funds for both FY '81 and FY '82 that will allow further improvements to readiness and sustainability, will go some way toward restoring aircraft production programs, and will take a major step toward the development and acquisition of a new bomber to ensure the future viability of the strategic triad and Air Force capability for global projection of power.

The Path Ahead

The military services are emerging from a prolonged period of inadequate public attention to the state of our armed forces and to an expanding Soviet threat. There are many encouraging signs that the nation has come to recognize the true situation and is prepared to make the adjustments necessary to rebuild its defenses.

This will not be achieved overnight or within a single budget; therefore, the path ahead is still demanding. However, it is gratifying to know that the contributions and sacrifices of the military professionals who labor to provide a stronger defense posture are appreciated by a newly aroused, concerned America. ■

In General Allen's view, Air Force "policies and actions must continue to be oriented toward attracting and retaining quality people."

Gen. Lew Allen, Jr., USAF's tenth Chief of Staff, is a 1946 graduate of the US Military Academy. After completing flying training, he was assigned to SAC as a bomber pilot. In 1954, he earned a doctorate in nuclear physics and spent the next seven years in the nuclear weapons field. From 1961 to 1971, General Allen filled a variety of assignments associated with space systems. Following duty as Director of the National Security Agency and Commander of Air Force Systems Command, he was named Vice Chief of Staff of the Air Force in April 1978. On July 1 of that year, General Allen became Chief of Staff.

THE ENLISTED LEADERSHIP OF TODAY'S AIR FORCE

BY JAMES M. McCOY
CHIEF MASTER SERGEANT OF THE AIR FORCE

EACH year in its annual Almanac Issue, AIR FORCE Magazine reports on the vital statistics of our Air Force. This report includes information on the many organizations and missions that make up the Total Force. Each major command, separate operating agency, and direct reporting unit describes its mission, latest activities, command structure, and people.

Pictured are each organization's commander and his top noncommissioned officer, the Senior Enlisted Advisor. The latter are directly responsible for advising their commanders on all matters concerning the health, welfare, morale, and use of the enlisted people assigned to their organizations. All have well over twenty years of service and have served in many career fields, from first sergeant and enlisted aircrew superintendent to security police and medical administrative manager. They are highly dedicated, professional, and extremely talented in their respective specialties.

Now, as advisors, they have a role of additional importance. They are leaders, managers, supervisors, counselors, advisors, motivators, and, most importantly, the top senior noncommissioned officers in their respective organizations. They are the enlisted leadership of our Air Force.

About 200 of the Finest

These highly respected individuals number about 200 and are authorized at all wing-level and higher units. However, even before Air Force Regulation 39-20, "The Senior Enlisted Advisor," first established the position in August 1977, many senior commanders had selected individuals to serve as their top NCOs and had sought their advice on enlisted matters.

Now, as then, these chief master sergeants earn the distinction of serving in this most prestigious position by their records of proven excellence. They are highly visible within work centers, shops, offices, classrooms, supply warehouses, conference rooms, on the flight line and off—communicating and explaining their commanders' policies and assessing the degree of understanding. They're out where the action is, where the enlisted men and women work and perform their most vital tasks.

Chief McCoy: Senior enlisted advisors "are out where the action is."

Observing living conditions both on and off base, work environments, recreational and educational activities, and evaluating the services performed by various base agencies are just a few of the duties wing senior enlisted advisors perform. They are involved in the Noncommissioned Officer Professional Military Education courses, NCO appointment ceremonies, selection committees, quality-of-life working sessions, and in representing the enlisted force at functions within the local community.

They are articulate and poised, always presenting the proper military image as the enlisted force's representatives.

Well-Organized Team

Working closely with squadron commanders and their first sergeants is a must! Together, the senior enlisted advisor and the assigned first sergeants combine their efforts as an effective and well-organized team. Counseling an airman with a problem, setting up a ceremonial function, ensuring that base and people maintain the proper appearance, or simply assuring that the attitude of the force remains positive are but some of the varied activities that these senior NCOs accomplish.

Many senior enlisted advisors serve at base level, while others assume the same responsibilities on a broader scale, at divisions, centers, and numbered air forces. Senior enlisted advisors within the same command meet periodically to discuss issues that affect the enlisted force. Dormitory upgrading, dining hall improvements, morale, welfare, and recreation activities, and other enlisted matters are discussed openly.

The senior enlisted advisors are brought up to date on the latest initiatives, including pay and entitlements, assignment policies, promotion opportunities, and other personnel matters. They may also receive briefings on recruiting objectives, retention efforts, and the annual Air Force Assistance Fund campaign. Time is normally set aside to make recommendations to improve the quality of life of the enlisted force.

All in all, these senior enlisted advisors' conferences offer commanders and their staffs the opportunity to confer with senior NCOs and monitor the pulse of the personnel assigned to their commands.

Convening With AFA

During this year's Air Force Association (AFA) Convention, the top senior enlisted advisors of the Air Force will meet again, for the fifth time, to discuss issues pertinent to the enlisted men

Chief Master Sergeant of the Air Force James M. McCoy joined the Air Force in January 1951. He has served in Air Defense Command, Air Training Command, SAC, and Aerospace Rescue and Recovery Service. Much of Chief McCoy's career has been in the field of training and education, where he has had assignments as base training NCO, Assistant Commandant of AFROTC Cadets at Notre Dame, Commandant of SAC's NCO Preparatory School, and Chief of the Military Training Branch, Hq. PACAF. In March 1975, he became the first SAC senior enlisted advisor. Chief McCoy has a bachelor's degree in business administration and was one of the twelve Air Force Outstanding Airmen of 1974. He was selected for his present position in August 1979.

and women of the Air Force. Since 1977, when they were first invited by AFA to join the Junior Officers Advisory Council and the Enlisted Advisory Council, this group of twenty-nine chief master sergeants has been asked to evaluate key issues, and to discuss and present recommendations to AFA's National President and his executive council about ongoing events that affect the lives of enlisted Air Force people.

During these conventions, the Senior Enlisted Advisors have also met with the senior members of the Air Staff, including the Chief and Vice Chief of Staff and congressional leaders.

Of the nine major initiatives that the first conference produced, seven were adopted by the Air Force. A central selection process for our Senior NCO Academy, further expansion of the high year of tenure programs, retraining senior NCOs who are overage in one career field to another that has a critical shortage of skilled people, and the development of the Chief Enlisted Managers (CEM) code were some of the items recommended at the first conference.

The next year produced sixteen items of interest. Continued emphasis on basic allowance for subsistence; family separation allowance for E-4s and below; more living space for E-5 and E-6 personnel living in dormitories; management of first sergeants; award of the NCO Professional Military Education ribbon to graduates of NCO Leadership schools; and the further enhancement of the Twelve Outstanding Airmen of the Year program were some of the subjects these top NCOs discussed in 1978. Twelve of the sixteen items have been approved or partially approved for implementation within the Air Force.

A Wreath for Arlington

The Twelve Outstanding Airmen of the Year, after visiting Arlington National Cemetery during the 1978 conference, brought to the attention of the senior enlisted advisors that there was not an Air Force plaque in the trophy room of the Tomb of the Unknowns. The advisors, through then CMSAF Robert D. Gaylor, pursued this initiative, culminating in a formal, all-enlisted ceremony at Arlington in conjunction with the 1980 AFA Convention. Along with four of my five fellow Chief Master Sergeants of the Air Force and these top senior noncommissioned officers, we laid a wreath at the Tomb of the Unknowns and presented a plaque on behalf of all Air Force enlisted men and women. The plaque represents the first active-duty Air Force tribute that has been placed in the trophy room.

The senior noncommissioned officers have not only the respect and admiration of the entire Air Force, but are also recognized by AFA as being a very dedicated group. In addition to meeting with the Air Force Association, they are called upon for their expertise and assistance to further enhance Air Force programs.

During the past year, they met with the officials of the Army and Air Force Exchange Service, the staff of the United States Soldiers and Airmen's Home, and the Board of Directors of the Air Force Enlisted Men's Widows and Dependents Home Foundation. They helped review the Basic Military Training program and commented on personnel programs such as Stripes for Exceptional Performers, Senior Airmen Below the Zone promotion procedures, billeting and transient facilities upgrade, family matters in the Air Force, and completely reviewed the Noncommissioned Officer Professional Military Education system. They provided inputs for the Air Force Uniform Board, the Air Force Aid Society, and assisted the Chief Master Sergeant of the Air Force immeasurably.

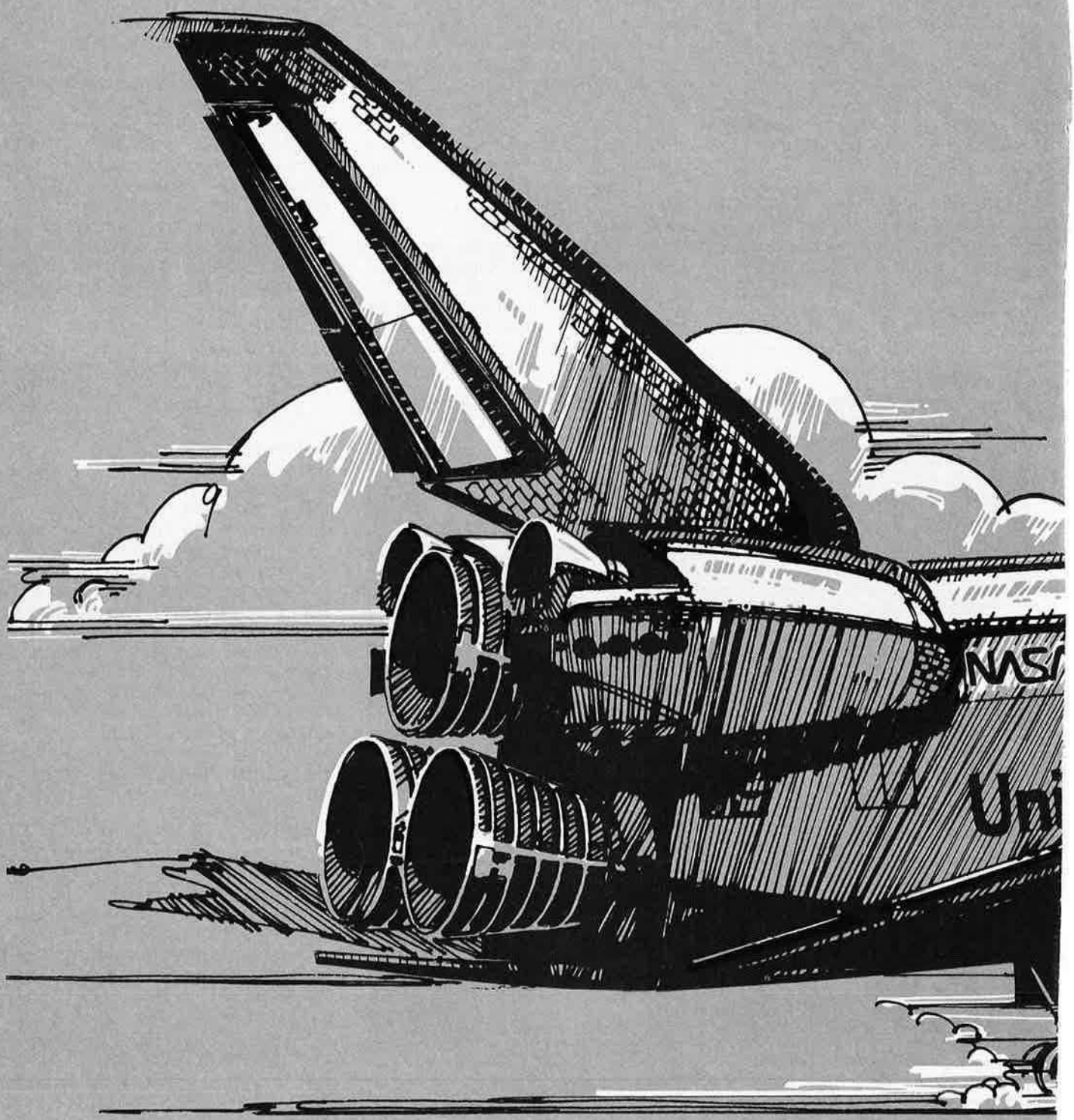
With increased emphasis on the retention of our highly skilled specialists and technicians, these senior noncommissioned officers are continuing to develop ideas and initiatives that will enhance an Air Force career.

They are also impressing on our people the reasons why a strong military defense system is so vital to our country. Through their efforts, people are developing more pride in themselves, their units, the Air Force, and the nation. ■

A key event at AFA's annual National Convention is the Senior Enlisted Advisors Conference, from which recommendations flow with Air Force-wide implications.

From the prime contractor to the prime beneficiary:

Congratulati



ons, America.

Once again, America is leading the world into space.

Rockwell International is prime contractor for the Shuttle orbiter. Also, our Rocketdyne Division built the main engines. And we assist NASA in the integration of the Space Transportation System. Our achievements in space and aircraft development demonstrate the high technology which characterizes all the businesses of Rockwell International.

We join America in saluting NASA, the *Columbia* crew — John W. Young and Robert L. Crippen — and the 50,000 people in many companies who worked with us to build America's Space Shuttle.

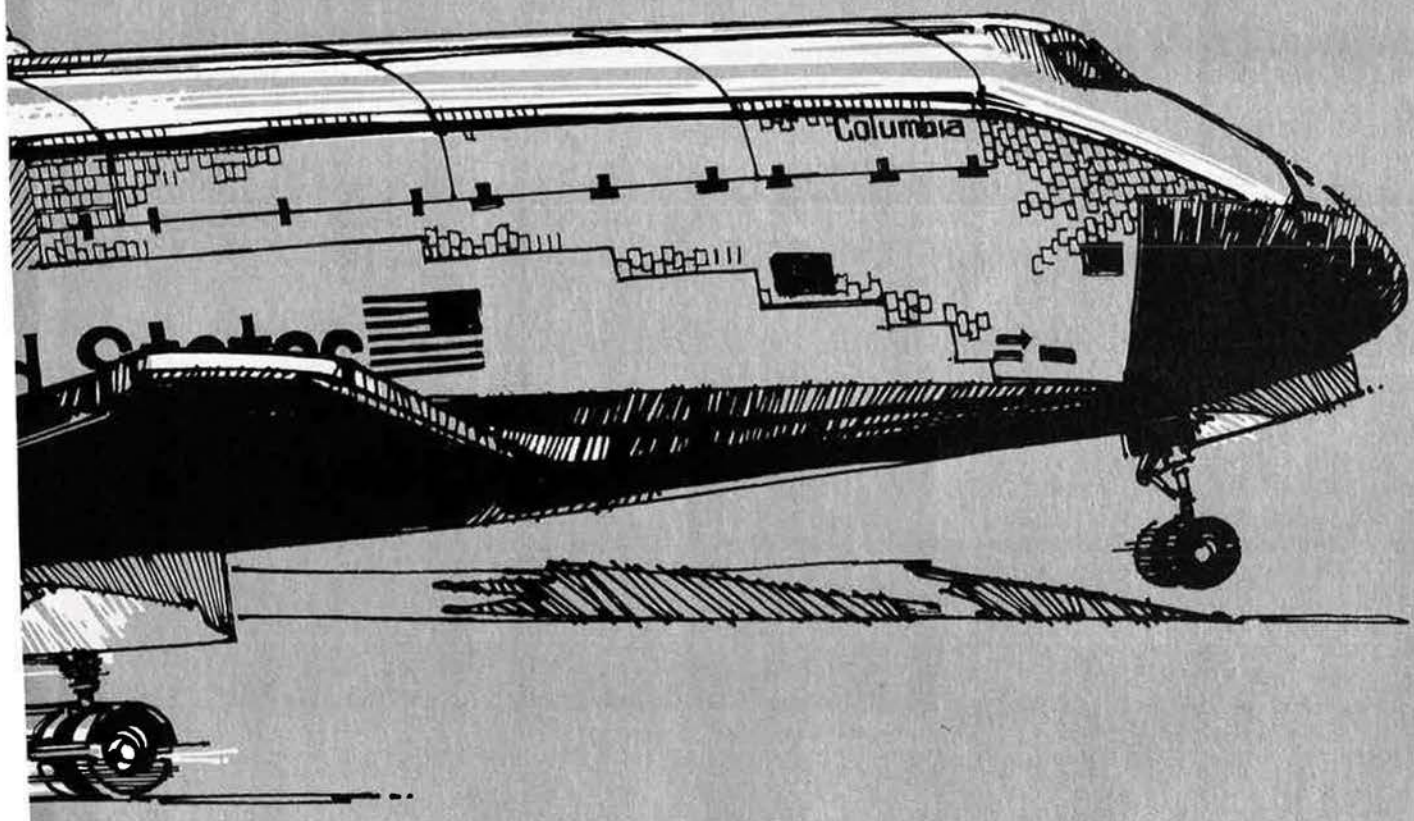
Congratulations, America. Through the Shuttle, designed for repeated flights into space, you have built a technology bridge to the benefits of this vast new frontier. It is a uniquely American achievement.

Good old American "know-how" is alive and well.

Rockwell International

...where science gets down to business

Automotive / Aerospace
Electronics / General Industries



Air Force Communications Command

A MAJOR COMMAND

The control tower at Scott AFB, Ill. AFCC's 6,000 air traffic controllers handle more than 12,500,000 operations annually, with better than a third of the active-force members serving abroad.

ON July 1, Air Force Communications Command (AFCC) celebrates its twentieth anniversary as a major command. In those two decades, the global communications command's mission has grown from providing air traffic services and selected communications support to a role as the Air Force's central manager for these activities and a source of common user data automation support for numerous military and federal agencies.

The span of AFCC's mission responsibilities also includes: engineering and installing communications, air traffic services, and weather equipment; evaluation of long-range radars; and maintenance responsibilities for sensor equipments that range from personnel intrusion to missile-detection systems.

To meet these tasks, the command employs an active-duty work force that tops 48,000 people—more than 41,000 military and about 7,000 civilians. Some 14,000 members of the Air National Guard (ANG) and Air Force Reserve, in 190 units, raise the command's total force assets to nearly 63,000.

The Air Force's most widely dispersed command owns no bases, but serves as a tenant at 420 locations in forty-nine of the fifty states, the District of Columbia, and twenty-three foreign countries and island possessions. Overseas mission requirements mean that better than a third of the active force is based abroad, and 2,300 of these people are serving unaccompanied tours.

Mission requirements also mean that skilled people in two major functional areas—engineering and installation, and combat communications—spend more than half of each year on the road.

Last year, the command's 350 electronic installation teams and 600-plus engineers spent 3,000,000 man-hours completing more than 5,600 jobs at 400 locations around the world. The nineteen ANG engineering and installation units contributed some 450,000 hours to this effort.

Guardsmen play an even larger role in meeting command requirements to deploy mobile communications and air traffic services equipment in support of exercises and contingencies. The eight ANG Combat Communications Groups make up better than seventy percent of the command capability and interchange lead unit roles with their five active sister units on worldwide deployments from Cairo to Kunsan.

In the air, three facility checking squadrons flying four C-140s and two T-39s use special equipment to evaluate landing systems, navigational aids, radar approach control equipment, and controllers and tower operators. They are part of the world's largest military air traffic control system in which nearly 6,000 controllers handle more than 12,500,000 operations yearly. The system includes 119 control towers, 117 radars, and more than 300 other landing and navigation aids. Since 1961, command controllers have been credited with saving 6,843 crew members and passengers aboard some 2,800 military and civilian aircraft worth more than $2 billion.

Additional support to the flying mission is provided through the AFCC-managed Notice-to-Airmen (NOTAM)

Maj. Gen. Robert T. Herres, Commander, AFCC.

CMSgt. Earl E. Dorris, Senior Enlisted Advisor, AFCC.

system and a system of radio stations that provides Air Force and other government officials, including the President, with communications to other aircraft and ground installations while in worldwide flight.

At fixed facilities, AFCC supplies a variety of communications services, including telephone systems, intrabase radios, message centers, fire and crash alarms, and intrusion detection and warning systems. The command also provides the links that tie bases into the Defense Communications System—the common-user long-distance voice and data network that serves the entire defense establishment. Nearly half of the satellite portion of that system is operated and maintained by AFCC.

In addition, an emergency communications capability is available from the AFCC-managed Military Affiliate Radio System (MARS), an organization of nearly 5,000 licensed volunteer amateur and military radio operators.

Command data automation responsibilities include developing, acquiring, testing, and maintaining computer systems that provide Air Force users with information in such areas as pay, supply, medical, transportation, and personnel. Some 2,600 people in nine organizations are responsible for the 187 computer systems that accomplish these tasks.

In June, a realignment of major subordinate headquarters will streamline the command's structure and enhance customer support while saving some 200 spaces and $5.3 million in annual operating costs. Major elements of the realignment are: establishment of an Airlift Communications Division at Scott AFB, Ill., to support the Military Airlift Command; creation of an Engineering Installation Center at Oklahoma City AFS, Okla., to manage centrally engineering and installation resources and responsibilities; and the merger of the Northern and Southern Communications Areas to form the Continental Communications Division at Griffiss AFB, N. Y. In addition, the Communications Areas that support strategic forces and tactical commands in the US, Europe, and the Pacific will be redesignated Communications Divisions.

Command accomplishments and initiatives reflect AFCC's anniversary theme—"A Past of Pride—A Future to Fulfill." Key accomplishments during the past year include: commissioning a new automated digital weather system; testing and fielding new mobile satellite terminals; modernizing RAPCONs and ILSs; developing quick reaction "comm" packages; refining wartime air traffic control procedures; improving chemical warfare readiness training; establishing a mobile unit dedicated to support requirements in the Pacific theater; and contracting for the replacement of base-level computer systems.

Next year will see interim improvements to the secure voice system; progress on communications and air traffic services support for the MX and GLCM systems and facilities; a major upgrade in telephone systems; new wartime missions for Guard and Reserve communications flights; support for the Space Shuttle; and continuing efforts to upgrade satellite and tactical communications equipment.

People will remain the centerpiece of command actions, with a special focus on equipment upgrades and management initiatives to improve the balance between overseas and CONUS assignments and reduce the number of involuntary remote tours.

AFCC's skilled people install, operate, maintain, and manage a range of information handling equipment and systems vital to the direction and day-to-day operations of the Air Force. Around the world and around the clock, they meet their motto by "Providing the Reins of Command." ■

AIR FORCE COMMUNICATIONS COMMAND

Headquarters, Scott AFB, Ill.

Commander
Maj. Gen. Robert T. Herres

European Communications Division Kapaun Barracks, 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.	**Engineering Installation Center** Oklahoma City AFS, Okla.	**Air Force Computer Acquisition Center** Hanscom AFB, Mass.
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.	**Phase IV Program Management Office** Gunter AFS, Ala.
47th Communications Group Cheyenne Mountain Complex, Colo.	**1954th Radar Evaluation Group** Hill AFB, Utah	**1980th Communications Group** Fort Myer, Va.	**1815th Test and Evaluation Squadron** Wright-Patterson AFB, Ohio
1866th Facility Checking Squadron Scott AFB, Ill.	**1872d School Squadron** Keesler AFB, Miss.	**2000th Management Engineering Squadron** Scott AFB, Ill.	**2199th Computer Services Squadron** Scott AFB, Ill.

Air Force Logistics Command

A MAJOR COMMAND

The mammoth maintenance hangar at Kelly AFB, Tex., where fourteen B-52s, six C-5s, or a combination of both can be overhauled simultaneously.

THE mission of Air Force Logistics Command (AFLC) is to keep the US Air Force's aerospace weapon systems in a constant state of combat readiness—worldwide. The best word to describe AFLC is support—support of the Air Force's weapon systems in the form of procurement, supply, maintenance, and transportation. AFLC provides the logistics management needed to keep the Air Force's aircraft, missiles, and support equipment in top condition.

This support is provided for all Air National Guard and US Air Force Reserve activities, as well as friendly nations who purchase military equipment and services under the Foreign Military Sales (FMS) program or receive aid under the Military Assistance Program (MAP), and other US government agencies.

These and other responsibilities of the command are divided among five Air Logistics Centers and five specialized organizations. In five of the six states having major AFLC installations, AFLC is the largest employer in a single location in the state. Through these units AFLC provides worldwide direct logistics support.

While the variables of cost and priority still affected the way AFLC's 89,000 people did their jobs in 1980, a major concern that still persists is the nation's declining industrial base and subsequent decrease in productivity. Says AFLC Commander Gen. Bryce Poe II, "Technology modernization is a key to increased productivity, both in our in-house operations and for our contractors." The command is vigorously pursuing the Air Force Manufacturing Technology Program (MANTECH) that seeks, through studies and development contracts with industry, better ways of carrying out manufacturing and repair processes. "We use our depot maintenance facilities as demonstration centers," says General Poe. Industry is invited to study the processes at work in a production environment.

The command is also testing a new industrial preparedness program that addresses the problem of over-long manufacturing lead times. Semifinished materials are bought well in advance, and the result is shorter manufacturing lead times.

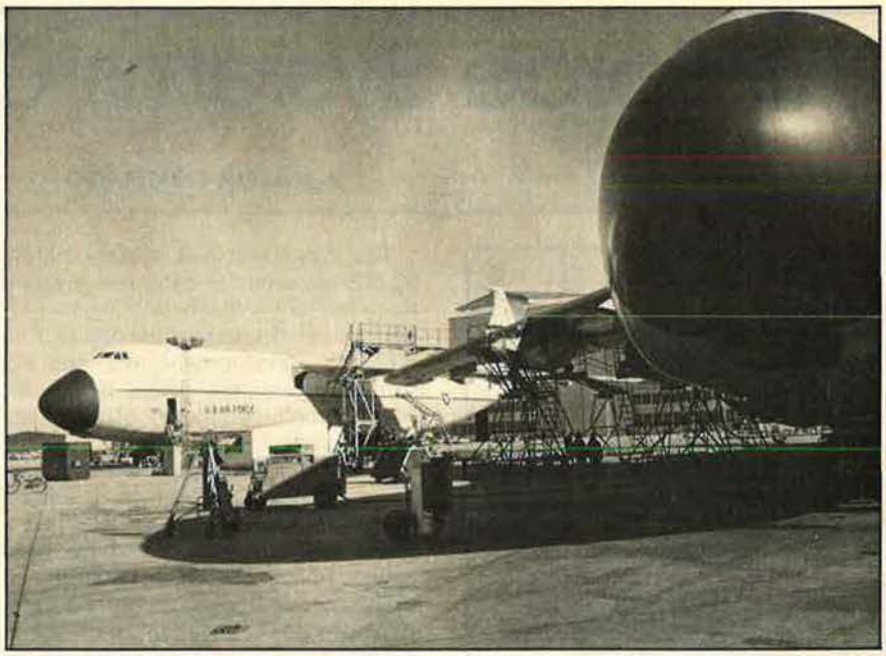
PACER LIFT (Logistics Improvement of Facilities and Technology) is an AFLC initiative to strengthen support capability. It emphasizes the application of proven technology to improve productivity and efficiency in the AFLC industrial complex.

The Air Force Acquisition Logistics Division (AFALD) led the way in the plan to reduce future maintenance and support costs by incorporating logistics considerations into weapon systems still on the drawing boards, saving millions of dollars in support costs over the system's life cycle. AFALD's "Lessons Learned" program is one such initiative in which the collective experience of those who actually operate the individual weapon system is assembled. "Lessons Learned" data was made available to industry for the first time in 1980.

AFLC's heavy involvement in interna-

Gen. Bryce Poe II, Commander, AFLC.

CMSgt. Robert E. Rogers, Senior Enlisted Advisor, AFLC.



The nose of a C-5 looms large as the aircraft receives depot-type maintenance at the San Antonio Air Logistics Center at Kelly AFB, Tex.

tional logistics continued in 1980 with the command managing Foreign Military Sales programs totaling $11.8 billion. Weapon systems, spare parts, logistics systems, and construction involving the Royal Saudi Arabian Air Force totaled $4.4 billion. Other Middle East programs amounted to an additional $1.3 billion, while customers in Asia, Europe, Africa, and South America rounded out the total.

Attention in 1980 was also paid to AFLC's specialists in rapid aircraft battle damage repair and combat packaging and supply operations. The command's Combat Logistics Support Squadrons (CLSS) demonstrated their proficiency by participating regularly in operational exercises. AFLC added ten rapid runway repair teams in 1980 for a total of twenty-eight special civil engineering teams, trained and equipped to deploy worldwide within twenty-eight hours.

In AFLC, computers are the force structure as much as aircraft and munitions are to other commands. In 1980, the integration of computers extended into every aspect of logistics—especially in direct support of operational forces. The Logistics Management Systems organization, established in 1980, is modernizing many of the command's general-purpose computers and enhancing the management systems that are run by them.

The Air Force Contract Maintenance Center (AFCMC) administered more than 3,000 contracts with a total value of $5.4 billion during 1980. AFLC gave strong support to small businesses, awarding in FY '80 some $880 million, or a ten percent increase over FY '79.

The AFLC maintenance work force processed more than 3,800 aircraft through the five ALCs and contractor plants in 1980. In addition, the command and its contractors overhauled or repaired some 4,700 engines.

Hill AFB, Utah, was selected as a site for prototypes of renewable energy sources for MX bases and sites. The Ogden ALC at Hill was assigned repair responsibility for the air-launched cruise missile. The Israeli Air Force completed initial F-16 pilot/maintenance training at Hill. This unique venture allowed joint IAF/USAF use of both countries' aircraft for maintenance and pilot training.

In January 1980, the first F-4D aircraft arrived at McClellan AFB in California, representing the start of a new depot maintenance work load for the Sacramento ALC; it is part of a work load shift from Ogden, which manages the F-4.

McClellan AFB environmental programs, including long-range land use, air- and water-pollution control, hazardous waste control, and an extensive, energy-saving van-pooling program were cited as DoD's best.

San Antonio ALC, Kelly AFB, Tex., was selected by the US Office of Personnel Management to receive the first Exemplary Practice in Federal Productivity Award. The year also saw the dedication of a new $10 million jet engine facility for overhauling and testing the fuel controls for the F100 engine that powers the F-15 and F-16.

Last year's fiscal management in AFLC involved funds totaling more than $20 billion. This included an appropriated budget of approximately $7 billion, stock and industrial funds totaling $9.2 billion, and logistics programs for sixty-two foreign countries.

The command's work force at the end of 1980 totaled 89,463—2,563 officers, 6,939 airmen, and 79,961 civilians. Women increased more than 2,200 to 24,457, representing twenty-seven percent of the total work force. ■

AIR FORCE LOGISTICS COMMAND

Headquarters, Wright-Patterson AFB, Ohio

Commander
Gen. Bryce Poe II

Ogden Air Logistics Center Hill AFB, Utah	**Oklahoma City Air Logistics Center** Tinker AFB, Okla.	**Sacramento Air Logistics Center** McClellan AFB, Calif.	**San Antonio Air Logistics Center** Kelly AFB, Tex.
Warner Robins Air Logistics Center Robins AFB, Ga.	**AFLC International Logistics Center** Wright-Patterson AFB, Ohio	**Military Aircraft Storage and Disposition Center** Davis-Monthan AFB, Ariz.	**Aerospace Guidance and Metrology Center** Newark AFS, Ohio
USAF Medical Center Wright-Patterson AFB, Ohio	**Air Force Acquisition Logistics Division** Wright-Patterson AFB, Ohio	**Air Force Museum** Wright-Patterson AFB, Ohio	**2750th Air Base Wing** Wright-Patterson AFB, Ohio

Air Force Systems Command

A MAJOR COMMAND

High-altitude rocket test cell—the world's largest—at AFSC's Arnold Engineering Development Center, Arnold AFS, Tenn.

THE mission of Air Force Systems Command (AFSC) is to advance aerospace technology and to acquire logistically supportable, cost-effective systems to meet validated operational requirements.

AFSC is responsible for design, construction, and purchase of 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 52,000 personnel, nearly half civilian, thirty percent enlisted, and twenty percent officer. Because of the nature of its research, development, test, and acquisition mission, AFSC is the Air Force's major employer of scientists and engineers.

Systems Command will manage approximately $19.7 billion in FY '81. Since the major portion is used to acquire weapon systems manufactured by industry (and that budget share is increasing), AFSC places special emphasis on strengthening its contracting practices and aerospace production capability. Efforts in this direction included selective adaptation of commercial practices. More contractor competition and greater use of firm fixed-price contracts were emphasized, with improvement in both areas.

The command initiative promoting the use of multiyear procurement began to produce results. Major contracts were awarded for GAU-8 30-mm ammunition and AN/ALQ airborne electronics.

Following through on an effort that began last year to reverse the serious decline in this nation's productive capability within the aerospace industry, several actions were taken to improve the productivity and responsiveness of the industrial base. These included expanding the manufacturing technology program to address critical industrial base sectors; focusing "early on" attention to critical materials in the program planning, system design, and acquisition process; and establishing a program that provides for joint business ventures in which government-sponsored manufacturing technology innovations are coupled with contract provisions to increase contractor capital investments in highly productive manufacturing capability.

The recruitment of engineers and scientists received special emphasis throughout the year because of heavy salary competition and strong demand from private industry. An AFSC program was developed to recruit engineering students following their sophomore year to become potential Air Force officers.

Other significant advances recorded during the past year:

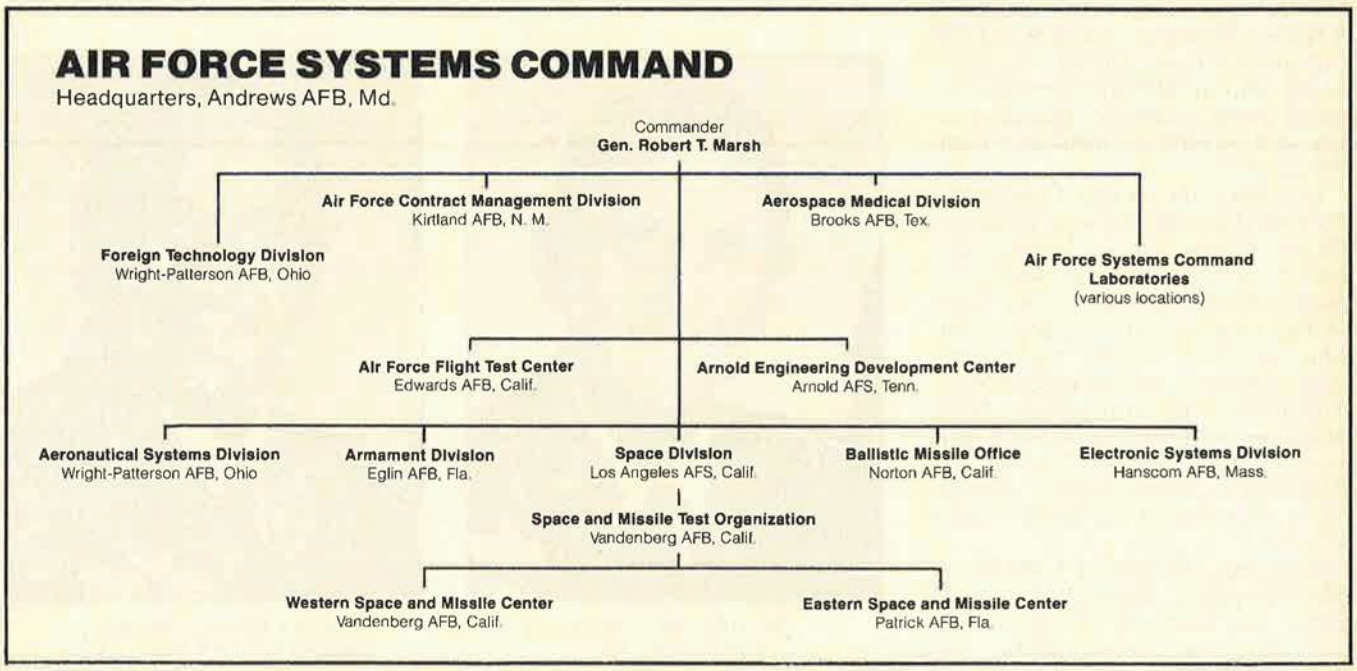
- The Boeing AGM-86B ALCM (air-launched cruise missile) was selected for production following a series of competitive flyoffs.
- The PAVE PAWS West range at Beale AFB, Calif., became operational and was turned over to SAC. The ten-story-high structure is the second part of a system designed to provide early detection of sea-launched ballistic missiles.
- Contracts were awarded for full-scale engineering development of the

Gen. Robert T. Marsh, Commander, AFSC.

CMSgt. Arthur L. Andrews, Senior Enlisted Advisor, AFSC.

fire-control pod and a head-up display for the LANTIRN night attack system for F-16 and A-10 aircraft. LANTIRN stands for Low-Altitude Navigation and Targeting Infrared for Night.

- The first flight of a BGM-109 Tomahawk ground-launched cruise missile occurred at the Dugway Proving Ground, Utah Test and Training Range, in midyear. Expected to achieve an initial operating capability in 1983, 560 GLCMs are expected to be deployed in the UK and on the Continent.
- A contract was awarded for development and acquisition of a modernized satellite command and control data-processing system to increase the capability, reliability, and supportability of the Air Force Satellite Control Facility global network for orbital servicing of military space systems.
- The EF-111A Tactical Jamming System, the first supersonic support jamming platform, began full-scale production. The program calls for forty-two systems, with initial operational capability in late 1983.
- Contracts were awarded for the Operational Control Segment Block II Operational Satellite Development portions of the Navstar Global Positioning System. With the two awards, the Navstar GPS program is in full-scale engineering development in all three segments—space, user, and control.
- Systems design review on the MX land-based ICBM has been completed. The MX Draft Environmental Impact Statement (EIS) has been released and the public comment period has begun. The system is expected to be deployed in the 1980s.
- Flight-testing of the F101 Derivative Fighter Engine was initiated in the F-16 at Edwards AFB, Calif.; the first flight occurred in late December and lasted fifteen minutes. The F101 DFE is derived from the F101 engine in the B-1 bomber and is intended to provide competition in the high-thrust fighter engine area.
- The first of eighteen E-3A aircraft for the NATO Airborne Early Warning force was delivered to the Dornier facility near Munich, Germany, for integration with the internal avionics systems.
- The concept definition phase for the Next Generation Trainer was completed. Full-scale development will begin in early FY '82.
- A forward-looking plan to incorporate future improvements of the F-16 was initiated to minimize retrofit costs. Termed the Multi-National Staged Improvement Plan, it synchronizes early incorporation of structure and wiring, phased development of F-16 peculiar line replacement units, and eventual installation of such growth systems as Advanced Medium-Range Air-to-Air Missile and LANTIRN.
- Production of A-10s continued with more than 450 aircraft delivered to TAC, USAFE, ANG, and AFRES. Upcoming base activations include Korea (PACAF) and Alaskan Air Command.
- The first construction phase for the Space Shuttle Launch Complex at Vandenberg AFB, Calif., has been completed. The second—including the payload preparation room, access tower, and the launch mount—is under way and twenty-five percent complete. Phase three, to include the mobile service tower, payload changeout room, and gas storage area began in January. The fourth phase, the Launch Control Center, is fifty percent complete.
- USAF remains in the forefront of DoD's high-energy laser program, with strong efforts under way in mission areas where lasers offer the greatest potential. Initial Airborne Laser Laboratory demonstrations against missile and drone targets at short ranges are being conducted.
- The Very-High-Speed Integrated Circuit program is proceeding satisfactorily. VHSIC is a triservice, six-year, $225 million program that seeks to accelerate the operational availability of the next two generations of integrated circuits.
- The Air Force is committed to utilizing shale-derived JP-4 fuel in operational aircraft beginning in the mid-1980s as these new fuels become available. Turbine engine components are currently being tested to ensure the compatibility of current hardware.
- Ultra-low-sidelobe radar antennas that are highly immune to conventional jamming techniques and to antiradiation missile seekers are being demonstrated.
- A one-megabit magnetic bubble memory chip, a fourfold improvement over existing devices, has been built.
- Materials, structures, and propulsion technology has been successfully transitioned into the MX baseline system, increasing payload by 1,700 pounds, or thirty percent.
- A cast aluminum structures technology that reduced the air-launched cruise missile fuselage cost by thirty percent was developed.
- A robotic work cell that forms advanced composite material and sheet metal aircraft parts and increases production with a zero reject rate was demonstrated in F-16 production. ■



Air Training Command

A MAJOR COMMAND

THE primary mission of Air Training Command (ATC), with headquarters at Randolph AFB, Tex., is implicit in its name. ATC administers all initial Air Force flying training; technical and military training; and professional military, undergraduate, graduate, and continuing education. The command is also responsible for Air Force recruiting, basic training of enlisted personnel, and pre-commissioning instruction through its Officer Training School and Air Force Reserve Officer Training Corps (AFROTC).

As the free world's largest training-educational system, ATC has an operating budget of $2.2 billion, assets of $3.5 billion, more than 1,620 aircraft, and a force of some 94,000 people, including permanent party personnel, students, and civilians.

ATC controls and operates fifteen installations. Six of these contain huge technical training centers, at which undergraduate pilot training is given, and one where undergraduate and advanced navigator training takes place. ATC also has ninety Field Training Detachments (FTDs) and Operating Locations worldwide, and conducts survival training in Washington state, Alaska, and Florida.

In the field of professional development education, ATC's Air University (AU) at Maxwell AFB, Ala., oversees the Air War College, Air Command and Staff College, Squadron Officer School, Airpower Research Institute, Senior Noncommissioned Officer Academy, Leadership and Management Development Center, Extension Course Institute, and the Air Force Institute of Technology (AFIT).

Last year, the Air War College, Air Command and Staff College, Squadron Officer School, and the Senior Noncommissioned Officer Academy graduated 3,049 officers and 1,205 NCOs, plus tens of thousands more who completed courses via nonresident seminars and correspondence programs. The command's NCO Academy, NCO Orientation and Supervisor Courses, and NCO Leadership Schools also prepared more than 6,600 NCOs for increased leadership responsibilities.

In FY '80, ATC trained 1,468 pilots, 609 navigators, seventy-six foreign pilots, and twenty-six foreign navigators. More than seventy women who were trained as pilots and navigators in ATC now serve on active duty, and 104 more are currently in flying training.

Interservice navigation training produced 227 US Navy and Marine Corps graduates. And in 1980 nearly 8,000 Air Force crew members received survival training.

More than ninety-four percent of the enlisted men and women who completed basic military training at Lackland AFB, Tex., last year also received training at one of ATC's Technical Training Centers in a variety of technical skills. In all, the command's technical training centers, AU, and the USAF School of Health Care Sciences at Sheppard AFB, Tex., conducted more than 2,800 resident and nonresident courses, producing more than 132,000 graduates. Another 140,000 completed field training courses at the FTDs, which offered more than 800 programs. (Since its inception in 1943, the Air Training Command has trained more than 10,000,000 people.)

In the commissioned officer area, OTS commissioned 4,557 new officers last year, while 2,716 were commissioned second lieutenants by 144 AFROTC detachments serving nearly 500 campuses.

While flying approximately twenty percent of the total Air Force flying hours last year, ATC experienced less than nine percent of reportable accidents, a flying safety record of 2.1 accidents per 100,000 flying hours.

More than 4,000 airmen from fifty-two allied nations received technical and professional military training valued in excess of $160 million. Almost 1,100 foreign students graduated from the Defense Language Institute's English

Recruiting for Quality

Air Force Recruiting Service, headquartered at Randolph AFB, Tex., continued to recruit quality people, a prime Air Force objective.

Air Force recruiters enlisted more than 81,000 people during 1980, including some 72,000 without prior service, 1,400 health professionals, 2,800 former service members, and 4,892 applicants for Officer Training School.

More than 33,300 age-qualified leads were provided to recruiters during the past year through the Air Force Recruiter Assistance Program (AFRAP).

Under the Recruiter Helper Program, some 2,804 first-term airmen played a part in 3,675 enlistments in 1980. Air Force recruiters are assigned throughout the United States, in Guam, Puerto Rico, England, Spain, the Philippines, and Germany.

Gen. Bennie L. Davis, Commander, ATC.

CMSgt. Emory E. Walker, Senior Enlisted Advisor, ATC.

Language Center at Lackland AFB.

ATC is embarking on two "new" programs. The first is the Euro-NATO Joint Jet Pilot Training program, about to come to fruition after years of negotiation and planning. Designed for joint training of NATO pilots on a cost-shared basis, more than 130 foreign student pilots, plus 110 USAF pilots and ninety instructor pilot trainees, will graduate from the program at Sheppard AFB, Tex., in the first year.

The second, approved by the Air Force last June, is the Specialized Undergraduate Pilot Training—commonly referred to as the "dual-track"—program. This is still in the planning stages. When implemented, student pilots will begin concentrating on either tactical (fighter/attack/reconnaissance) or the heavier (tanker/transport/bomber) aircraft at about the midpoint in their flight training.

The Community College of the Air Force (CCAF), which offers college-level educational opportunities to enlisted men and women, continued to flourish. At the end of the year, active registrations stood at a total of more than 123,000, with new enrollments averaging 3,000 a month. Associate in Applied Science degrees were awarded during the year to 4,246 young men and women who had successfully completed prescribed curricula.

The Extension Course Institute, the world's largest correspondence school, provided more than 370 professional, specialized, and career development courses available worldwide to personnel in all branches of service. During 1980, approximately 273,000 students enrolled in ECI courses, while 150,535 completed their course requirements.

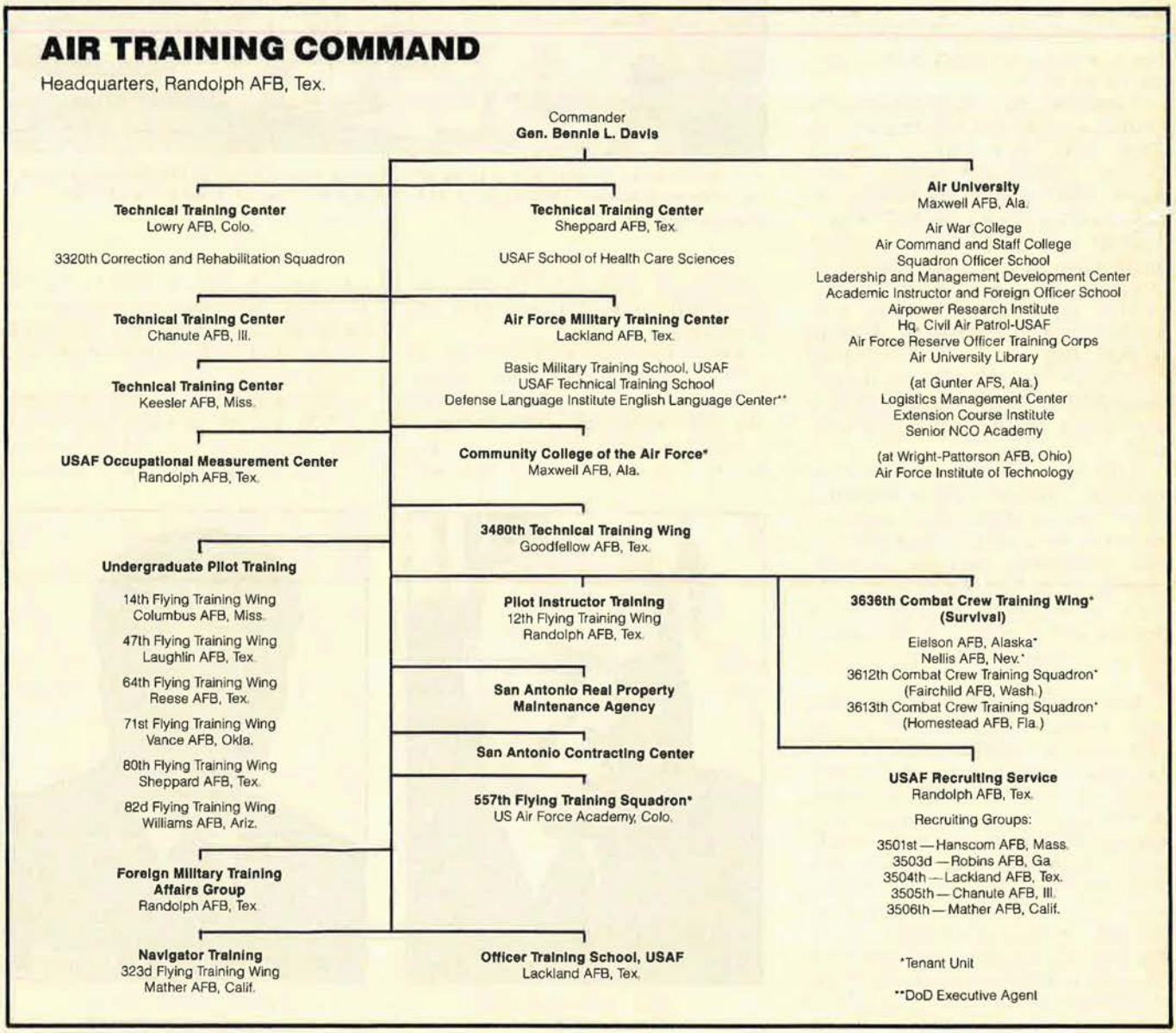
Also last year, 595 officers earned graduate degrees through the Air Force Institute of Technology. Another 15,687 completed professional continuing education programs. Under the Health Professions Scholarship Program, 444 health-care professionals received degrees and 249 physicians and medical officers completed advanced degrees and residency programs.

The Civil Air Patrol (CAP), a 60,000-member volunteer auxiliary of the Air Force, receives advice and assistance through its headquarters located at Maxwell AFB. In 1980, CAP flew 1,175 search missions, located 649 search objectives, and was credited with saving fifty-two lives, plus an additional sixty-three joint saves.

In addition to providing Air Force recruiting, training, and education, ATC also plays a direct role in Air Force readiness. Approximately 4,200 of its members are trained, equipped, and assigned to mobility teams designed to augment operations forces in time of crisis. ■

AIR TRAINING COMMAND

Headquarters, Randolph AFB, Tex.



Alaskan Air Command

A MAJOR COMMAND

ALASKA is not always a land of ice and snow, yet harsh winters are a factor the men and women of the Alaskan Air Command (AAC) must contend with in fulfilling their mission: training and employing combat-ready, tactical air forces to preserve the national sovereignty of the US.

The Alaska area of operations encompasses more than 500,000 square miles and, at its westernmost point, is within fifty miles of Siberia. Responsibility for this huge area lies with the 800 officers, 6,500 enlisted people, and 1,100 civilian employees of AAC.

The AAC Commander 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 addition, the AAC Commander is responsible to the Commander in Chief, North American Air Defense Command/Aerospace Defense Command (CINCNORAD/CINCAD) for the defense of the Alaskan NORAD Region against aerospace attack, and for accomplishing assigned operational missions. To meet these responsibilities, the AAC Commander also serves as the Commander, Alaskan NORAD Region. When directed by CINCNORAD/CINCAD, he places those AAC combat units dedicated to aerospace defense on operational alert.

In the event of a contingency (natural disasters, emergencies, 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. As such, he maintains air superiority in Alaska and provides air-to-surface support of Alaskan-based ground forces.

AAC personnel are assigned to three main bases, thirteen aircraft control and warning (AC&W) squadrons, and two forward operating bases. The main bases are Elmendorf AFB, bordering Anchorage, the state's largest city; Eielson AFB, twenty-six miles southeast of Fairbanks; and Shemya AFB, near the tip of the Aleutian Islands chain. The AC&W squadrons are along the western coast and in the interior of the state. Galena and King Salmon Airports are forward operating bases for F-4 Phantom aircraft from Elmendorf. In addition, AAC provides administrative and logistic support for Strategic Air Command units at Shemya AFB and Clear AFS.

Vigil by the dawn's early light at Clear AFS, Alaska, where a unit of the Ballistic Missile Early Warning System stands guard. At its westernmost point, Alaska is within fifty miles of Siberia.

AAC is headquartered at Elmendorf AFB, home of the 21st Tactical Fighter Wing and 21st Combat Support Group. The latter is the host unit for the base.

The 21st TFW is the main flying arm of AAC. The wing's 43d and 18th Tactical Fighter Squadrons both fly the F-4 Phantom. But there are changes in store for both squadrons. Air Force plans call for modernization of AAC aircraft during the '80s.

The 21st TFW also employs a number of T-33 aircraft as does AAC's only other flying arm, the 5010th Combat Support Group, host unit at Eielson

Lt. Gen. Lynwood E. Clark, Commander, AAC.

CMSgt. Jeffrie D. Evans, Senior Enlisted Advisor, AAC.

AFB. Both units use the T-33s for training. The 5010th CSG's 25th Tactical Air Support Squadron flies the O-2A, primarily in support of US ground forces in Alaska.

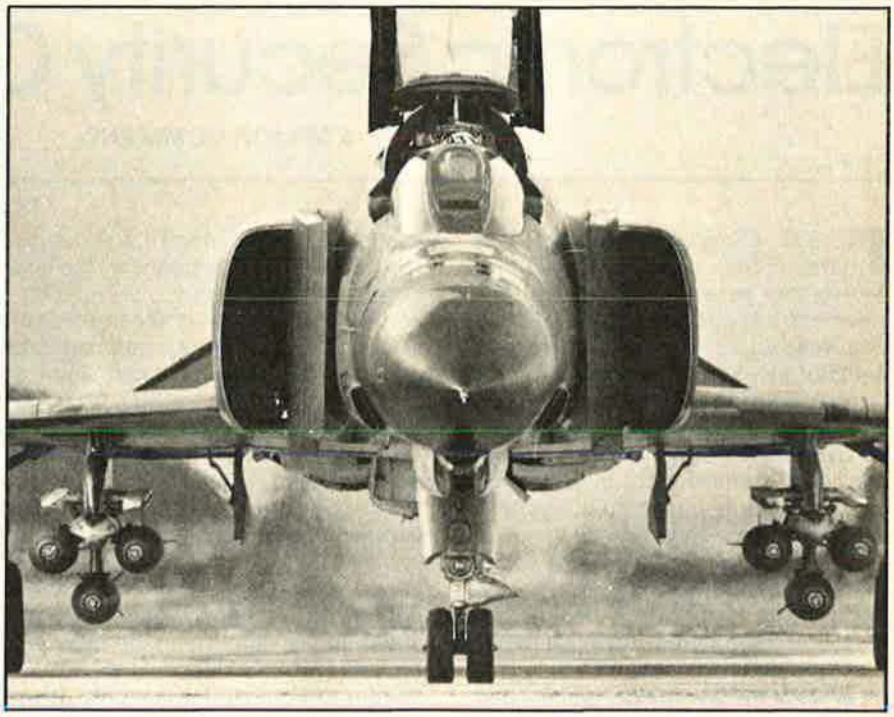
Major tenant units at Elmendorf include MAC's 616th Military Airlift Group and its 17th Tactical Airlift Squadron, equipped with C-130s; and the 71st Aerospace Rescue and Recovery Squadron, equipped with HC-130s and HH-3 helicopters. Other tenants include the 1931st Communications Group and the 6981st Electronic Security Squadron.

Eielson's largest tenant unit is SAC's 6th Strategic Wing, equipped with KC-135 Stratotankers and RC-135 aircraft.

At Elmendorf, AAC operates the Alaska Rescue Coordination Center. When a search-and-rescue mission is under way, the RCC may, and often does, coordinate efforts involving aircraft and personnel from all the military services within the state, plus CAP, Alaska State Highway Patrol, FAA, and civilian volunteers. During 1980, the RCC coordinated emergency assistance for 584 military and civilian persons in distress and was credited with saving 192 lives. Since its inception in October 1961, the RCC has recorded 10,417 assists and 3,518 saves.

A Joint Task Force was formed during January 1981 for the joint service exercise, Brim Frost '81. With the AAC Commander serving as the JTF commander, more than 12,000 active-duty, ANG, and AFRES personnel from all the military services participated in the exercise, which ended in February. In past joint Arctic training exercises, as many as 20,000 personnel have been involved.

AAC's thirteen aircraft control and warning squadrons, manned by operations personnel assigned to the command and by maintenance personnel provided under contract with RCA Alaska Communications, will undergo changes during the 1980s. In 1982, a computerized Region Operations Control Center will be operational providing consolidation of operations, reduction of remote tours, and nearly instantaneous transfer of information to the Command and Control Center. By the mid-1980s, all AC&W squadrons are to receive new minimally attended, three-dimensional radars that will further automate the Alaskan surveillance and command control and communications environment, while deleting most remote tours and saving money.



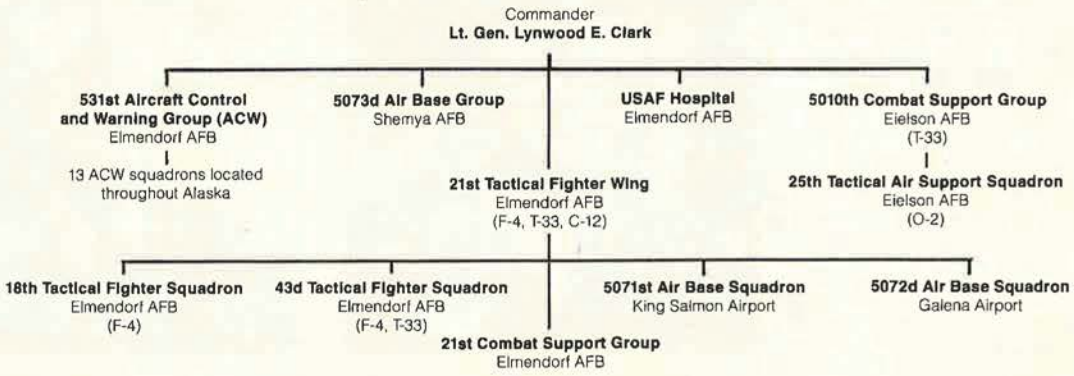
An F-4E Phantom of AAC's 43d Tactical Fighter Squadron, Elmendorf AFB, Alaska, during engine runup prior to takeoff. USAF plans to station E-3A Sentry Airborne Warning and Control System aircraft at Elmendorf on a periodic basis during the 1980s, requiring an estimated $5.6 million in new construction at the base.

Also planned for the '80s, E-3A Sentry Airborne Warning and Control System (AWACS) aircraft will be stationed at Elmendorf on a periodic basis. The E-3As will be deployed by their home unit, the 552d Airborne Warning and Control Wing at Tinker AFB, Okla. Associated with the E-3A deployments will be an estimated $5.6 million in new construction at Elmendorf.

As the strategic location of Alaska becomes even more important during the 1980s, so will the mission of the men and women of the Alaskan Air Command—that of providing "Top Cover for America." ■

ALASKAN AIR COMMAND

Headquarters, Elmendorf AFB, Alaska



Electronic Security Command

A MAJOR COMMAND

IN 1980, Electronic Security Command (ESC) celebrated its first anniversary as a new command. The command brought with it the mission and responsibilities of the former Security Service and acquired a new major mission in command control and communication countermeasures (C^3CM). The C^3CM mission is to support USAF commanders in protecting their command and control systems while denying the enemy use of his.

ESC is the Air Force component of the US cryptologic system. Years of experience in monitoring the electromagnetic environment have given ESC a unique ability to deal with the complexities of the signal environment and support C^3CM battle management.

ESC Commander Maj. Gen. Doyle E. Larson believes that "the electromagnetic environment will become a new medium of warfare on a par with ground, sea, and air. Modern military forces have an inherent vulnerability directly traceable to their dependence on electronic technology. Electronic devices are suspectible to jamming, deception, destruction, and exploitation.

"In the past, the Air Force has used some C^3CM concepts to degrade command and control systems associated with air defense. The objective has been to increase the survivability of aircraft penetrating enemy airspace. This is a very worthwhile objective, but we have yet to employ the full power of C^3CM to attack the total enemy command and control structure. If an enemy's command and control structure can be degraded, we will eliminate his ability to maneuver his forces effectively, provide resupply, and, in general, conduct warfare. Enemy command and control structures can be dismembered and individual systems reduced to isolated islands and rendered ineffective."

From its headquarters in San Antonio, Tex., ESC controls a worldwide operation that supports combat commanders. The command's operators collect, analyze, and report data about potential enemy C^3 systems and train in all aspects of C^3CM. ESC has initiated specific programs to provide combat commanders with C^3CM support. ESC will provide a specialized data display system designed to provide the near-real-time information required for executing C^3CM. General Larson says, "By near-real-time, I mean that the time lapse between acquiring the information and displaying it is fifteen seconds or less. It is a matter of screening data and passing pertinent information in time for the combat commander to apply effective countermeasures."

In addition, ESC is developing a ground-based jammer to assist in defense against enemy air attack. Ground-based jammers with listen, jam, and deception capability can help create a favorable zone for friendly fighters to engage enemy strike aircraft. On the defensive side, ESC will provide a mobile electronic monitoring system to improve the security of our tactical forces. ESC will identify in very specific terms what electronic vulnerabilities our forces offer to the enemy and recommend defensive measures.

General Larson states, "Our job is to keep operational commanders informed on the C^3CM threat. The commander must know what kind of information is being made available to the enemy from US military communications." To counter this threat, emphasis is being placed on both encryption and jam-resistant technology fixes. In many cases, communications security (COMSEC) problems can be greatly reduced with disciplined procedures using codes and authenticators. ESC is the Air Force manager of such programs. The command provides COMSEC information and education material to Air Force people around the world.

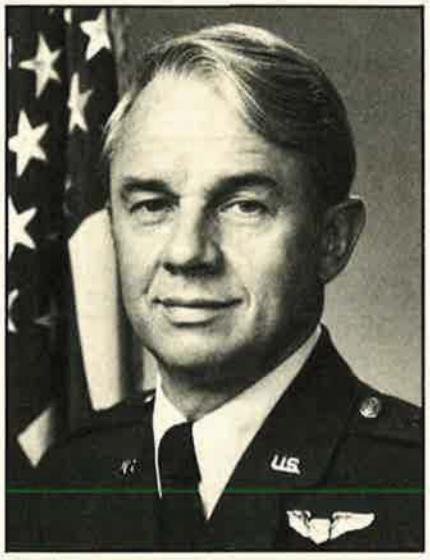
TEMPEST is another program associated with defensive C^3CM. Special equipment is checked for errant emissions caused by design deficiencies. Corrective actions are identified and administered.

ESC is developing a "Red Rec Force" to emulate a hostile electromagnetic environment. Using enemy tactics and procedures, the Red Rec Force will be used in all major exercises to create an ECM environment for realistic training of operational forces.

ESC also operates the Air Force Cryptologic Support Center. It buys, stores, distributes, maintains, and accounts for all cryptologic communication devices used by the Air Force. Its engineers help design and construct cryptologic equipment to meet secure communication requirements.

The command moved into electronic warfare activities in 1966, when Hq. USAF tasked it to evaluate the effectiveness of electronic warfare in Southeast Asia. Since then, the Air Force Electronic Warfare Center has specialized in EW technology and serves as a technical consultant to the EW community.

In October 1980, the Joint Electronic Warfare Center was established by the Secretary of Defense and collocated with Hq. ESC. In addition to being Com-



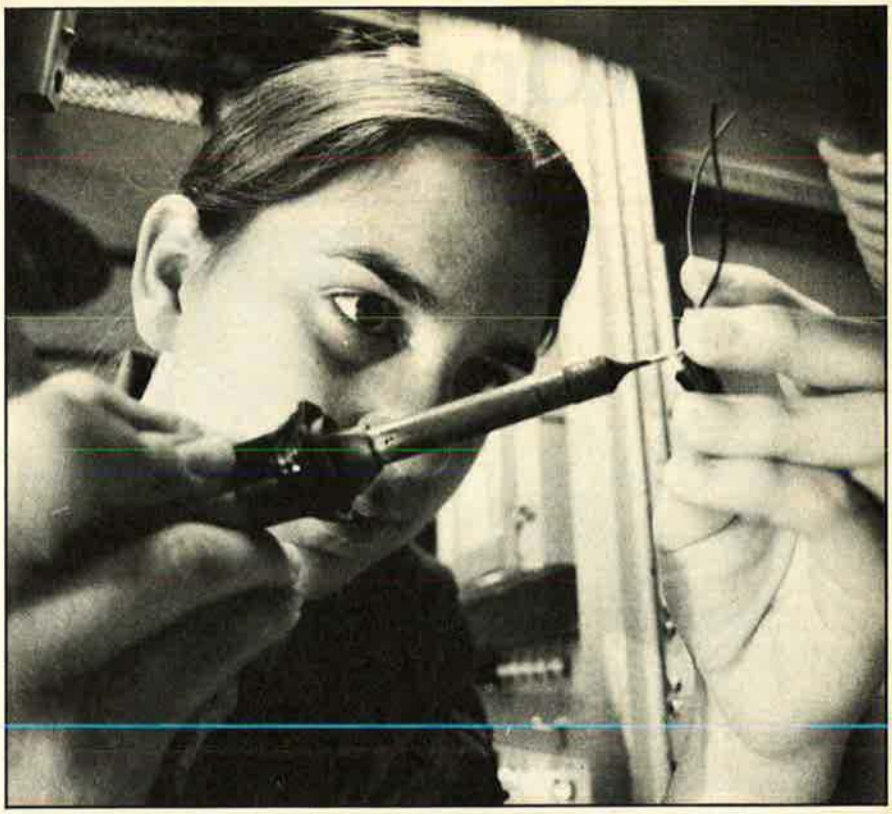
Maj. Gen. Doyle E. Larson, Commander, ESC.

CMSgt. William C. Chapman, Senior Enlisted Advisor, ESC.

mander of ESC, General Larson was appointed as dual-hat Director of the JEWC. The JEWC has a broad charter to provide analytical and technical support to EW and C^3CM joint operations. The JEWC and the AFEWC work together and share data bases, computer resources, and publication facilities.

During 1980, ESC initiated an annual worldwide competition to identify its top enlisted technicians. The program is called Comfy Olympics and consists of hands-on operational competition as well as written and oral testing. The top three performers in six functional specialties were brought to San Antonio for a final round of evaluation. Gold, silver, and bronze medallions were awarded to the top performers. The competition was heralded as an excellent builder of morale and professional pride.

Much has been learned about C^3CM as ESC has become more involved in this new mission area. The best learning ground has been such live exercises as Team Spirit in Korea. These exercises have taken C^3CM from the classroom to battlefield reality. ESC and PACAF, working as a team, were able to demonstrate all aspects of C^3CM. Team Spirit people went through the planning and execution functions of a C^3CM cell, provided real-time identification of C^3 targets, demonstrated the effectiveness of precisely timed jamming, and showed the disruptive nature of deception and the effectiveness of COMSEC discipline. ■



Advanced computer technology requires top-notch maintenance technicians capable of repairing even the most complex systems.

ELECTRONIC SECURITY COMMAND

Headquarters, San Antonio, Tex.

Commander
Maj. Gen. Doyle E. Larson

Electronic Security, Europe
Hq. Ramstein AB, Germany

- 6911th Electronic Security Group, Hahn AB, Germany
- 6913th Electronic Security Squadron, Augsburg, 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 dei Normanni AS, Italy
- 6931st Electronic Security Squadron, Iraklion AS, Crete, Greece
- 6950th Electronic Security Group, RAF Chicksands, UK
- 6988th Electronic Security Squadron, RAF Mildenhall, UK

6940th Electronic Security Wing
Hq. 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
- 6948th Electronic Security Squadron
- 6960th Security Police Squadron
- 6964th Computer Services Squadron
- 6993d Electronic Security Squadron

(All at San Antonio, Tex.)

6949th Electronic Security Group
Hq. Offutt AFB, Neb.

- 6985th Electronic Security Squadron, Eielson AFB, Alaska

Electronic Security, Pacific
Hq. Hickam AFB, Hawaii

- 6903d Electronic Security Squadron, Osan AB, Korea
- 6920th Electronic Security Group, Misawa AB, Japan
- 6922d Electronic Security Squadron, Clark AB, Philippines
- 6924th Electronic Security Squadron, Wheeler AFB, Hawaii
- 6981st Electronic Security Squadron, Elmendorf AFB, Alaska
- 6990th Electronic Security Group, Kadena AB, Japan

DIRECT REPORTING UNITS

Electronic Security, Tactical
Hq. Langley AFB, Va.

Air Force Cryptologic Support Center
Hq. San Antonio, Tex.

Air Force Electronic Warfare Center
Hq. San Antonio, Tex.

Military Airlift Command

A MAJOR COMMAND

A stretched C-141B StarLifter moves up on a jet tanker refueling boom. Modification of the C-141 fleet to the "B" model should be complete by mid-1982.

FROM headquarters at Scott AFB, Ill., Military Airlift Command (MAC), a specified command, directs some 87,000 active-duty and 51,000 Reserve Forces people, both military and civilian, as well as almost 1,000 aircraft at more than 300 locations in twenty-four countries.

Operating thirteen bases in the United States and controlling US facilities at Lajes in the Azores, and at Rhein-Main AB, Germany, MAC occupies a central position in America's defense strategy. The command, through its vital worldwide missions, serves as this nation's backbone of deterrence by providing mobility to US fighting forces. While training for ultimate use in conflict, MAC supports readiness of theater forces and projects the American spirit at home and abroad through its many humanitarian airlift operations.

MAC's major missions include deployment and employment of combat forces and their support equipment, and logistical resupply of these forces. In 1980, acting as the executive agent for Department of Defense airlift, MAC moved 439,000 tons of cargo and more than 2,000,000 people through domestic and overseas passenger and cargo terminals.

MAC brings together people and equipment from the command, the Air National Guard, the Air Force Reserve, and the civil air transport industry to form a national military air transport system. When mobilized, Air National Guard and Air Force Reserve forces will provide—on a completely integrated basis—about half of MAC's wartime capability, including C-130, C-7, and C-123 aircraft.

The Civil Reserve Air Fleet (CRAF) is a successful twenty-nine-year partnership between civil air carriers and DoD. With more than 400 civilian transport aircraft, both passenger and cargo, committed to the program, the CRAF is the fastest way to double the nation's military airlift capacity for response to a contingency. MAC has demonstrated many times its capability to support small-scale contingencies. However, even the considerable airlift resources under MAC's direction will not be enough to satisfy the total demands of a major contingency overseas, especially the need to move large, heavy, military equipment on a sustained basis.

Several initiatives are under way to increase MAC's airlift capacity. The C-5's wing is being strengthened. The first production aircraft is to be delivered in 1983. All C-5s will have their wings modified by mid-1987, increasing their lift capability and extending the life of the entire fleet into the twenty-first century.

The first stretched C-141 StarLifter was delivered to the command in December 1979. Each aircraft is being lengthened by more than twenty-three feet, increasing cargo capacity by about thirty percent. In-flight refueling is also being added so the stretched StarLifter can fly anywhere in the world without landing en route. These modifications are ahead of schedule, below cost, and should be completed in July 1982.

Initiatives are also under way to increase the CRAF's cargo capability. By adding features such as wide doors and stronger floors to civilian airliners, these civil transports could carry signif-

Gen. Robert E. Huyser, Commander in Chief, MAC.

CMSgt. Harry E. Davis, Senior Enlisted Advisor, MAC.

icantly more cargo—and more kinds of cargo—during contingencies. This contribution to defense displays the civil air carriers' dedication to the nation.

Even with these improvements, MAC still needs more capability to move large, heavy military equipment over intercontinental distances. The Air Force is developing a new aircraft—the CX—that will give MAC a balanced capability to carry heavy loads long distances into small, austere fields close to the battle area. The CX will be a multirole aircraft that will integrate with and complement the existing military and civil airlift force.

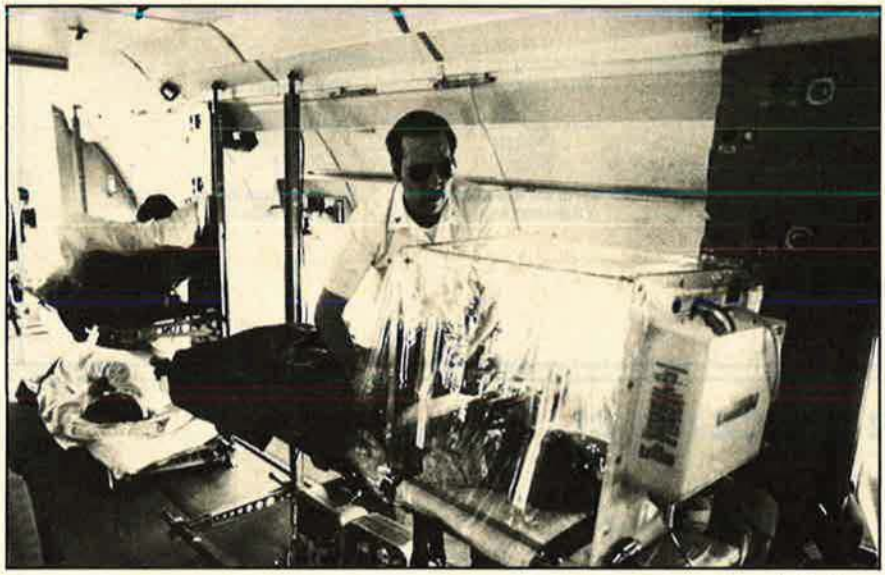
MAC is responsible for more than airlift. Its technical services perform several related missions:

• *The Aerospace Rescue and Recovery Service (ARRS)* is responsible for combat search and rescue, SAC missile site support, and worldwide weather reconnaissance. ARRS flies C-130 Hercules and C-135 aircraft, and HH-1, HH-3, and HH-53 helicopters. Full-scale engineering and development for the HX rescue helicopter is to begin early in FY '82. The HX is a derivative of the US Army UH-60 Blackhawk built by Sikorsky. As an invaluable by-product of its peacetime combat rescue training, ARRS also helps civilians in distress within the United States and abroad. ARRS forces have been credited with saving more than 19,900 people in the last thirty-five years.

ARRS, through the Air Force Rescue Coordination Center (AFRCC) located at Scott AFB, Ill., coordinates all inland search-and-rescue operations using ARRS, other military units, Civil Air Patrol, and a variety of volunteer organizations. The AFRCC also cooperates and works closely with state and local agencies to use the services of police and sheriff departments as well as local rescue teams aiding people in distress.

OPERATIONAL AIRCRAFT ASSIGNED TO MAC
(As of January 31, 1981)

TYPE	NUMBER
T/UH-1F/P	27
UH-1N	49
HH-1H	22
C/HH-3	45
C/HH-53	21
C-5	77
C-6A	1
C-9A/C	23
C-12	6
CT-39	113
C-130	266
HC-130H/N/P	28
WC-130E/H	13
WC-135B (incl. C-135B/C)	13
C-137	5
C-140	11
C-141	270
TOTAL	990

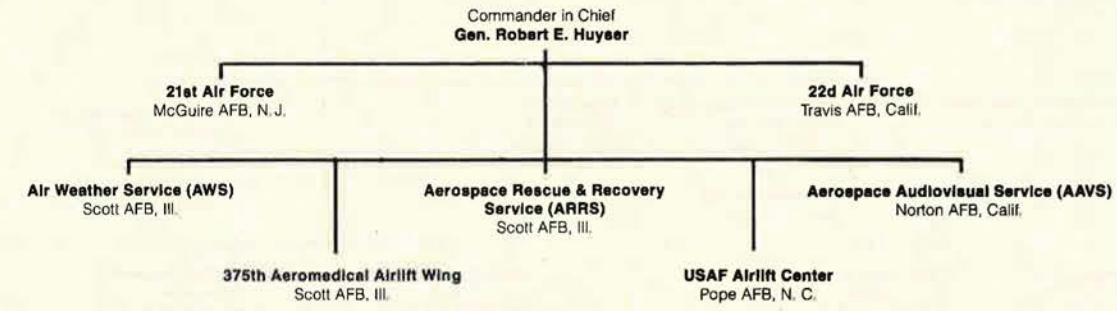


Sgt. Francis A. Hanson of the 57th Aeromedical Evacuation Squadron, Scott AFB, Ill., tends a patient in a minioxygen tent during a C-9 Nightingale medevac flight.

• *Air Weather Service (AWS)* provides global weather and environmental services to the Air Force and Army. Its primary mission is to support combat operations in wartime. AWS provides direct decision-making assistance to military commanders, enabling them to take advantage of weather in their operations and to protect valuable resources. With ARRS, AWS provides tropical storm and special weather reconnaissance.

• *The Aerospace Audiovisual Service (AAVS)* is the Air Force's single manager for combat and audiovisual documentation. Headquartered at Norton AFB, Calif., AAVS operates four squadrons and twenty-five detachments around the world providing motion picture, television, and still photographic coverage of Air Force activities. In addition to its primary documentation mission, AAVS produces intracommand training products, provides optical instrumentation and technical documentation of USAF space and missile tests, and manages base

MILITARY AIRLIFT COMMAND
Headquarters, Scott AFB, Ill.



audiovisual service centers throughout MAC and at selected locations in Europe, the Pacific, Alaska, and Central America.

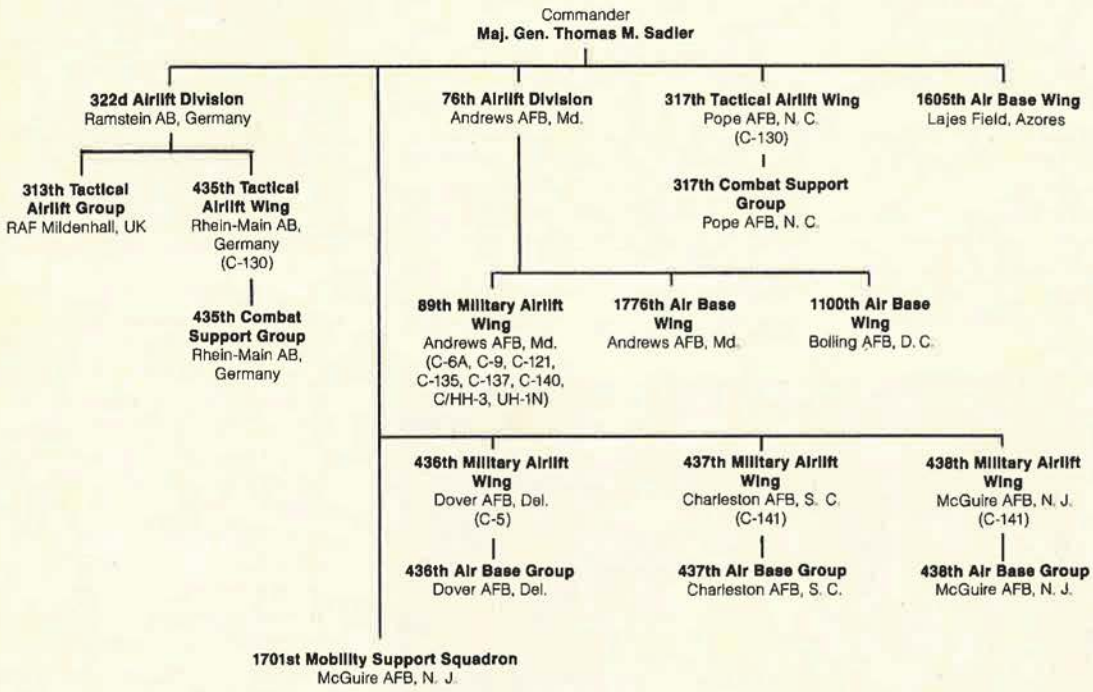
Aeromedical airlift is another important MAC mission. During 1980, aircrews, nurses, and medical technicians of the 375th Aeromedical Airlift Wing, using their C-9 Nightingales throughout the world, and assisted by C-141 StarLifters and C-130 Hercules from other MAC wings, flew 67,000 patients to hospital facilities for care not available at their duty stations.

Another special airlift unit, the 89th Military Airlift Wing, provides airlift for the President, other US government officials, and foreign dignitaries.

MAC's patriotic, dedicated people operate daily on a global scale to show the flag and to help achieve US objectives. The command's mission epitomizes America itself—always ready to serve. ■

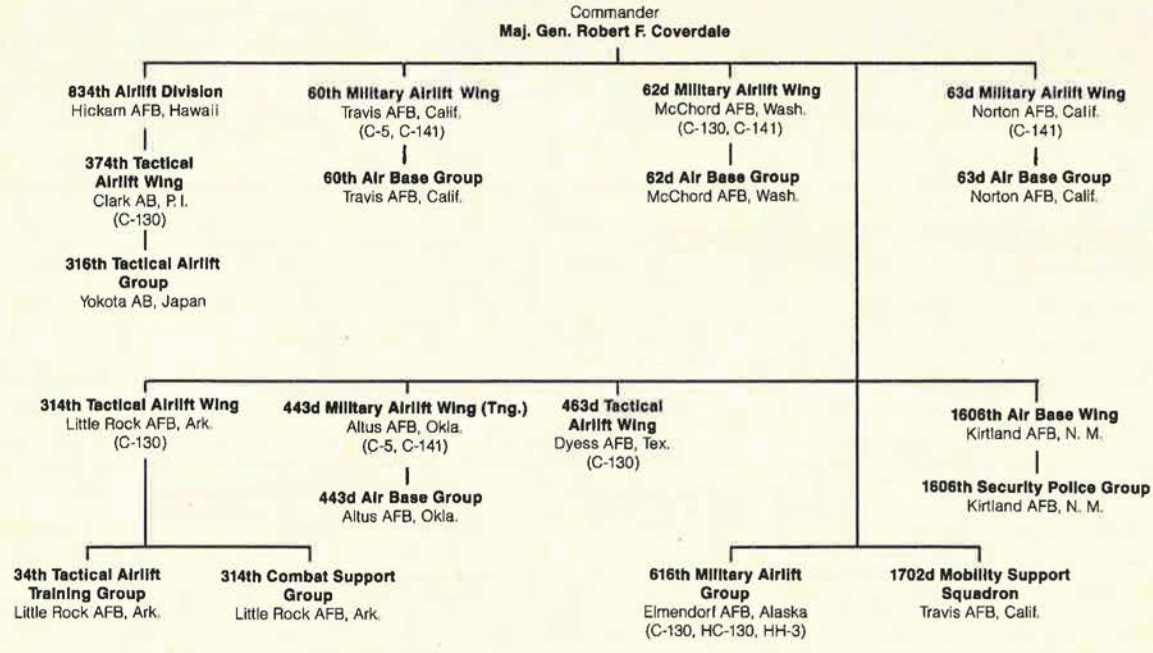
TWENTY-FIRST AIR FORCE (MAC)

Headquarters, McGuire AFB, N. J.



TWENTY-SECOND AIR FORCE (MAC)

Headquarters, Travis AFB, Calif.



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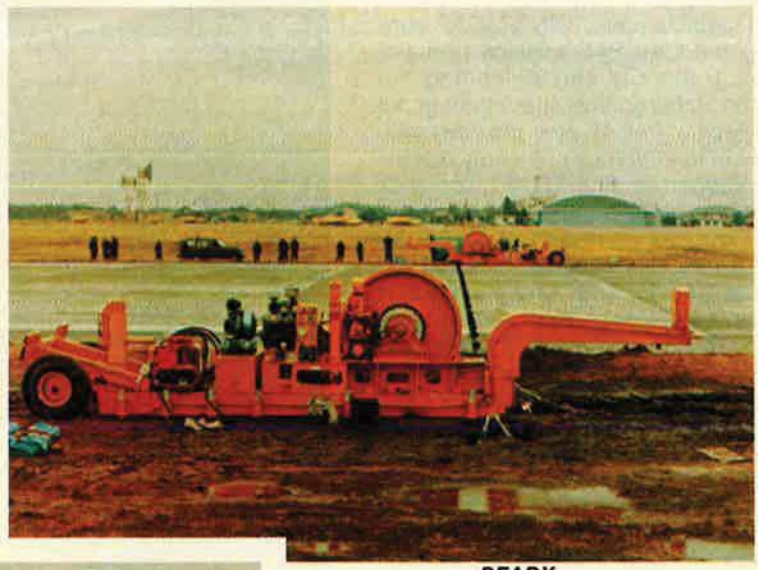
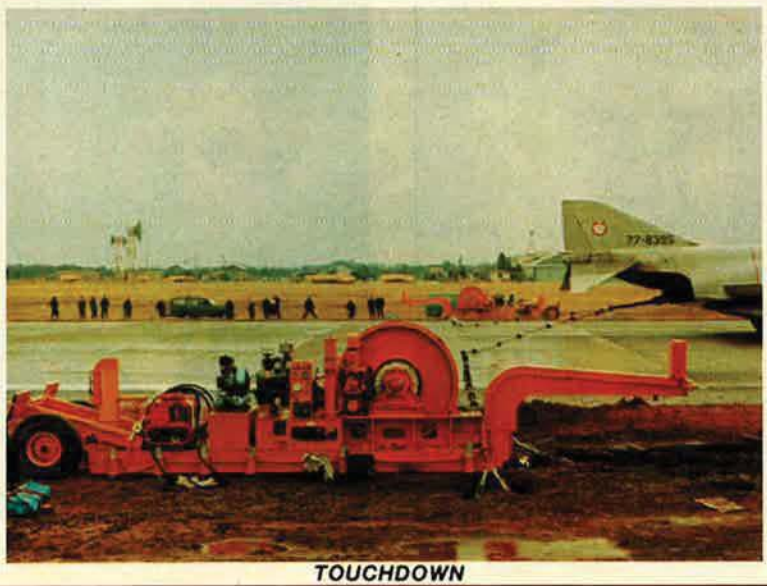


READY



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Pacific Air Forces

A MAJOR COMMAND

PACIFIC Air Forces (PACAF), with headquarters at Hickam AFB, Hawaii, is the air component of the unified Pacific Command. PACAF's overall mission is to plan, conduct, control, and coordinate offensive and defensive air operations in accordance with tasks assigned by the Commander in Chief, Pacific Command (CINCPAC).

Lt. Gen. James D. Hughes, Commander in Chief, Pacific Air Forces (CINCPACAF), has 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—an area that encompasses more than half the earth's surface and includes some two billion people living under more than thirty-five different flags.

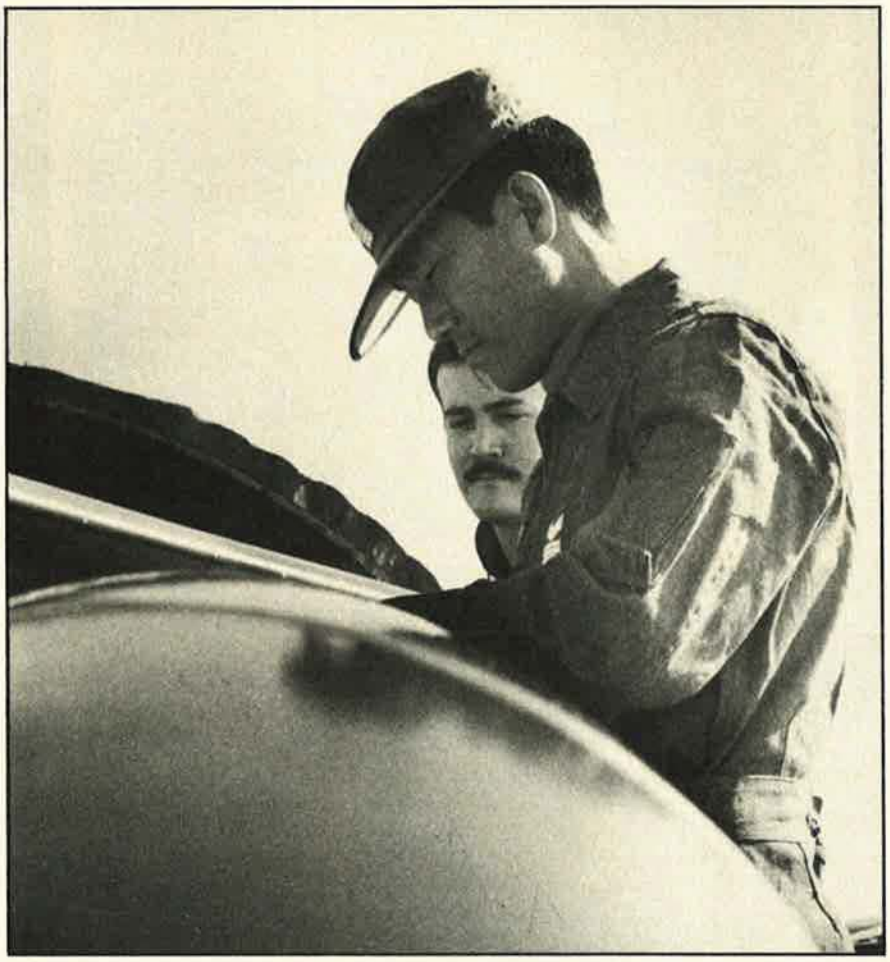
Working with other service component commanders, CINCPACAF supports the CINCPAC mission of maintaining security and defending the United States against attack throughout the Pacific. PACAF also provides military aid to air forces of friendly nations and support for other USAF commands operating in the Pacific area.

As a major command of the US Air Force, PACAF's manpower strength exceeds 34,000, with operational and support personnel stationed at eight major bases and more than eighty-seven facilities located principally in Japan, Korea, the Philippines, and Hawaii.

During 1980, important progress was made in modernization of assigned forces. The 18th Tactical Fighter Wing at Kadena AB, Japan, completed conversion from the F-4 Phantom to three fully operational squadrons of F-15C and D aircraft. Deployment of the E-3A Airborne Warning and Control Aircraft to Kadena in July 1980 significantly enhanced PACAF's ability to control and integrate tactical air operations.

Force modernization will continue throughout 1981. In July, the 8th Tactical Fighter Wing at Kunsan AB, Korea, will begin converting from the F-4D to the F-16 Fighting Falcon, with conversion of the entire wing scheduled for completion by early 1982. In addition, construction is now under way at Suwon AB, Korea, in preparation for the early 1982 deployment of a squadron of A-10 Thunderbolt II aircraft. The A-10 will give the Air Force a greater ground-attack capability in the Korean theater.

Pacific Air Force continued to main-



At Taegu AB, South Korea, US and Korean technicians of the 6497th Consolidated Aircraft Maintenance Squadron work together on a 497th TFS F-4 Phantom.

Lt. Gen. James D. Hughes, Commander in Chief, PACAF.

CMSgt. James C. Binnicker, Senior Enlisted Advisor, PACAF.

An E-3A AWACS over Osan AB, Korea, as Air Force Security Police stand-to.

tain readiness through an extensive series of exercises. Team Spirit 81, the free world's largest joint training exercise, was held in the Republic of Korea during March. This annual exercise demonstrates PACAF's ability to augment rapidly assigned forces and integrate combat operations with other US and Republic of Korea forces.

Cope Thunder is PACAF's series of realistic tactical air warfare exercises conducted eight times annually at the Crow Valley Range near Clark Air Base in the Republic of the Philippines. In this exercise series, PACAF and Philippine Air Force aircrews, as well as SAC, naval, and Marine aircraft from throughout the Pacific theater, participate in realistic training in a simulated combat environment.

Cope North is a joint and combined exercise series with the Japan Air Self-Defense Force. These exercises provide mutually beneficial training in all aspects of air defense, including command and control of airborne fighters conducting Dissimilar Aircraft Combat Tactics (DACT). During 1980, the Hawaii ANG, equipped with the F-4C, traveled to Japan to participate in Cope North. The visit proved to be an ideal opportunity to exercise a unique segment of PACAF's total force.

In August, eight PACAF F-15s and two E-3As made an operational visit to the Southwest Pacific when they deployed to Australia for a USAF/RAAF combined exercise, Pacific Consort. During a redeployment phase, two of the F-15s and one E-3A visited New Zealand, Singapore, Malaysia, and Thailand.

PACAF personnel throughout the command remained active in community and humanitarian efforts. Typical of this effort was widespread support of Amerasian orphan programs in Korea, helping to bring aid and public attention to the plight of these children of racially mixed parentage.

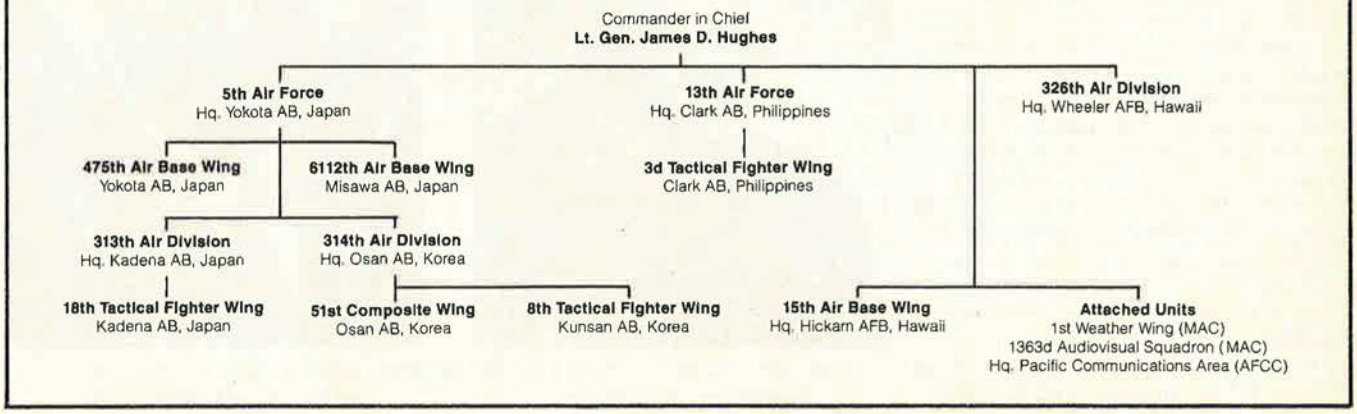
In a dynamic geopolitical environment, the men and women of Pacific Air Forces stand ready to protect US national security interests and assist in maintaining peace and stability throughout the 100,000,000-square-mile area of PACAF responsibility. ■

THE MAJOR UNITS OF PACIFIC AIR FORCES (PACAF)

UNIT	LOCATION	AIRCRAFT
15th Air Base Wing	Hickam AFB, Hawaii	EC-135, T-33 (+ ANG F-4C)
326th Air Division	Wheeler AFB, Hawaii	O-2
FIFTH AIR FORCE HQ., YOKOTA AB, JAPAN		
8th Tactical Fighter Wing	Kunsan AB, Korea	F-4D, F-16 (arrives mid-Aug. '81)
	Taegu AB, Korea	F-4D
18th Tactical Fighter Wing	Kadena AB, Japan	RF-4C, T-39, F-15, E-3A (TAC)
51st Composite Wing (Tactical)	Osan AB, Korea	F-4E, OV-10
313th Air Division	Kadena AB, Japan	
314th Air Division	Osan AB, Korea	
475th Air Base Wing	Yokota AB, Japan	T-39, UH-1
6112th Air Base Wing	Misawa AB, Japan	
THIRTEENTH AIR FORCE HQ., CLARK AB, PHILIPPINES		
3d Tactical Fighter Wing	Clark AB, Philippines	MC-130, F-4E, F-4G, F-5, T-39, T-33

PACIFIC AIR FORCES

Headquarters, Hickam AFB, Hawaii



Strategic Air Command

A MAJOR COMMAND

Above, an SR-71 of SAC's 9th Strategic Reconnaissance Wing, Beale AFB, Calif. Another SAC reconnaissance platform is the RC-135, right, currently operating from Offutt AFB, Neb., and Eielson AFB, Alaska. The RC-135s are equipped for aerial refueling and thus are not range-limited in their worldwide mission.

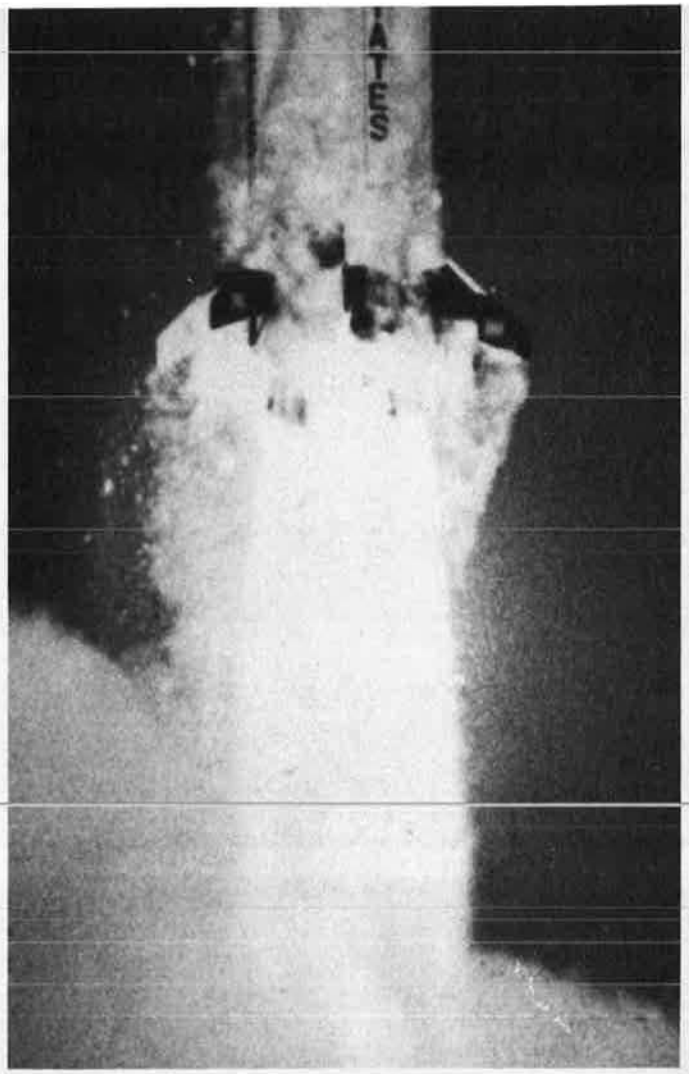
THE Strategic Air Command (SAC) is responsible for the major portion of America's strategic deterrent forces. The command maintains approximately seventy percent of all US nuclear delivery vehicles (1,053 intercontinental ballistic missiles and approximately 400 manned bombers) and a significant amount of the total deliverable megatonnage.

SAC has been tasked with deterring any enemy from attacking the United States or allied nations and protecting our vital national interests, regardless of where they may lie. To do this, nearly 100 percent of the ICBMs and some thirty percent of the bombers and tankers are kept in constant readiness. If deterrence should fail, SAC can instantly respond at the direction of the National Command Authorities against an aggressor with sufficient force to inflict massive destruction on economic, political control, and military targets. SAC is equally effective in the conventional arena.

For many years, SAC's bombers represented virtually all the strategic nuclear power of the US. Even with the addition of the sea-launched ballistic

Gen. Richard H. Ellis, Commander in Chief, SAC.

CMSgt. Charles L. Reynolds, Senior Enlisted Advisor, SAC.



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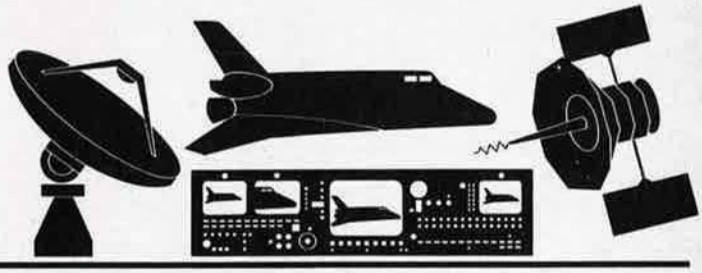

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These improvements permit more precise target control and increased mission profile flexibility. For example, low altitude terrain following missions and simultaneous three vehicle flight missions can be flown. And the MQM-107B digital control system has additional computer capacity already built in to accommodate the even more stringent target requirements of the future.

In addition to improved performance, the MQM-107B has an improved payload capability with an internal volume capacity of 4.8 cubic feet. Easy access to augmentation and scoring payload and core electronics are also included in the design. And the new MQM-107B is mobile. Launch, tracking and control units are all self-contained. Relocation of a target operation is a matter of just picking up and moving.

The MQM-107B and all the various elements of its improved design have been thoroughly tested. It more than meets the military's demands for large payload volume and weight, target size, speed, altitude, endurance and precise controllability. All within a down to earth, cost-efficient system. That's technology.

For further details, please write to: Beech Aircraft Corporation, Aerospace Programs, Wichita, Kansas 67201.

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missiles and intercontinental ballistic missiles, bombers have continued to make important contributions and currently provide more than half our deliverable megatonnage.

A B-52G squadron equipped with air-launched cruise missiles will be fully operational in late 1982, with a SAC proposal to transition all B-52G and H models into standoff ALCM carriers by 1990. Major modifications on the B-52 include an offensive avionics system on the G and H models, while the B-52D is being modified by the replacement of the bombing and navigation system with a state-of-the-art digital bomb navigation system.

As the single air refueling manager for the Air Force, SAC maintains a fleet of more than 600 KC-135 tankers. These support not only SAC aircraft but those of other commands. A significant portion of SAC's refueling force—nearly 130 KC-135As—is now assigned to Air National Guard and Air Force Reserve units under DoD's Total Force policy. Improvements to the current tankers include wing reskinning, upgraded navigation systems, and engine modifications.

Acquisition of the new KC-10A Extender advanced tanker/cargo aircraft will also enable SAC to meet increasing aerial refueling requirements. The first of the new tankers, scheduled to be delivered in March 1981, will be based at Barksdale AFB, La. The Air Force Reserve will participate in the employment of the KC-10A under the Air Force Reserve Associate Program.

Delivery of the first E-4B, an upgraded version of the National Emer-

STRATEGIC AIR COMMAND

Headquarters, Offutt AFB, Neb.

Commander in Chief
Gen. Richard H. Ellis

8th Air Force
Hq. Barksdale AFB, La.

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
4000th Aerospace Applications Group
4315th Combat Crew Training Squadron
4392d Aerospace Support Group

3d Air Division
Hq. Andersen AFB, Guam

43d Strategic Wing
Andersen AFB, Guam
(B-52/KC-135)

376th Strategic Wing*
Kadena AB, Japan
(KC-135)

7th Air Division
Hq. Ramstein AB, Germany

306th Strategic Wing*
RAF Mildenhall, UK

TUSLOG Det. 8, Turkey

11th Strategic Group
RAF Fairford, UK

15th Air Force
Hq. March AFB, Calif.

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
Technical Wing
Offutt AFB, Neb.

3902d Air Base Wing
Offutt AFB, Neb.

*Tenant Unit

EIGHTH AIR FORCE (SAC)

Headquarters, Barksdale AFB, La.

Commander
Lt. Gen. Edgar S. Harris, Jr.

10th Air Division
Carswell AFB, Tex.

2d Bomb Wing
Barksdale AFB, La.
(B-52/KC-135)

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)

340th Air Refueling Group*
Altus AFB, Okla.
(KC-135)

15th Air Division
Pease AFB, N.H.

416th Bomb Wing
Griffiss AFB, N.Y.
(B-52/KC-135)

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)

6th Missile Warning Squadron
Otis AFB, Mass.

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)

305th Air Refueling Wing
Grissom AFB, Ind.
(KC-135)

351st Strategic Missile Wing
Whiteman AFB, Mo.
(Minuteman)

4684th Air Base Group
Sondrestrom AB, Greenland

12th Missile Warning Group
Thule AB, Greenland

42d Air Division
Blytheville AFB, Ark.

19th Bomb Wing*
Robins AFB, Ga.
(B-52/KC-135)

68th Bomb Wing*
Seymour Johnson AFB, N.C.
(B-52/KC-135)

97th Bomb Wing
Blytheville AFB, Ark.
(B-52/KC-135)

308th Strategic Missile Wing*
Little Rock AFB, Ark.
(Titan II)

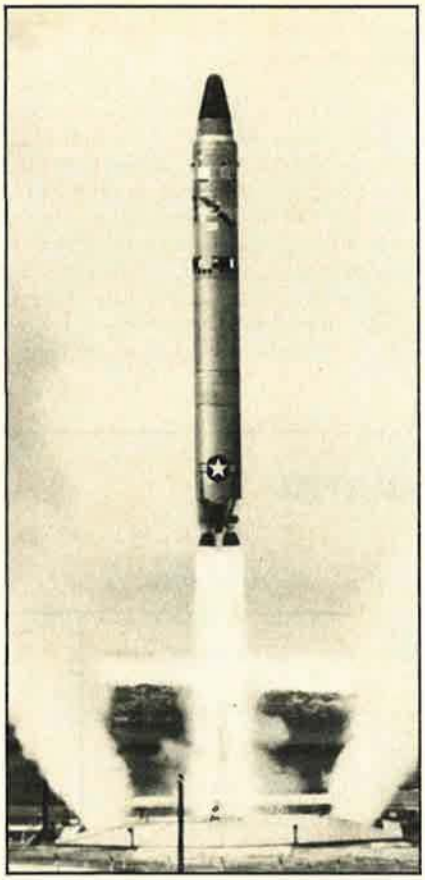
20th Missile Warning Squadron*
Eglin AFB, Fla.

* Tenant Unit

gency Airborne Command Post E-4A, was made in January 1980, and the first operational mission was flown in March. The E-4B can perform SAC's alternate airborne command post airborne alert as well as the NEACP mission.

SAC's land-based intercontinental ballistic missile force of 1,000 Minuteman and fifty-three Titan II missiles remains the centerpiece of our nation's nuclear deterrent force and is unsurpassed in terms of readiness, immediate reaction, and economy of operation. Development and deployment of the MX advanced ICBM in a mobile basing mode will further support SAC's force-modernization goals of maintaining ICBM survivability while enhancing security and strengthening strategic deterrence.

While its mission primarily centers on strategic nuclear matters, SAC also has a significant conventional responsibility—an area often overshadowed by the command's traditional association with the nuclear role. SAC demonstrated its ability to rapidly project US military power to any point in the world in March of last year, during a nonstop around-the-world flight. During the forty-three-and-one-half-hour flight, two B-52s flew sea surveillance/reconnaissance missions in support of the Commander in Chief, Pacific Command's Indian Ocean operations.



The heavyweight in SAC's ICBM arsenal is the Titan II, which has a launch reaction time of one minute.

SAC exercises involve the movement of aircraft, launching certain portions of the nonalert force, and a considerable amount of emergency war order practices by both aircraft and missile crews. The B-52's ability to provide various forms of conventional support to theater commanders is also tested through SAC-conducted exercises and participation in several NATO exercises in Europe. In September 1980, the first exercise involving SAC's Strategic Projection Force was held. The Strategic Projection Force concept was developed to rapidly deploy a conventional force worldwide in response to potential time-sensitive crises and to support the Rapid Deployment Joint Task Force.

SAC assumed a new and major responsibility in early 1980—overall operational management for our country's current and future space surveillance and missile warning systems. In its role as resource manager, SAC is responsible for organizing, training, equipping, and operating the assigned resources.

The command comprises some 120,000 men and women, operating from more than fifty locations worldwide. SAC's major operational systems include the B-52 and FB-111, KC-135, RC-135, SR-71, U-2, EC-135, E-4, in addition to Titan II and Minuteman II and III ICBMs. ■

FIFTEENTH AIR FORCE (SAC)

Headquarters, March AFB, Calif.

Commander
Lt. Gen. James P. Mullins

4th Air Division
F. E. Warren AFB, Wyo.

28th Bomb Wing
Ellsworth AFB, S. D.
(B-52/KC-135)

44th Strategic Missile Wing
Ellsworth AFB, S. D.
(Minuteman)

46th Aerospace Defense Wing
Peterson AFB, Colo.

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 Bomb Wing
March AFB, Calif.
(B-52/KC-135)

96th Bomb Wing
Dyess AFB, Tex.
(B-52/KC-135)

14th Air Division
Beale AFB, Calif.

9th Strategic Reconnaissance Wing
Beale AFB, Calif.
(SR-71/U-2)

93d Bomb Wing
Castle AFB, Calif.
(B-52/KC-135)

100th Air Refueling Wing
Beale AFB, Calif.
(KC-135)

320th Bomb Wing*
Mather AFB, Calif.
(B-52/KC-135)

307th Air Refueling Group*
Travis AFB, Calif.
(KC-135)

7th Missile Warning Squadron
Beale AFB, Calif.

47th Air Division
Fairchild AFB, Wash.

92d Bomb Wing
Fairchild AFB, Wash.
(B-52/KC-135)

341st Strategic Missile Wing
Malmstrom AFB, Mont.
(Minuteman)

6th Strategic Wing*
Eielson AFB, Alaska
(RC/KC-135)

13th Missile Warning Squadron
Clear AFS, Alaska

16th Surveillance Squadron*
Shemya AFB, Alaska

57th Air Division
Minot AFB, N. D.

5th Bomb Wing
Minot AFB, N. D.
(B-52/KC-135)

55th Strategic Reconnaissance Wing
Offutt AFB, Neb.
(RC/KC-135)

91st Strategic Missile Wing
Minot AFB, N. D.
(Minuteman)

319th Bomb Wing
Grand Forks AFB, N. D.
(B-52/KC-135)

321st Strategic Missile Wing
Grand Forks AFB, N. D.
(Minuteman)

*Tenant Unit

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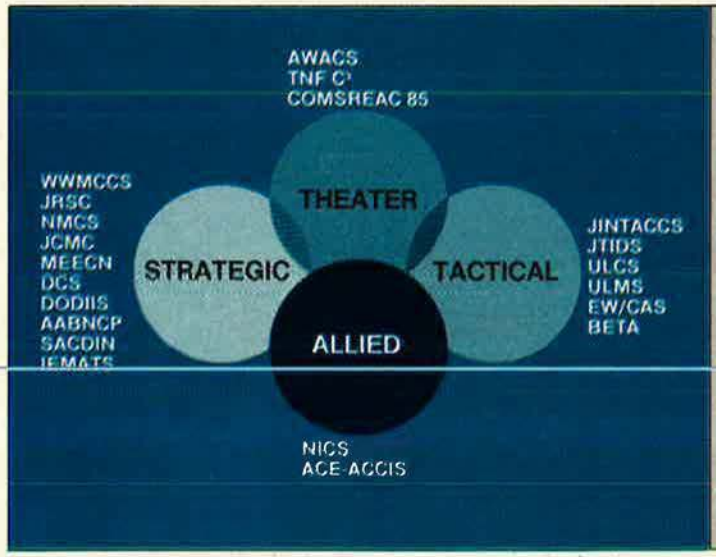

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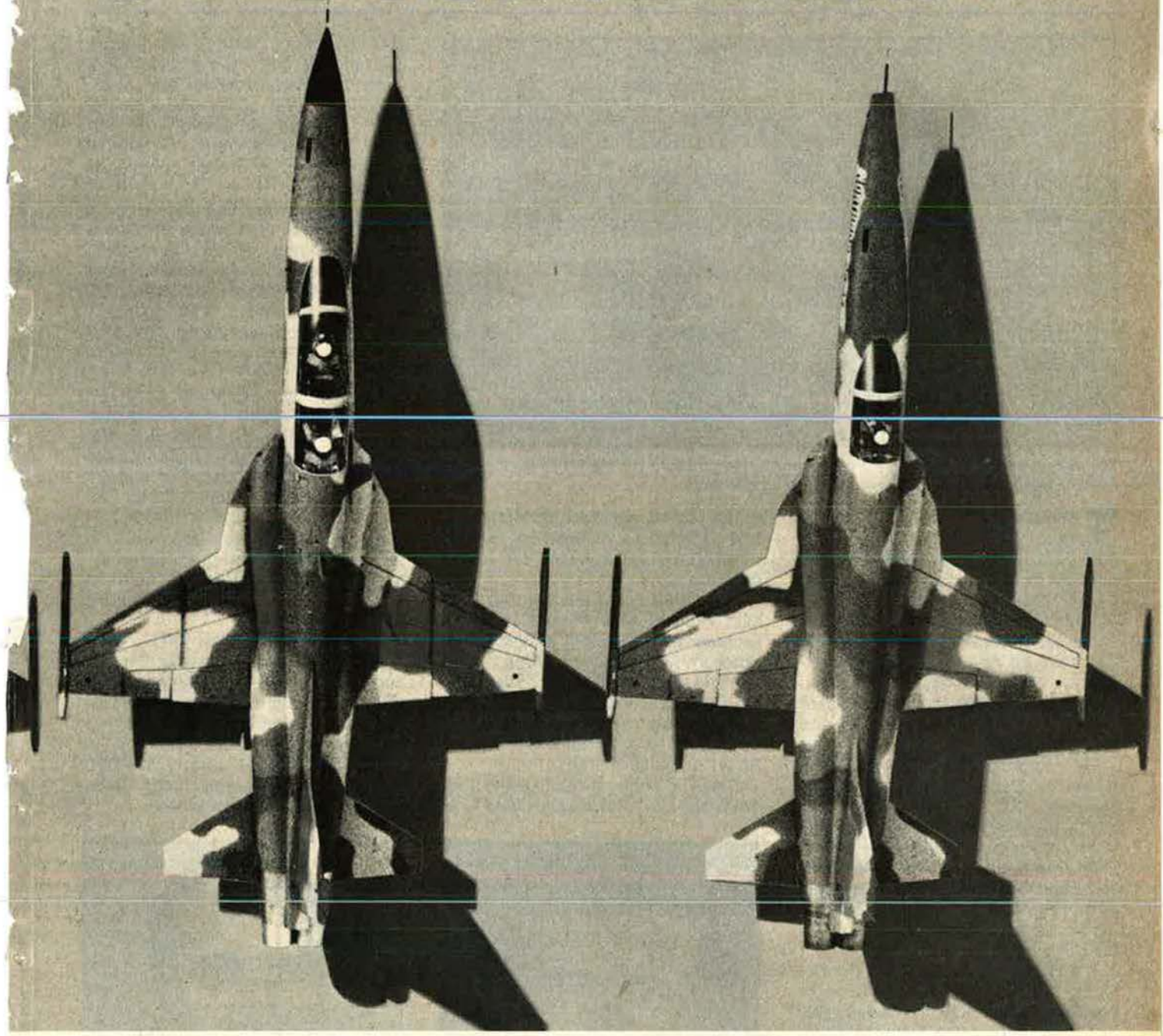

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Tactical Air Command

A MAJOR COMMAND

The newest addition to the Air Force weapon-system inventory is the F-16 Fighting Falcon, one of the most maneuverable aircraft ever built.

THE mission of the Tactical Air Command (TAC) is to organize, train, and equip assigned forces and to maintain a combat-ready reserve capable of rapid worldwide deployment. To accomplish this mission, TAC has about 112,000 people and more than 2,400 aircraft. Additionally, upon mobilization, TAC would assume command of more than 61,000 Air National Guard and Air Force Reserve personnel and their equipment.

TAC consists of two numbered air forces; the Deputy Commander for Air Defense, TAC; eleven air divisions; twenty-eight wings; and three specialized centers, plus other direct reporting units. The Ninth Air Force, Shaw AFB, S. C., and Twelfth Air Force, Bergstrom AFB, Tex., oversee the daily tactical readiness and training operations in the US.

The Deputy Commander for Air Defense, TAC (ADTAC), is responsible for providing resources to the Commander in Chief, Aerospace Defense Command (CINCAD) and North American Air Defense Command (CINCNORAD) for air defense operations. The ADTAC air defense mission is to ready these forces to meet the needs of peacetime air sovereignty and wartime air defense.

The Tactical Air Warfare Center, Eglin AFB, Fla.; the Air Defense Weapons Center, Tyndall AFB, Fla.; and the Tactical Fighter Weapons Center, Nellis AFB, Nev., conduct specialized training; test equipment, procedures, tactics, and doctrine for tactical and strategic air defense forces; and establish requirements for future equipment.

The US Air Force Southern Air Division, Howard AFB, Panama, is TAC's representative in Latin America. The Southern Air Division provides for and controls the air elements in defense of the Panama Canal, trains and assists Latin American air forces, and supplies air support for joint training with Latin American military forces.

The 552d Airborne Warning and Control Wing (AWACW) operates from Tinker AFB, Okla.; Kadena AB, Japan; Keesler AFB, Miss.; Keflavik NAS, Iceland; and Davis-Monthan AFB, Ariz., providing radar surveillance, battlefield command and control and overseas deployment control of tactical fighter aircraft to unified commands worldwide.

The 1st Special Operations Wing, Hurlburt Field, Fla., which became a direct reporting unit to TAC in 1980, concentrates on developing unconventional warfare methods, and training US and allied personnel in the geopolitical, psychological, and military implications of Air Force special operations.

TAC's combat capability continues to increase through the ongoing conversion of active, Air National Guard, and Air Force Reserve units to more modern tactical and support aircraft. Currently, TAC's aircraft inventory includes 338 F-15s, 216 A-10s, 207 F-16s, and twenty-three E-3As, while the air reserve forces now possess twenty-two squadrons of F/RF-4s, fourteen squadrons of A-7s, and five squadrons of A-10 aircraft.

Consistent with the TAC motto, "Readiness Is Our Profession," readiness training is heavily emphasized, with tactical aircrew flying steadily increasing. Aircraft sortie rates are up forty-four percent from 1978 and, in 1980, TAC logged nearly 524,000 hours with the best safety record since realistic training began in 1974.

Gen. W. L. Creech, Commander, TAC.

CMSgt. Norman O. Gallion, Senior Enlisted Advisor, TAC.

TACTICAL AIR COMMAND

Headquarters, Langley AFB, Va.

Commander
Gen. W. L. Creech

9th Air Force
Hq. Shaw AFB, S.C.
8 tactical fighter wings
1 tactical reconnaissance wing
1 tactical air control wing

12th Air Force
Hq. Bergstrom AFB, Tex.
6 tactical fighter wings
4 tactical training wings
1 tactical reconnaissance wing
1 tactical air control wing

Air Defense Forces, TAC
6 air divisions
Air Defense Weapons Center
Air Force Forces Iceland

USAF Southern Air Division
Hq. Howard AFB, Panama
1 composite wing
Inter-American Air Forces Academy

USAF Tactical Air Warfare Center
Hq. Eglin AFB, Fla.

4441st Tactical Training Group (Blue Flag)
Eglin AFB, Fla.

USAF Air-Ground Operations School
Hurlburt Field, Fla.

552d Airborne Warning & Control Wing
Tinker AFB, Okla.
Keesler AFB, Miss.
(E-3A, EC-135, EC-130)

1st Special Operations Wing
(CH-3, UH-1, MC/AC-130)

USAF Special Operations School
Hurlburt Field, Fla.

USAF Tactical Fighter Weapons Center
Hq. Nellis AFB, Nev.

554th Operations Support Wing
Nellis AFB, Nev.
range group

57th Fighter Weapons Wing
Nellis AFB, Nev.
(F-15, F-111, A-10, F-4, F-5)
USAF Fighter Weapons School
Red Flag training group
Thunderbirds

NINTH AIR FORCE (TAC)

Headquarters, Shaw AFB, S. C.

Commander
Lt. Gen. A. W. Braswell

1st Tactical Fighter Wing
Langley AFB, Va.
(F-15, EC-13 , UH-1)

363d Tactical Reconnaissance Wing
Shaw AFB, S.C.
(RF-4C)

507th Tactical Air Control Wing
Shaw AFB, S.C.
(O-2 and CH-3 at Shaw;
OV-10 at Patrick AFB, Fla.)

23d Tactical Fighter Wing
England AFB, La.
(A-10, A-7D)

4th Tactical Fighter Wing
Seymour Johnson AFB, N.C.
(F-4E)

56th Tactical Fighter Wing
MacDill AFB, Fla.
(F-4D/E, UH-1, F-16)

354th Tactical Fighter Wing
Myrtle Beach AFB, S.C.
(A-10)

31st Tactical Fighter Wing
Homestead AFB, Fla.
(F-4E)

33d Tactical Fighter Wing
Eglin AFB, Fla.
(F-15)

347th Tactical Fighter Wing
Moody AFB, Ga.
(F-4E)

TWELFTH AIR FORCE (TAC)

Headquarters, Bergstrom AFB, Tex.

Commander
Lt. Gen. W. R. Nelson

831st Air Division
George AFB, Calif.

35th Tactical Fighter Wing
George AFB, Calif.
(F-4E/G, F-105G, UH-1)

832d Air Division
Luke AFB, Ariz.

58th Tactical Training Wing
Luke AFB, Ariz.
(F-4, TF-104)

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
Bergstrom AFB, Tex.
(O-2)

388th Tactical Fighter Wing
Hill AFB, Utah
(F-16)

474th Tactical Fighter Wing
Nellis AFB, Nev.
(F-4D)

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)

AIR DEFENSE FORCES (TAC)

Headquarters, Colorado Springs, Colo.

Commander, Tactical Air Command

Deputy Commander for Air Defense
Maj. Gen. J. L. Piotrowski

- **20th Air Division** — Hq. Fort Lee AFS, Va.
  - **48th Fighter-Interceptor Sqdn.** — Langley AFB, Va. (F-106, T-33)
- **21st Air Division** — Hq. Hancock Field, N. Y.
  - **49th Fighter-Interceptor Sqdn.** — Griffiss AFB, N. Y. (F-106)
- **23d Air Division** — Hq. Duluth International Airport, Minn.
  - **87th Fighter-Interceptor Sqdn.** — K. I. Sawyer AFB, Mich. (F-106)
- **24th Air Division** — Hq. Malmstrom AFB, Mont.
  - **5th Fighter-Interceptor Sqdn.** — Minot AFB, N. D. (F-106, T-33)
- **25th Air Division** — Hq. McChord AFB, Wash.
  - **318th Fighter-Interceptor Sqdn.** — McChord AFB, Wash. (F-106)
- **26th Air Division** — Hq. Luke AFB, Ariz.
  - **84th Fighter-Interceptor Sqdn.** — Castle AFB, Calif. (F-106)
- **USAF Air Defense Weapons Center** — Hq. Tyndall AFB, Fla.
  - **USAF Interceptor Weapons School**
- **Air Force Forces Iceland** — Keflavik, Iceland
  - **57th Fighter-Interceptor Sqdn.** — Keflavik, Iceland (F-4)

These gains were made with no increase in manpower or spare parts. The big factor in increasing sortie rates by more than sixteen percent per year over the last three years has been the implementation of the decentralized Combat-Oriented Maintenance Organization (COMO). It divides the wing maintenance force into squadron-size packages, just right for deployment. COMO places greater authority and responsibility on commanders and NCOs at the squadron level, and it ties operations and maintenance personnel together. The result is improved esprit among both pilots and mechanics.

Realism remains a top priority training objective, accomplished through TAC's "flag" programs:

- *Red Flag* training exercises on the Nellis AFB ranges give fighter crews simulated combat experience in a high threat environment complete with "enemy" ground and air threats. These exercises routinely involve up to 200 aircraft flying 3,600 sorties over a six-week period. The first Rapid Deployment Force (RDF) Red Flag was held in June 1980. Units which could become part of the RDF flew 5,100 sorties in the thirty-day exercise.
- *Silver Flag* prepares TAC support personnel to go to war through training programs that condition them for new roles required in wartime.
- *Gold Flag* improves both the quantity and quality of training for TAC's aircrews.
- *Black Flag* provides an environment in which the aircraft maintenance work force is trained and organized to perform the wartime missions.
- *Blue Flag* trains commanders and staff officers in decision-making for battle management and operations.
- *Green Flag* focuses on coordinating and increasing the electronic warfare capabilities of the tactical air forces.
- *Checkered Flag* provides realistic training in which units do extensive preparation for operations at their specific wartime beddown location.

During the past year, overseas deployments demonstrated that TAC units are well prepared to respond to international contingencies. Chief among these operations were the "Coronet Hammer," "Proud Phantom," and "Coronet Eagle" deployments to England, Egypt, and Germany.

Coronet Hammer demonstrated that the F-111D could be operated at high combat sortie rates over an extended period from a forward base. In twenty flying days at Boscombe Down, England, F-111D crews flew 554 sorties.

Proud Phantom was a valuable learning experience for Moody AFB flight and maintenance crews operating in a Middle East desert environment. The ninety-day training program at Cairo West, Egypt, was of great benefit to operations and maintenance personnel of both the Egyptian Air Force and USAF.

On Coronet Eagle, eighteen F-15s from Eglin AFB, Fla., flew 1,001 sorties from Bremgarten, Germany. During eighteen days of simulated surge combat operations, air and ground crews achieved an overall 3.0 sortie rate.

In September 1980, TAC's E-3A Sentry Airborne Warning and Control System (AWACS) aircraft were called upon to respond to international developments. With little warning, four E-3As were deployed to Saudi Arabia, at that government's request, to augment the Saudi air defense system. Ground-based tactical air control units were also deployed along with the E-3As. All elements were in full operation in less than twenty-four hours after arriving in Saudi Arabia.

Another significant event for 1980 occurred in November, when the 388th Tactical Fighter Wing's 4th Tactical Fighter Squadron, Hill AFB, Utah, became the first F-16 squadron to be rated combat ready.

In March of this year, Tactical Air Command marked its thirty-fifth anniversary as a USAF major command. Its people and increasingly capable equipment and weapon systems will allow the command to continue to provide flexible, effective response to global situations. ■

Many hands make light work of spreading camouflage netting over A-10 Thunderbolt II close-support aircraft.

Integration

of Shuttle-era Space Control Centers

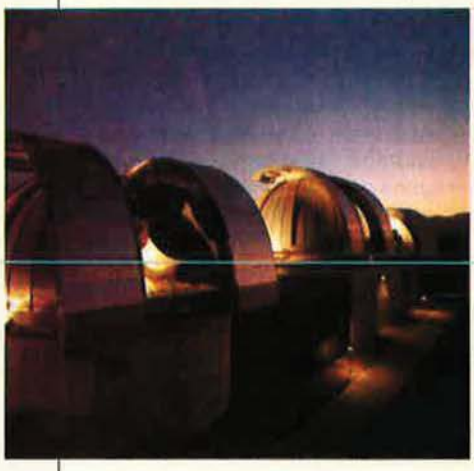
With increasingly complex military space missions under development, the Air Force is planning a Consolidated Space Operations Center (CSOC).

It will blend new technology with existing equipment and proven software from today's control centers; it will also use the matchless skills of the people who run them. The key to successful development of CSOC, however, will be excellence in systems engineering and integration.

TRW's experience in this extremely demanding work is both broad and deep. We started with the earliest satellite tracking and control centers twenty years ago; we supported the NASA centers throughout the Apollo missions to the Moon. Now, we're building and integrating the ground station for the world's biggest comsat, Western Union's TDRSS. For the Air Force, we're building and integrating GEODSS, a global tracking system for monitoring all objects in Earth orbit.

Because our experience covers the entire spectrum of space technologies, we're now working on the Control Center Implementation Contract for the Air Force. It covers integration of DoD security requirements at NASA's launch and mission control center and systems definition studies for the Shuttle part of CSOC.

This combination of long experience with current studies gives TRW a unique background for successful integration of CSOC, which will become the Air Force Space Control center for the 21st Century.



SPACE CONTROL CENTER INTEGRATION

from

A COMPANY CALLED TRW

DEFENSE AND SPACE SYSTEMS GROUP

United States Air Forces in Europe

A MAJOR COMMAND

CONTINUED equipment modernization and increased combat sustainability are major objectives in the coming years for US Air Forces in Europe (USAFE).

Gen. Charles Gabriel, USAFE Commander in Chief and Commander of the six-nation Allied Air Forces Central Europe, noted that the answer to the threat in the past has been modernization—resulting in the much-needed deployment of F-15s and A-10s to Europe. The need now is twofold, according to General Gabriel: "While modernization must continue, we also must procure adequate stocks of spare parts and consumables in order to sustain our forces in combat."

In 1981, USAFE will continue to modernize its forces and increase sustainability with initiatives in four areas: survivability, realistic training, readiness, and people-oriented improvements.

Modernization of the USAFE force of more than 650 aircraft will continue with the delivery of the first F-16s in January 1982. A sixth squadron of A-10s became fully equipped in September 1980. More capable C and D model F-15s are currently replacing A and B models in the USAFE inventory. A full squadron of F-4G Wild Weasels began operations in Europe during 1980, while F-4Es were upgraded with improved avionics, radar and navigation, and weapons delivery systems. USAFE RF-4Cs are being upgraded with new avionics and down-link capabilities to provide near real-time reconnaissance data. Ground-launched cruise missiles are programmed to join the force, with the first flight to be operational in 1983.

More than 600 steel- and concrete-hardened aircraft shelters are complete, with 200 more in various stages of design and construction. Squadron and wing operations buildings, refueling vehicle shelters, and other sortie-generating facilities are being hardened for improved survivability.

Security Police distributed area defense forces will receive heavy weapons and tactical vehicles in the next two to five years to bolster base survivability. An exercise at Hahn AB, Germany, in November 1980 confirmed that a fighter base can operate effectively with people in full chemical warfare protection suits.

F-15s Eagles based at Camp New Amsterdam in the Netherlands.

Training is increasingly realistic as aircrews train with USAFE's F-5E Aggressor squadron, a new surface-to-air missile threat simulator, and an air combat maneuvering instrumentation range. They also fly to more than thirty allied ranges for routine gunnery training and special exercises. USAFE crews regularly exercise from Norway to the Mediterranean with their NATO counterparts and exchange tactics through the AAFCE tactical leadership program.

Day-to-day readiness improvements include USAFE fighter units' conversion to the production-oriented maintenance organization for more effective response to wartime sortie tasking.

Maintenance crews have also expanded their ability to cross-service allied fighter aircraft, adding flexibility to USAFE and AAFCE operations. The effectiveness of tactical reinforcements from the US has been increased with the addition of numerous host-nation-provided collocated operating bases. Refined host-nation air traffic control agreements also give all-weather, day-night support to deploying forces.

USAFE maintenance technicians worked with the Royal Air Force to develop an interim aircraft battle damage repair (ABDR) capability for quickly re-

Gen. Charles A. Gabriel, Commander in Chief, USAFE.

CMSgt. Billy P. Cecil, Senior Enlisted Advisor, USAFE.

turning damaged aircraft to combat. Fighter units simulate ABDR during exercises and inspections regularly. A new Red Horse unit in central England provides rapid runway repair capability to Third Air Force. Elsewhere, local civil engineers train for RRR contingencies in respective countries.

Command control communications and intelligence operations also are moving ahead. The TPS-43E mobile ground radar, with potential for a fiber-optic remoting, significantly upgraded the 407L Tactical Air Control/Tactical Air Defense System. C^3I survivability and interoperability are being enhanced as USAFE joins other NATO contingents in centralized static war headquarters operations, intelligence support processing and production, and the interface of data automation and communications systems.

Medical readiness will improve with the addition of a wartime medical complex at RAF Little Rissington, England. The installation initially will be a medical war-readiness storage facility. A 500-bed wartime hospital and 500-bed aeromedical staging unit will be added later.

The sustainability equation ultimately depends on people. Initiatives are under way to improve support of USAFE people.

The command added 612 family apartments and 950 dormitory spaces during 1980, with another 1,382 family units and 520 dorm spaces scheduled for construction through Fiscal Year 1982. Accelerated housing projects in Turkey are among improvements scheduled for NATO's southeastern flank.

Retention, professional education, and family issues also are being addressed. Squadron commanders attend regional symposia on retention issues. When the Seventeenth Air Force NCO Leadership School completes a scheduled move to Lindsey AS, Germany, from its shared quarters at the USAFE NCO Academy, the Academy will increase from seventy-five to 105 students per class and the Seventeenth Air Force School from forty-two to seventy-five. Families are central to retention and readiness. The first annual USAFE family week recognized their sacrifices and contributions to mission accomplishment.

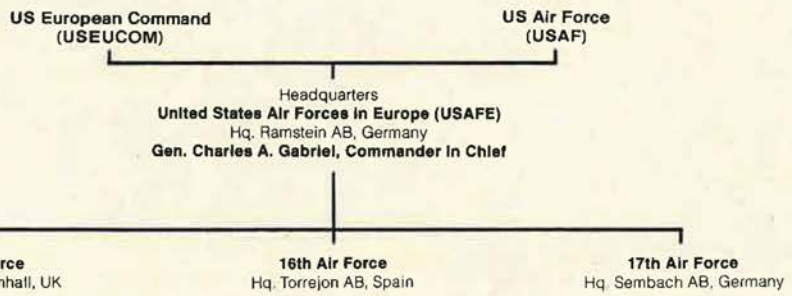
The programmed population of the command is approximately 57,000 USAFE military members. Another 24,000 from other major air commands are stationed in Europe and receive USAFE support, along with 3,100 General Schedule civilian employees, 3,000 US nonappropriated fund workers, and 10,000 host-nation employees. Nearly 93,000 family members round out the total Air Force strength in Europe. ■

THE MAJOR OPERATING UNITS OF USAFE

UNIT	*LOCATION*	*AIRCRAFT/MISSION*
	England	
10th Tac Recon Wing	RAF Alconbury	RF-4, F-5
20th Tac Fighter Wing	RAF Upper Heyford	F-111
48th Tac Fighter Wing	RAF Lakenheath	F-111
81st Tac Fighter Wing	RAF Bentwaters/Woodbridge	A-10, MAC rescue HC-130, HH-53
513th Tac Airlift Wing	RAF Mildenhall	MAC rotational C-130 SAC rotational KC-135
7020th Air Base Group	RAF Fairford	SAC rotational KC-135
7274th Air Base Group	RAF Chicksands	Support and communications
	Spain	
401st Tac Fighter Wing	Torrejon AB	F-4
406th Tac Fighter Trng Wing	Zaragoza AB	Tactical range support weapons training school SAC rotational KC-135
	Italy	
40th Tactical Group	Aviano AB	Rotational USAFE aircraft
7275th Air Base Group	San Vito AS	Support and communications
	Turkey	
Hq. TUSLOG	Ankara AS	Command and logistical management
Det. 10, TUSLOG	Incirlik AB	Rotational USAFE aircraft
	Greece	
7206th Air Base Group	Hellenikon AB	Support and communications
7276th Air Base Group	Iraklion AS, Crete	Support and communications
	The Netherlands	
32d Tac Fighter Squadron	Camp New Amsterdam	F-15
	Germany	
26th Tac Recon Wing	Zweibrücken AB	RF-4
36th Tac Fighter Wing	Bitburg AB	F-15
50th Tac Fighter Wing	Hahn AB	F-4
52d Tac Fighter Wing	Spangdahlem AB	F-4
86th Tac Fighter Wing	Ramstein AB	F-4, MAC: UH-1, T-39, C-140, C-12
600th Tac Control Group	Hessisch-Oldendorf AS	Command control communications
601st Tac 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 Tac Airlift Wing (MAC)	Rhein-Main AB	MAC: C-9, C-130

UNITED STATES AIR FORCES IN EUROPE

Headquarters, Ramstein AB, Germany



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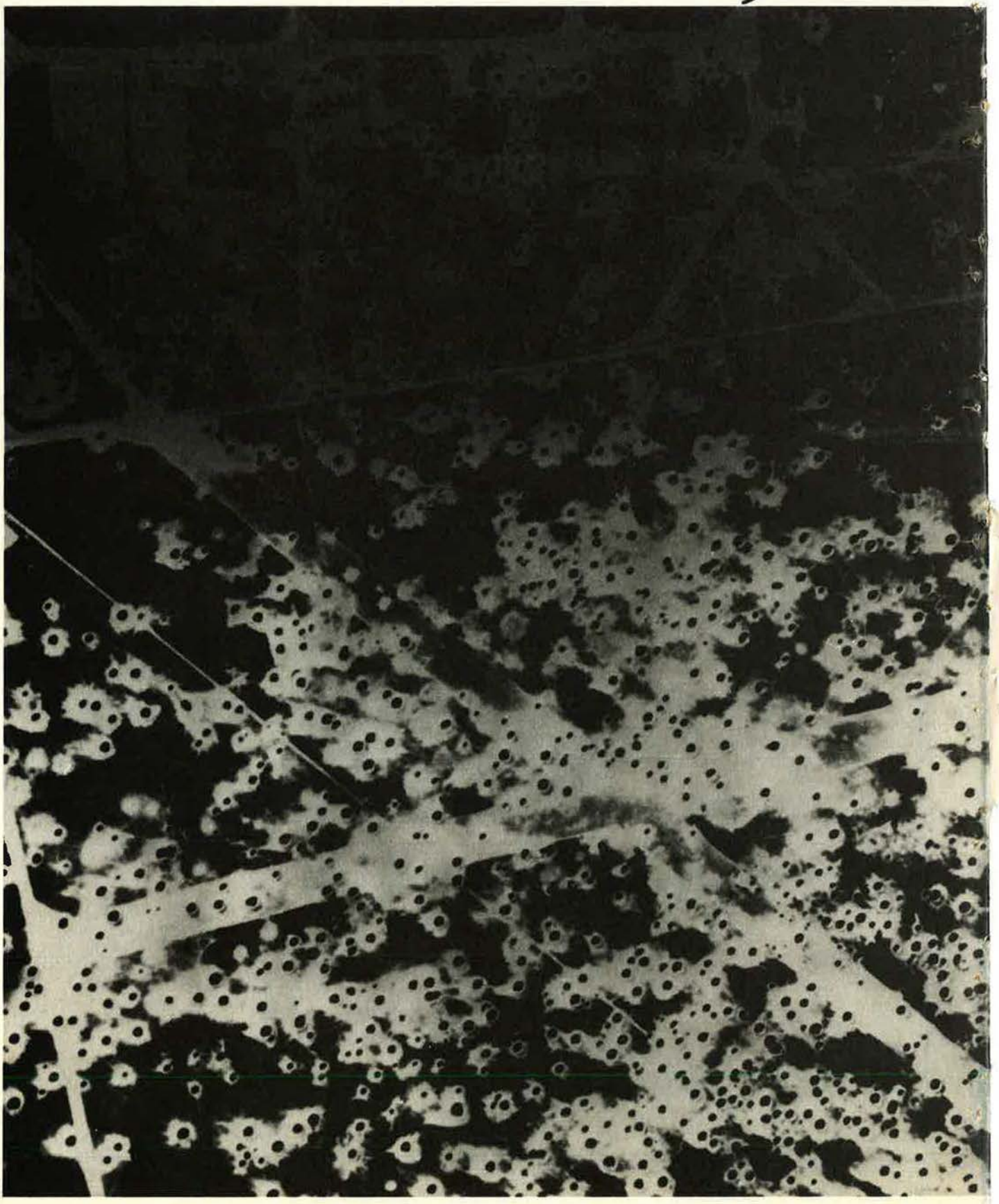


eet Home, for the AV-8B.

It is a fact that tactics in wartime will increasingly be to immobilize air bases, and in one fell swoop to eliminate the enemy's capacity to retaliate.

Because when you wreck a runway, you virtually disable a nation's tactical, conventional airplanes. If they're on the ground, they can't get off. If they're in the air, they can't get home.

The vertical/short take-off AV-8B, however, is no conventional airplane. It is powered by a Rolls-Royce Pegasus vectored-thrust engine. And has a higher survival rate than most. It can take off quickly, and land on a space just 75 feet square. It can operate from a flight deck, a road, a grassy field . . . and a bombed-out air base.

So, in a war, the AV-8B could be your only military 'plane left operational at air bases in the combat zone.

ROLLS-ROYCE INC, 375 PARK AVENUE, NEW YORK, NEW YORK 10152.

ROLLS RR ROYCE

USAF AT WORK

A Portfolio of Photographs Showing Some of the Day-to-Day Activities of the Air Force

BY HUGH WINKLER, ASSOCIATE EDITOR

As attested to by the many statistics and facts in the Almanac section of this issue of AIR FORCE Magazine, the United States Air Force is a large and complex organization. But it is not statistics and facts that make up the Air Force; it is the equipment and especially the people who perform diverse and difficult jobs that are the bottom line. Their expertise and dedication are demonstrated individually every day in countless ways, and collectively they fulfill the mission of USAF—to be ready, if necessary, to fly, fight, and win.

The staff of AIR FORCE Magazine, assisted by Air Force photographers, have put together in these four pages a photo essay illustrating a few of the everyday tasks carried out by the men and women of the Air Force. This photo essay is a brief look at the Air Force at work.

For instance, in photo 1, a C-5 is undergoing an operational utility evaluation (OUE) of C-5 ground operations on various unimproved surfaces. This evaluation is being carried out by the Air Force Test and Evaluation Center for Military Airlift Command to determine the best procedures for operating MAC's aircraft under austere conditions. In this particular evaluation the C-5 is taxiing on a snow-covered runway at Griffiss AFB, N. Y.

In photo 2 we see an FB-111A from Plattsburgh, AFB, N. Y., on a training mission. Continuous training ensures that SAC's bombers and aircrews will be prepared.

Photo 3 shows the anechoic chamber at Air Force Logistics Command's San Antonio Air Logistics Center. This chamber is used to nullify outside radio frequencies during tests of electronic equipment that might contaminate test results.

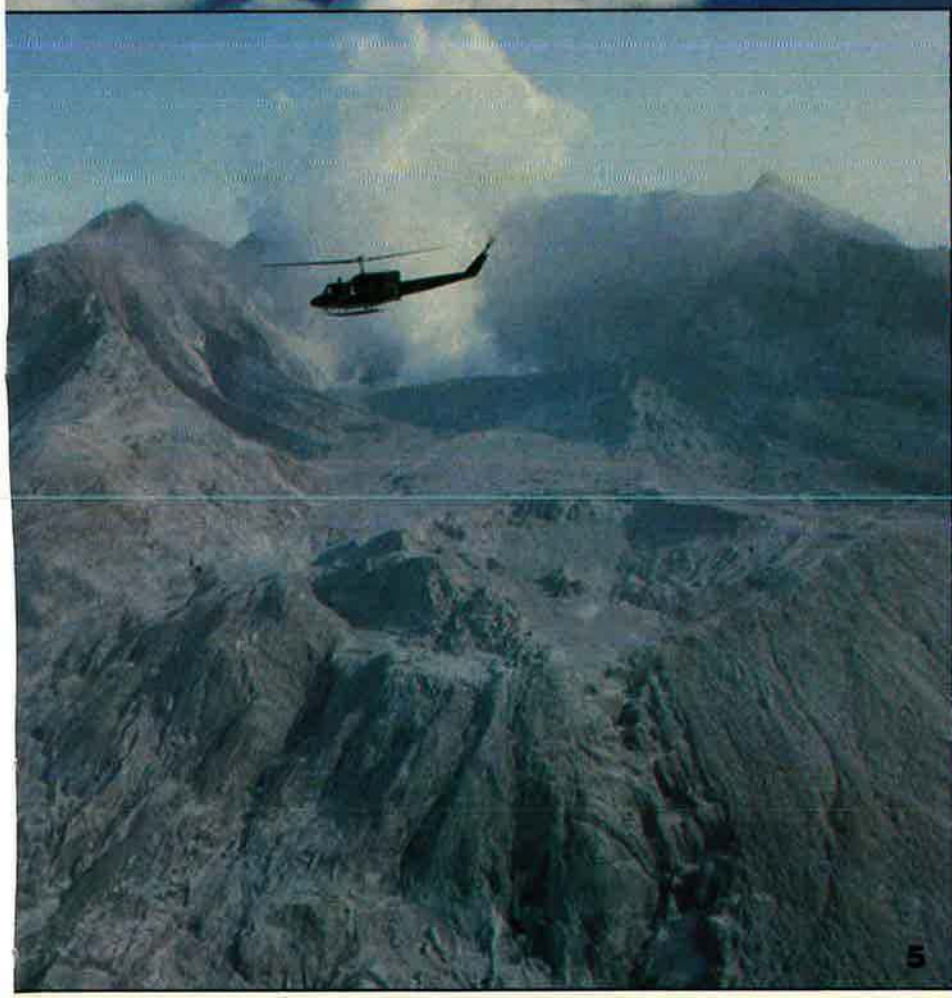
SrA. Lisa A. Otthofer, a navigational aids technician, solders a control board transistor in photo 4. Airman Otthofer works in the 2052d Communications Squadron at Keesler AFB, Miss.

The AFRES UH-1N helicopter in photo 5 is searching the slopes of Mount St. Helens for signs of life after the devastating eruption of the volcano last May. The UH-1N is assigned to the 304th Aerospace Rescue and Recovery Squadron at Portland IAP, Ore.

Photo 6 depicts Air Training Command at work. Here, basic trainees are being tested on the Confidence Course over a water hazard.

And, in photo 7, a Boeing AGM-86B air-launched cruise missile is seen in flight during a series of competitive flyoffs. The AGM-86B was selected for production in early 1980.

2



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"...it is inevitable for anyone new to the Air Force to be impressed deeply — almost awed — by the scale of its operations, and to be struck also by the capabilities of its equipment and the quality of its people."

— Air Force Secretary Verne Orr

An Alaskan Air Command F-4 Phantom, silhouetted by the setting sun, skims the clouds in photo 1. Designated Eleventh Air Force during World War II, AAC took its present name in 1945 and guards US airspace and provides early warning of attack.

In photo 2 a munitions loader assigned to the United States Air Forces in Europe at Hahn AB, Germany, works in full chemical warfare protection gear during the chemical warfare defense exercise SALTY MACE held last November. The exercise provided valuable information on conducting sustained combat operations in a CW environment.

An F-4 is seen in photo 3 as it prepares to take off from Pacific Air Forces's Kadena AB, in Japan.

In photo 4, a hydroacoustic analyst monitors analog waveform data for the Air Force Technical Applications Center. Underwater sound data are collected in deep ocean waters and monitored for underwater explosions, supporting US efforts to verify compliance with the limited test ban treaty.

Photo 5 depicts the Air Force Accounting and Finance Center's $14 million computer center. The computer processes pay information for more than 1,200,000 Air Force people, including the Reserve, Guard, retirees, and annuitants. AFAFC added its second IBM 370/168 computer in 1980.

In photo 6, USAF fire fighters practice extinguishing a blaze. The Air Force Engineering and Services Center is responsible for the USAF fire protection program, and relies on more than 10,000 USAF fire fighters.

Photo 7 shows a security policeman on duty guarding an E-3A Sentry AWACS on the ramp at Kadena AB, Japan.

The AN/FLR-9 antenna system in photo 8 has become the forty-acre signature of Electronic Security Command around the world. USAF's five systems, properly called Circular Disposed Antenna Arrays, but often called "elephant cages," provide signal direction-finding ability. They enable search and rescue authorities to locate and pinpoint the locations of aircraft in distress.

Two F-15 Eagles from Tactical Air Command take off from Langley AFB, Va., in photo 9.

In photo 10, a KC-10A, USAF's newest tanker aircraft, refuels a B-52 as part of its test program. The KC-10A program is managed by Air Force Logistics Command's Acquisition Logistics Division at Wright-Patterson AFB, Ohio. The new tanker is now entering the operational inventory as part of Strategic Air Command.

As these photos demonstrate, the work of the Air Force is varied, far-flung, and challenging. Coping with these many tasks is the job of the men and women of the Air Force when the Air Force goes to work. ■

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 132 Air Force accounting and finance offices. The Center provides accounting reports to Air Force managers, Office of Secretary of Defense, Congress, and other federal departments, and operates centralized functions to pay all military personnel as well as billing, collecting, and trust-fund accounting for all DoD foreign military sales.

The magnitude of AFAFC's mission is apparent when considering the number of people and amount of money involved in its operation. The Center's forty-four officers, 187 enlisted personnel, and 1,834 civilians pay more than 1,200,000 USAF people, including the active forces, Air Force Reserve, Air National Guard, retired members, and annuitants.

The Center accounts through its network for all money appropriated to the Air Force by Congress—more than $55 billion in FY '81—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 of the financial status of the DoD foreign military sales program and bills the countries to whom sales are made.

In 1980, AFAFC established new programs, continued to improve existing financial management systems, and planned future actions to meet the needs of the Center's many customers.

A few recent initiatives are:

- A new Aviation Fuel Management Accounting System was developed by AFAFC to permit faster and more accurate tracking of usage and costs throughout the Air Force.
- Toll-free telephone lines (1-800-525-0104) were installed at AFAFC to allow Air Force retirees to discuss their pay. In addition, automatic telephone recorders were added to these lines so retirees can leave recorded messages after office hours.
- AFAFC began a project named "AFO of the Future" at the Lowry accounting and finance office. Headed by a group of experts, the project's aim is to "eliminate and automate"—eliminate unnecessary work at base-level accounting and finance offices and automate, wherever possible, tasks now done by hand. The result will be modern base-level AFO technology for the '80s and more efficient customer service.

The results of these and similar advances improve our efficiency, productivity, and service to our customers—the people of the Air Force. The people at AFAFC take pride in providing today's Air Force with the best in modern financial management. ■

Maj. Gen. George C. Lynch, Commander, AFAFC.

CMSgt. Donald E. Lindemann, Senior Enlisted Advisor, AFAFC.

Air Force Audit Agency

THE Air Force Audit Agency (AFAA), headquartered at Norton AFB, Calif., is USAF's internal audit organization. It has eighty-five offices located on seventy-nine Air Force installations throughout the world. The agency is authorized 844 professional auditors and a total of 191 support personnel.

Internal auditing includes evaluations of operating efficiency and effectiveness; program achievements; and compliance with established policies, procedures, and governing directives. The objective is to provide an independent evaluation and meaningful and useful data to Air Force management. The AFAA charter provides its auditors access to all Air Force units, activities, and functions.

Jerome Stolarow is the Auditor General, and Col. (Brig. Gen. selectee) D. Lynn Rans is the Deputy Auditor General and Commander of the AFAA. The Auditor General reports directly to the Secretary of the Air Force and has direct access to the Chief of Staff. This enables the agency to be independent of the activities and functions it audits.

Audits meet the needs of each management level. Centrally directed audits (CDAs) are typically performed concurrently at several locations to evaluate Air Force or major command programs, systems, and activities. Findings and recommendations are provided to top Air Force managers. This technique serves both Hq. USAF and major command staffs.

Unlike centrally directed audits, installation audits are conducted at single sites by area audit offices. Results are reported to the appropriate installation and major command commanders. When findings warrant, these reports, together with pertinent recommendations, are also provided to the functional managers on the Air Staff for

action as may be considered necessary.

The audit force is managed by the Auditor General through two geographic regions and two specialized directorates. The Western region at Norton AFB includes Air Force activities in the western US, Alaska, and the Pacific. This region has thirty-two area audit offices. The Eastern region at Langley AFB, Va., includes thirty-one offices and serves the eastern US, the Canal Zone, Greenland, and Europe.

The two directorates—Acquisition and Logistics Systems at Wright-Patterson AFB, Ohio, and Service-Wide Systems at Andrews AFB, Md.—provide specialized services. The Directorate of Acquisition and Logistics Systems concentrates on the activities of the Air Force Systems Command and Air Force Logistics Command. It is deeply involved in life-cycle costs, weapon-system procurements and provisioning, and depot maintenance. Its products flow primarily to Air Force Logistics Command, Air Force Systems Command, and to Hq. USAF. The Service-Wide Systems Directorate audits systems and programs common to the entire Air Force. This directorate has field offices at the Air Force Accounting and Finance Center, Air Force Manpower and Personnel Center, and Air Force Data Systems Design Center. It is concerned with evaluating such areas as the military and civilian pay systems, standard base supply system, centralized Air Force training and recruiting, and civil engineering policies and procedures. Reports go primarily to Hq. USAF.

In FY '80 AFAA auditors issued seventy summary reports of audit and more than 2,300 installation-level reports. ■

Jerome Stolarow, Auditor General, AFAA.

Col. (Brig. Gen. selectee) D. Lynn Rans, Commander, AFAA.

Air Force Commissary Service

THE Air Force Commissary Service (AFCOMS), a separate operating agency with headquarters at Kelly AFB, Tex., was activated in January 1976, and assumed operational control of USAF commissaries the following October.

AFCOMS is governed by a Board of Directors responsible to the Air Force Chief of Staff and made up of Air Force general officers and the Chief Master Sergeant of the Air Force. The board provides needed direction to the AFCOMS commander for commissary operations and approves basic policies, plans, and programs.

Under the command of Maj. Gen. Charles E. Woods, the Air Force Commissary Service is manned by approximately 9,200 civilian and 680 military personnel who operate 137 commissaries and 117 troop issue and subsistence functions in the CONUS and overseas. Total sales in FY '80 exceeded $1.7 billion.

Commissaries are managed through fifteen Stateside complexes and two overseas regions—European and Pacific (including Far East, Alaska, and Hawaii).

AFCOMS primarily supports the troop issue and the subsistence program; that is, it purchases and provides food for all authorized Air Force appropriated fund dining facilities. It also seeks to reduce commissary operating costs, provide authorized patrons with food and household items at the lowest practical cost, and maintain a reliable, efficient management system. As required by law, it generates sufficient earnings through the surcharge program to pay operating expenses and

Maj. Gen. Charles E. Woods, Commander, AFCOMS.

CMSgt. Fred Dickinson, Senior Enlisted Advisor, AFCOMS.

construction costs. AFCOMS also continues to provide its patrons with an average twenty-five percent savings. This is verified with market-basket surveys that compare commissary prices with local supermarket prices.

Some of the improved services AFCOMS provides include more frequent vendor deliveries to reduce inventories, and automated systems for reports, inventory control, and accounts payable. Coordination is maintained with the Air Force Auditor and the Office of Special Investigations to reduce the potential for fraud, waste, and abuse. AFCOMS also coordinates with local and national vendors on special offers, discounts, and sales promotions.

AFCOMS patrons began paying a four percent surcharge at the checkout counter in 1976. Since then, more than $145 million has been spent on new store construction and rehabilitation. During FY '80, thirteen new stores were opened. By FY '85, an additional $160 million will have been spent at Air Force installations around the world. New or renovated stores have better lighting, heating, and refrigeration, as well as wider aisles, more shelf space, and better traffic flow. Whenever possible, delicatessens and bakeries are built into the new store.

Data automation, electronic cash registers with scanners, and electronic scales are other improvements recently implemented or under consideration. Another on-going program involves continuous training of commissary employees in administrative, technical, professional, and management skills.

In 1980, AFCOMS made strong advances in contract shelf stocking and built a base of knowledge to make this an even more viable program. FY '81 plans call for conversion of thirty-five more stores to contract shelf stocking.

AFCOMS has contributed toward customer savings through a vigorous Patron Savings Program. Imaginative programs such as anniversary sales, manager sales, mandatory stockage, and Best Buy sections have saved shoppers millions of dollars.

AFCOMS operates for the good of the commissary patron under the motto: "We Serve Where You Serve." ■

Air Force Engineering and Services Center

THE Air Force Engineering and Services Center (AFESC) is a focus for many worldwide engineering and services activities. AFESC has a dual function—a policy development role in support of the Directorate of Engineering and Services at Hq. USAF, and an assistance role as a separate operating agency.

AFESC guides and assists major commands, installations, and other federal agencies in seven major areas that affect the daily operation of the Air Force: readiness and contingency operations, facility energy, environmental planning, installation operations and maintenance, fire protection, food service, and billeting.

AFESC also manages the Air Force civil-engineering research and development program in cooperation with Air Force Systems Command.

While most of AFESC's 800 personnel are at its new headquarters at Tyndall AFB, Fla., the rest are stationed at four Air Force Regional Civil Engineering Offices and at numerous operating locations.

The Regional Civil Engineers in San Francisco, Dallas, and Atlanta provide Air Force, Air Force Reserve, and Air National Guard units in their respective areas with expertise in military construction, housing design and construction, and environmental liaison and assistance.

The fourth Regional Civil Engineer, at Norton AFB, Calif., is responsible for MX missile facilities.

Assistance teams from AFESC travel wherever necessary to help improve the Air Force and other federal agencies—from dining halls to electrical generators to runways.

One group providing assistance, the Civil Engineering and Services Management Evaluation Team, provides management evaluation and consultant services to base-level support activities. The team spent a third of last year traveling more than 500,000 miles to visit bases in eleven states and four other countries.

Last year the AFESC headquarters staff and its traveling teams:

- Established a field school for contingency training in rapid runway repair, field food services, and other wartime responsibilities.
- Managed the Air Force facility energy conservation effort that nearly doubled the Air Force goal of reducing energy consumption by 7.5 percent and thus identified a potential savings of $94 million in energy costs.
- Demonstrated new state-of-the-art techniques in repairing runways rapidly after an attack in a simulated wartime exercise in South Carolina.
- Performed pavement testing for the landing strip of the Space Shuttle *Columbia* at the request of NASA.
- Began a program to convert P-2 fire trucks from gasoline to diesel that will avoid more than $50 million in new vehicle procurement.
- Developed the Air Force hazardous waste program, continually dem-

Col. Hisao Yamada, Commander, AFESC.

CMSgt. Wade H. Grimm, Senior Enlisted Advisor, AFESC.

onstrating the USAF's concern for the environment.

- Began updating the Air Force ten-year facility energy plan, which will include the increased use of coal and refuse-derived fuels and use of solar and geothermal energy and wind power.
- Completed delivery of fifty-three of the massive, two-engine P-15 fire trucks, which have a capacity of more than twice that of earlier fire trucks.
- Began a program to automate food accounting, and developed an automated recipe and menu pricing system that will improve food service in Air Force dining halls.

AFESC continually develops initiatives to improve the daily operation of the Air Force. ■

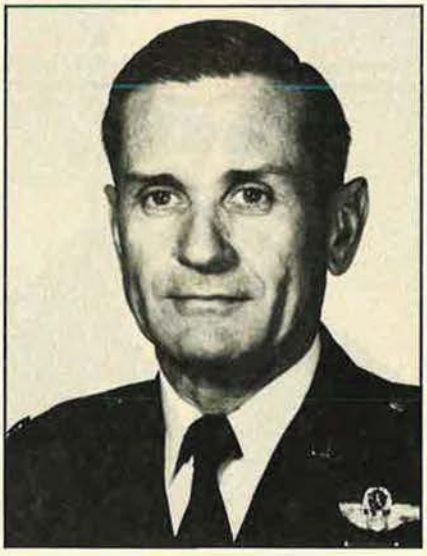
The heavy hitter of the Air Force's fire protection services is the massive and fast two-engine P-15 fire truck.

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 with an assessment of Air Force fighting capability and resource management effectiveness. Maj. Gen. Harry Falls, Jr., commands AFISC and is also the Deputy Inspector General for Inspection and Safety, Hq. USAF.

AFISC has an assigned work force of 379 military and 128 civilian personnel, representing seventy Air Force specialties. It is divided into four directorates and two offices.

- *The Directorate of Inspection* determines operational readiness status within the major commands by monitoring their Operational Readiness Inspection (ORI) reports and by conducting Over-the-Shoulder Inspections (OTSIs) of command IG teams during ORIs. The directorate also evaluates the effectiveness and efficiency of USAF management systems through Functional Management Inspections (FMIs) and System Acquisition Management Inspections (SAMIs). FMIs evaluate the management of well-defined Air Force activities and programs, while SAMIs are more specialized inspections involving the review of all aspects of new weapon-systems acquisition. In addition, the directorate conducts an Inspection School to train all newly assigned Air Force, major command, and separate operating agency inspectors.
- *The Directorate of Aerospace Safety* develops and monitors USAF mishap prevention programs in all areas of flight, ground, missile, and explosives safety. The directorate also administers the mishap reporting system established by DoD and studies mishap trends to identify areas with a high payoff in prevention. In addition, the directorate manages the USAF Safety Awards Program. Directorate personnel design, plan, and develop resources for safety education programs, including university-level safety courses, and publish *Flying Safety*, *Driver*, and *Maintenance* magazines, and the *USAF Safety Journal*.
- *The Directorate of Medical Inspections* plans and conducts an Air Force and Air Reserve Forces medical inspection program to ensure efficient and effective management of health-care resources. Directorate personnel conduct Health Services Management Inspections, which are compliance- and management-oriented, and Functional Management Inspections, which address Air Force-wide management problems requiring major command or Air Staff action.
- *The Directorate of Nuclear Surety* at Kirtland AFB, N. M., plans, develops, directs, and evaluates the Air Force Nuclear Surety Program and makes recommendations to improve nuclear surety and the management of nuclear resources. The directorate also pub-



Maj. Gen. Harry Falls, Jr., Commander, AFISC.

CMSgt. Thomas J. Feeney, Senior Enlisted Advisor, AFISC.

lishes the bimonthly *USAF Nuclear Surety Journal*, which disseminates nuclear safety, security, and inspection information to nuclear-capable units.

• *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 Requested, conducted as the result of involvement by the Inspector General.

• *The Office of Management Support* manages manpower, personnel, budget, data automation, supply, and administrative services for the Center and monitors major command and Air Force inspection schedules and activities. ■

Air Force Intelligence Service

THE Air Force Intelligence Service (AFIS), established June 27, 1972, as a separate operating agency, provides intelligence services to both Hq. USAF and Air Force commanders.

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 DoD 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, headquartered in Washington, D. C., was established the following year.

AFIS supports USAF planning and combat operations, responding to changing Air Force intelligence requirements. Its activities include:

• *Substantive intelligence.* AFIS 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. AFIS provides experts on targeting, weapons, photo research, and cartography; serves as Air Force intelligence contact with the Defense Mapping Agency; provides intelligence support of electronic warfare activities; and ensures that the Secretary of the Air Force, the Chief of Staff, and key Air Staff officers receive the timely and the accurate intelligence necessary to assess critical situations in world crises.

• *Security and communications management.* AFIS 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.* AFIS plans, coordinates, and exercises managerial control of worldwide Air Force intelligence data handling systems.

• *The Air Force attaché program.* AFIS supports the Defense Attaché System (DAS) and monitors all matters concerning Air Force participation in DAS.

• *The AFIS Reserve program.* AFIS implements and manages the Air Force Intelligence Reserve Program, which includes recruiting, administering, training, and using intelligence mobilization augmentees. These Reservists provide immediate support under the Total Force policy to the active force during peacetime, contingencies, and mobilization.

• *Soviet affairs.* AFIS conducts the Air Force's Soviet Awareness Program, consisting of the *Soviet Military Thought* and *Studies in Communist Affairs* book series, "Soviet Press Selected Translations" periodical, internal publications, the Soviet Military Power Week, Soviet Awareness Team, and the Soviet Military Literature Research facility.

• *Evasion and escape/prisoner of war matters.* AFIS provides centralized management and cohesive direction to all aspects of intelligence support of evasion and escape/prisoner of war matters and serves as the action office for DoD code-of-conduct training.

The 7602d Air Intelligence Group (AINTELG), headquartered at Fort Belvoir, Va., manages and collects worldwide human resources intelligence.

In support of its many missions, the 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 Reserve Forces intelligence personnel. ■

Col. Jack Morris, Commander, AFIS.

CMSgt. Roy J. Nolin, Senior Enlisted Advisor, AFIS.

Air Force Legal Services Center

THE Air Force Legal Services Center (AFLSC), as part of The Judge Advocate General's Department, provides Air Force-wide legal services in the areas of military justice, claims, litigation, and preventive law. The Center was established in 1978.

The Center headquarters is located in Washington, D. C., and commanded by Maj. Gen. Thomas B. Bruton, who is also The Judge Advocate General. His Senior Enlisted Advisor is CMSgt. Thomas R. Castleman. The 250 officer, 135 enlisted, and 170 civilian members of the Center are located throughout the CONUS and in sixteen foreign countries.

A large number of the Center's personnel are involved in the administration of military justice in the Air Force. The Judge Advocate General assigns military judges and defense counsel to the Center to assure independence from local commands. Attorneys at the Center also perform post-trial appellate and clemency actions, including representation before the Air Force Court of Military Review and the US Court of Military Appeals.

In addition to supervising Air Force claims activity, which in 1980 included 140,000 claims actions totaling almost $46 million, the Center manages the Air Force's 2,200 civil lawsuits. These cases involve aviation law, environmental law, medical malpractice, general torts, freedom of information, procurement, tax and utilities, and military personnel issues. Through the Central Labor Law Office, the Center provides advice on labor law questions and representation for the Air Force in a variety of hearings. The Center is also the most active federal body in patent litigation, and manages the Air Force inventory of more than 3,100 active patents.

The Air Force Preventive Law and Legal Assistance Program is directed by the Center. In 1980, through that program, more than 500,000 clients were advised on more than 1,100,000 different personal civil matters. The office also provides the Air Force representatives on the Armed Services Individual Income Tax Council and the Armed Forces Tax Group.

Computers play an important role in the modern practice of law. The Center is the DoD executive agent for FLITE, or Federal Legal Information Through Electronics. FLITE provides computerized access for the research of case law and precedent, including Comptroller General decisions and Air Force administrative regulations. Computers also track claims with CAMP, the Claims Administrative Management Program, and monitor military justice activity with AMJAMS, the Automated Military Justice Analysis and Management System.

The Air Force Legal Services Center is one of the world's largest law firms. Through the Center, commanders and other Air Force members benefit from ready access to legal counsel. ■

Maj. Gen. Thomas B. Bruton, Commander, AFLSC.

CMSgt. Thomas R. Castleman, Senior Enlisted Advisor, AFLSC.

Air Force Manpower and Personnel Center

THE Air Force Manpower and Personnel Center (AFMPC) at Randolph AFB, Tex., is dedicated to serving the needs of more than half a million Air Force people. Assignments, retraining, promotions, separations, and other actions to sustain the Air Force are the day-to-day responsibilities of AFMPC.

Managing the wide range of programs that affect people from the time they enter the Air Force through their retirement is a staff of about 550 officers, 1,000 airmen, and 700 civilians. An additional 550 people are assigned to the Office of Civilian Personnel Operations, the Air Force Management Engineering Agency, and the Air Force Civilian Appellate Review Agency, all part of AFMPC. Aside from controlling the normal extensive personnel network within the Air Force, AFMPC also supports some 6,000 Air Force people assigned to non-Air Force activities.

AFMPC serves as the operational hub of the worldwide manpower and personnel information network. This computer-based function provides responsive information to commanders, increases productivity of personnel technicians, and provides better overall customer service to support people programs in all echelons of the Reserve, Guard, and active forces.

National security hinges on readiness, and AFMPC supports USAF contingency operations on a global scale. The AFMPC Personnel Readiness Operations Center is the focal point, directing major command and base-

level personnel policies to support Air Force commitments worldwide. During major deployments or in the likelihood of mobilization, major commands report personnel shortages to AFMPC to be staffed and filled by identifying active-duty, Reserve, or retired Air Force members. Through the Contingency Operations Mobility Planning and Execution System (COMPES), automated support for wartime personnel planning and execution is integrated with operations and logistic actions at base and major command levels. This permits more efficient use of personnel resources.

Readiness depends on well-trained, experienced people, and retention of experienced officers and NCOs continues to be a prime issue at AFMPC. The officer and the enlisted retention groups have been consolidated to pool their resources and focus on the overall retention effort. Their combined efforts and those of the major commands and separate operating agencies have begun to pay off, resulting in an improved retention environment. However, the retention issue has not been resolved and continued efforts are needed.

One way AFMPC has complemented retention and improved experience levels in the Air Force is through the Voluntary Reserve Recall Program. The program is designed to bring experienced officers who have separated from the Air Force back to active duty, capitalizing on their experience and training and saving taxpayer money. This effort has resulted in an increase in the number of such applications.

Thirty-two central selection boards met at the Center during the past year to select Air Force people for promotion, regular appointment, and professional military education. AFMPC-directed boards also consider eligible NCOs for promotion to senior and chief master sergeant slots and select the most qualified chief master sergeants for high year of tenure.

Casualty assistance and mortuary services are provided by AFMPC's Casualty and Mortuary office to more than 6,000 Air Force next of kin each year, while the missing persons function closely monitors the status of missing, captured, or detained persons, and works closely with family members.

Policy guidance and assistance of Air Force morale, welfare, and recreation programs is provided by the Center, while it also manages programs dealing with recognition, suggestions, dress, and appearance.

AFMPC will continue to develop and administer people programs in the interests of enhancing the quality of life for Air Force members and their families. ■

Maj. Gen. Kenneth L. Peek, Jr., Commander, AFMPC.

CMSgt. W. D. Humphries, Senior Enlisted Advisor, AFMPC.

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 on July 1, 1978, and became operational October 1, 1978. Brig. Gen. James F. Culver, the AFMSC Commander, also serves as Deputy Surgeon General for Operations and Director of Professional Services.

AFMSC assists the Air Force Surgeon General in developing policies and practices concerning routine and emergent health care in peace and war. The Center acts as the Air Force Surgeon General's agent for implementing policies, studies, and management and administrative research.

AFMSC has two directorates and two corps chiefs' offices. The Directorates are Professional (Clinical) Services and Health Care Support. The corps are the Medical Service and the Biomedical Sciences Corps.

AFMSC sets clinical medical policy and approves the purchase of such large equipment as this CAT scanner.

- *The Health Care Support Directorate*, largest in AFMSC, develops plans and procedures to ensure that needed medical facilities are available, required medical supplies and material are provided, and that patient affairs, including medical records and statistics, are properly managed.
- *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.

The 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 single point of Air Force contact with the United States Nuclear Regulatory Commission on all matters of licensing.

The Health Education Program Central Office was relocated from Sheppard AFB to AFMSC in February 1981 and renamed Consumer Health Education Division. It will function as a part of the Professional Service Directorate. The new division will work primarily in three areas of patient education: patients' diseases and treatments, disease prevention, and how to maintain health.

• *The Medical Service Corps* and *Biomedical Sciences Corps* chiefs are responsible for policy development and advice to the Surgeon General on matters involving their respective corps, including career development, monitoring and progression, and professional education. The MSC is concerned with health-care administration, and the BSC with the scientists and engineers who support the physicians in clinical and aerospace medicine professions.

AFMSC is 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. ■

Brig. Gen. James F. Culver, Commander, AFMSC.

CMSgt. Paul F. Greenwood, Senior Enlisted Advisor, AFMSC.

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. William R. Brooksher, also serves as the Air Force Chief of Security Police. In both capacities, he is responsible to The Inspector General, USAF. A staff of thirty-three officers, sixteen enlisted, and eighteen civilians is assigned to Kirtland; additional personnel are part of the Air Force Security Clearance Office, an operating location in Washington, D. C.

AFOSP develops the operational policies and practices for the security of Air Force resources and information and also implements Air Force IG-approved and directed plans, policies, and programs. Specific areas of interest include: air base 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; military working dog program; and a technology division looking to the future.

AFOSP accomplishments during the past year include:

• Peacekeeper '80: A systematic, long-term effort to reduce security police problems of attrition and discipline. The program identifies and resolves problems that make security

Brig. Gen. William R. Brooksher, Commander, AFOSP.

CMSgt. Robert J. McLaurine, Senior Enlisted Advisor, AFOSP.

police duty less fulfilling and more difficult than other Air Force specialties. The goal is to make the career field truly an elite force—professional in every respect. To date, this effort has yielded nearly seventy specific initiatives now being pursued by Hq. AFOSP and major command staffs.

- Tactical Fire Team Test: This is one of the most fruitful Peacekeeper '80 initiatives. At test bases, security police flights have been restructured into four-person fire teams, with one person identified as the leader. This filled the leadership void that has existed in large flights. Preliminary evaluation of the test results indicates the new flight structure has a positive leadership and performance effect. Since the test results have been so positive, plans are to implement the new structure in security flights during 1981.
- Intensified air base defense training: To increase the effectiveness of the Air Force's ground combat force, attendance at US Army infantry courses has been increased, and new Air Force courses have been developed. An improved base defense capability remains the most important goal. Some progress has been made, but continuing efforts will improve readiness, mobility, and firepower. Significant progress has been made in AFOSP's ability to assess the preparedness of existing base defense forces.
- A major effort to lower drug abuse with the increased help of drug-detection dogs. Apprehension rates indicate the program is working.
- Sponsorship of the annual worldwide marksmanship matches and symposium at Lackland AFB, Tex. The Royal Air Force, the National Guard, Air Force Reserve, and nine major commands participated.
- Participation in the research and development of systems and equipment programs to enhance security police operations. One such program, Scope Shield, will provide a communications system for command and control over security forces engaged in weapon systems security or base defense and contingency operations wherever USAF forces may now operate or may be deployed in the future. In addition, several electronic security systems will be tested and evaluated under the USAFE SAFE Programs intended to increase the protection of Air Force nuclear weapons, alert aircraft, and other priority resources. Several IRPS (Individual Resource Protection Systems) candidates are being considered to provide close-in security sensors for USAF alert and selected logistics support aircraft.
- Increased security expertise to the Air Force research and development community during all stages in the development of new weapon systems. AFOSP is now deeply involved in developing security concepts for the ground-launched cruise missile system, the medium-range ballistic missile system, and the Space Shuttle program. AFOSP is also providing security expertise for a conceptual study of storing nuclear weapons inside aircraft shelters.

In 1981 AFOSP is upgrading the resources protection program and granting more decision-making authority to security police at base level. Also, an Air Force Emergency Service Flight will be organized, equipped, and trained by Air Training Command using a concept developed by AFOSP. The flight will be available to base commanders to augment their response forces in dealing with acts of terrorism. ■

Besides their military duty of providing against enemy threats, Air Force Security Police are very much in the fight against modern crime.

Air Force Office of Special Investigations

THE Air Force Office of Special Investigations (AFOSI), headquartered at Bolling AFB, D. C., is the Air Force's professional investigative service. AFOSI supports USAF commanders through some 1,900 special agents and support people, including highly trained forensic science specialists, in twenty-eight district offices and 125 detachments and operating locations worldwide. AFOSI functions only as an investigative agency. Judicial or administrative actions are taken by appropriate commanders on advice of their Staff Judge Advocates.

AFOSI's investigative responsibility includes crimes against USAF personnel or property, crimes committed on Air Force installations, and crimes committed by people subject to the Uniform Code of Military Justice (UCMJ). Further, the Agency investigates fraudulent activities, violations of public trust, and administrative irregularities. Such investigations could involve Air Force contracting and acquisitions, disposal, pay and allowance matters, and nonappropriated fund activities. In addition, AFOSI serves as Executive Agency for coordinating investigative support to the Army and Air Force Exchange Service, and provides investigative assistance to Defense Logistics Agency field offices throughout the world.

Special Agents use offensive and defensive measures to detect, neutralize, and destroy the effectiveness of threats posed to Air Force security by hostile

intelligence. AFOSI also detects terrorist threats to Air Force facilities and personnel, and warns the affected commanders. Coupled with this, AFOSI supervises various counterterrorism services for Air Force commanders during heightened terrorist activity and also provides protective services to selected senior personnel as required.

The USAF Technical Surveillance Countermeasures (TSCM) program is another important responsibility. At the national level, AFOSI helps develop TSCM policies and procedures, and research and design for TSCM equipment. At Air Force level, these technical services support counterintelligence, criminal, and fraud investigations.

AFOSI also directs the USAF polygraph and Identi-kit programs, maintains the USAF master terminal to the FBI National Crime Information Center, and performs continuing crime and counterintelligence patterns and trends analyses.

Since many investigations extend beyond Air Force "boundaries" (people or bases), AFOSI maintains liaison with law enforcement and investigative organizations at international through local level jurisdictions. This liaison function helps assure Air Force commanders the most thorough investigative services possible.

To get the job done, AFOSI selects and trains special agents from among the most highly qualified and capable officer, NCO, and civilian volunteers. All agents attend an intensive ten-week course at the Air Force Special Investigations Academy in Washington, D. C. They usually return for advanced or specialized training after gaining administrative and investigative field experience.

In response to presidential, congressional, and DoD emphasis—and in concert with a major USAF effort—AFOSI is expanding its white-collar and computer-crime detection efforts and its briefing programs to sensitize commanders and managers to fraud; increasing its participation in joint task forces and surveys of high potential crime areas; and working closely to ensure exchange of information with USAF managers and counterpart agencies. ■

Col. Richard S. Beyea, Jr., Commander, AFOSI.

CMSgt. Joel M. Hamilton, Senior Enlisted Advisor, AFOSI.

Air Force Service Information and News Center

DURING the past year, the Air Force Service Information and News Center (AFSINC) continued to help inform Air Force members and the public about Air Force missions, aerospace systems, people, and activities. The Center provided information products and services to these audiences, as well as to commanders and their public affairs representatives.

AFSINC was created following the announcement in April 1978 of the planned merger of several public-affairs functions, including the Internal Information Division from the Pentagon and Command Services Unit from Bolling AFB, D. C., and their relocation to Kelly AFB, Tex., on June 1, 1978. The Air Force Hometown News Center, formerly at Tinker AFB, Okla., moved to Kelly in June 1979; and the Army Hometown News Center, previously at Kansas City, Mo., moved to Kelly in October 1980.

The American Forces Radio and Television office in AFSINC became a directorate in 1980 when DoD reorganized its AFRT program, giving AFSINC management and operational control of all Air Force radio and television outlets in overseas areas.

Air Force public affairs units in Chicago, Los Angeles, and New York receive budgetary and administrative support from the Center.

AFSINC, as a separate operating agency, is responsible to the Department of the Air Force through the Director of Public Affairs in the Office of the Secretary of the Air Force. Its four directorates support the Air Force public-affairs program.

- *The Directorate of Internal Information* provides information products and services to keep Air Force military and civilian members informed about Air Force matters and Air Force, DoD, and national policies, decisions, and actions. Thus, the directorate helps promote high morale and positive motivation of Air Force personnel and units. Printed and audiovisual products produced include *Airman* magazine; the Commander's Policy Letter and its Supplement for Air Force Commanders; Air Force News Service releases for base newspapers; *Air Force Now*, *Air Force Weekly*, and the Lithograph Series. To assist Air Force public-affairs offices, the directorate publishes biographies of general officers and high-ranking civilians; and fact sheets, speech inserts, foldouts, slide briefings, and articles on Air Force subjects of interest. It also manages the Air Force's base newspaper program and monitors the Commander's Call program.
- *The Directorate of Army and Air Force Hometown News* provides stories about newsworthy activities of Army and Air Force people to their hometown

newspapers and other local media. The program reports accomplishments and activities of active-duty people, Reservists, and people enrolled in the commissioning programs (Army and Air Force service academies, Army and Air Force ROTC, Army Officers' Candidate School, and Air Force Officers' Training School). Hometown news releases for newspapers and taped radio and audiovisual interviews make it possible for Army and Air Force people to receive public recognition of their accomplishments and retain their identities in their hometown communities. The releases also keep the public abreast of Army and Air Force activities, engender citizen support, and enhance local recruiting efforts.

- *The Directorate of American Forces Radio and Television* manages and operationally controls all Air Force radio and television outlets in Europe, Alaska, Greenland, the Middle East, and the Pacific area. The directorate coordinates with DoD and other military departments on matters of joint interest, and also is the point of contact for Air Force activities seeking counsel on AFRT matters.
- *The Directorate of Administration* handles the Center's administrative matters. The directorate also is responsible for the reproduction of the Center's information products through in-house, local base, or commercial printing. These products, along with some material provided by DoD's American Forces Information Service, are distributed worldwide by the directorate to more than 7,000 addresses. Computerized photocomposition is provided by the directorate's word-processing center for many of the Center's information products.

As of January 31, 1981, AFSINC was authorized about 500 military and 150 civilians for a total strength of 650, including twenty-eight US Army positions. ■

Col. Roger L. Williams, Commander, AFSINC.

CMSgt. Louis M. Nicolucci, Senior Enlisted Advisor, AFSINC.

Air Force Test and Evaluation Center

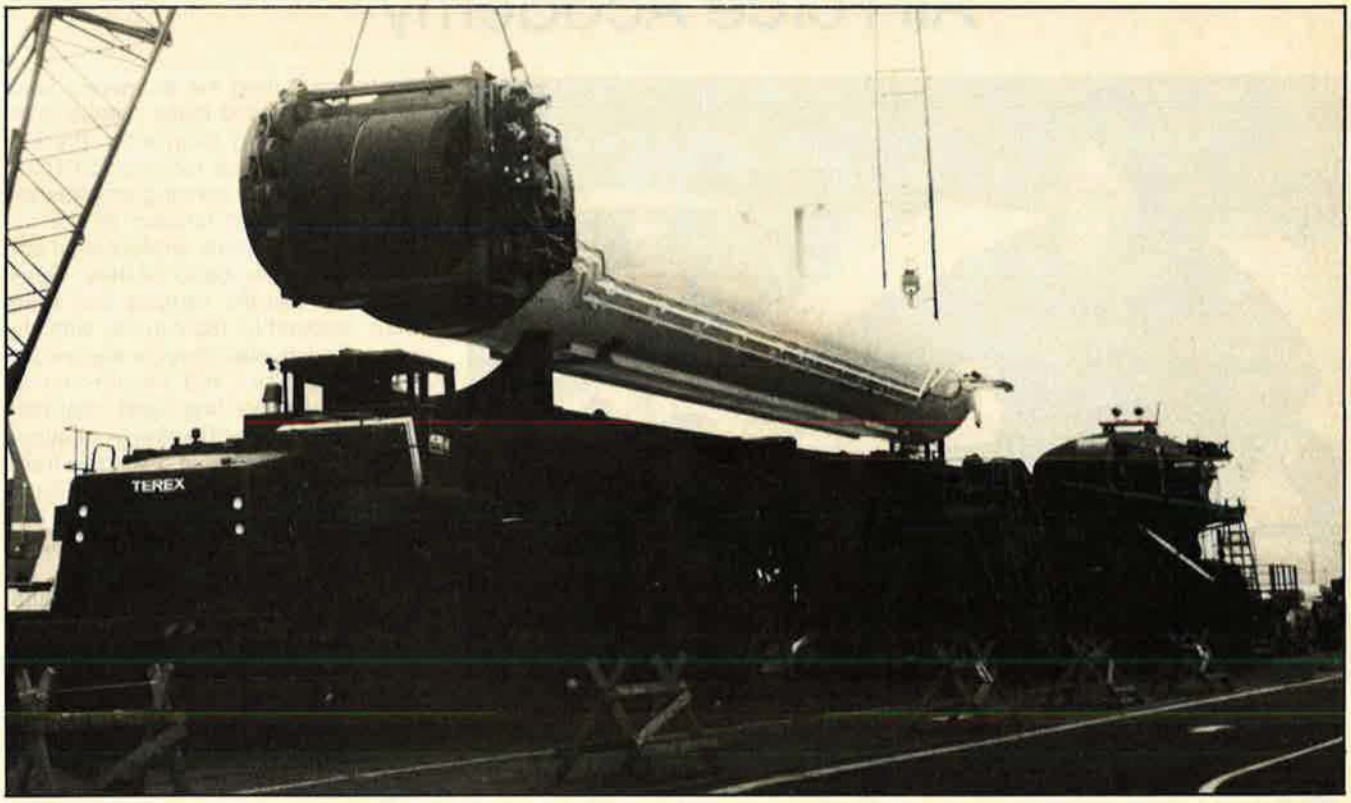
THE Air Force Test and Evaluation Center (AFTEC), headquartered at Kirtland AFB, N. M., was established on January 1, 1974, in response to DoD and congressional desires that each of the military services have an operational test and evaluation (OT&E) organization separate and distinct from the developing and operating commands. AFTEC is the USAF independent agency that furnishes OT&E information to the Air Force Chief of Staff, the Secretary of Defense, and Congress. For all programs designated by Hq. USAF, through its own independent channels, AFTEC plans, directs, controls, evaluates, and reports on OT&E and recommends OT&E policy to Hq. USAF.

The 450-person Center consists of the headquarters, four permanently established detachments, and field test teams at designated test sites. The headquarters staff primarily designs tests, prepares pretest documentation (including test plans), monitors the activities of the field test teams, assists in data analysis and evaluation, and prepares formal test and evaluation reports.

Each AFTEC test team comprises people from AFTEC, from the various operating commands involved in the specific weapon system undergoing test (*e.g.*, Military Airlift Command, Strategic Air Command, or Tactical Air Command), and from such supporting commands as Air Force Logistics Command and Air Training Command. An average of 600 to 800 people from these commands are normally assigned to AFTEC test teams at any specific time.

To support personnel at selected test sites, permanent detachments have been established at Kapaun AS, Germany; Eglin AFB, Fla.; and Nellis AFB, Nev. Additionally, twenty-one AFTEC operating locations (OLs) have been established at individual testing sites. For example, an OL at Edwards AFB, Calif., serves the AFTEC test team for the air-launched cruise missile (ALCM); an OL at Dugway Proving Ground, Utah, serves the AFTEC test team for the ground-launched cruise missile (GLCM); and an OL at Columbia Falls, Me., serves the AFTEC test team for the over-the-horizon backscatter (OTH-B) radar system. Such operating locations are established only for the duration of AFTEC's active operational testing of the system concerned. Two AFTEC liaison offices, at Hq. USAF and at the US Army's Operational Test and Evaluation Agency at Falls Church, Va., complete the unit's organizational structure.

An AFTEC initial operational test and evaluation (IOT&E), conducted under conditions that are as realistic as possible, addresses critical operational questions and issues of a system. Such testing is carried out to estimate a system's operational effectiveness and suitability while concurrently identifying deficiencies or needed modifications. Early test results, normally from tests of prototype and preproduction models, are considered in Air Force and DoD decisions during the early stages of the acquisition process.



AFTEC is currently testing the MX transporter, the world's largest rubber-tire vehicle, near Nellis AFB, Nev. Besides AFTEC people, the test team also includes personnel from SAC, which will manage the missile system.

When AFTEC conducts follow-on operational test and evaluation (FOT&E), it is designed to refine assessments made in IOT&E, to evaluate modifications made to correct deficiencies identified during IOT&E, and to verify the capabilities or production items normally in a fully operational configuration.

In addition, the OT&E information gathered by AFTEC is used by Air Force agencies to assess organizational structure, personnel requirements, doctrine and tactics, and to verify operating instructions, complete documentation, establish training requirements, and develop handbooks.

Typically, AFTEC is involved in planning, conducting, or reporting OT&E on approximately ninety different systems at any given time. Current examples include the space transportation system (STS), the global positioning system (GPS Navstar), the MX missile, guided bombs, and also the replacement of base-level electronic data-processing equipment. Additionally, when directed by Hq. USAF, AFTEC monitors operational test and evaluation programs being conducted by Air Force major commands. AFTEC is actively monitoring between 160 and 180 such tests at any given time.

AFTEC also manages the Air Force's involvement in Joint Test and Evaluation (JT&E) sponsored by the Director of Defense Test and Evaluation within the Office of the Secretary of Defense. These tests, conducted in a joint service environment, provide data for application in future operational concept developments and weapon-system design. In this role, AFTEC acts as the Air Force planning agent and primary point of contact for OSD support agents during the test feasibility study and test design for each JT&E proposal.

Through its various programs and endeavors, the Center helps ensure that the Air Force provides the operational forces with the best possible systems at the lowest possible cost to accomplish mission objectives. ■

Maj. Gen. Wayne E. Whitlach, Commander, AFTEC.

CMSgt. Zach J. Allison, Senior Enlisted Advisor, AFTEC.

Air Force Academy

A cadet performs preflight check before T-41 takeoff. TAC's 557th Flying Training Squadron conducts the course at the Air Force Academy.

ON April 1, 1954, the US Congress passed a bill authorizing the establishment of the Air Force Academy. The institution was given the mission of producing well-educated and highly motivated career Air Force officers. Now, more than twenty-seven years later, the Academy staff reflects the same commitment to excellence that has been the school's hallmark throughout its short history.

Lt. Gen. K. L. Tallman, Superintendent, has managed the Academy's program for nearly four years. Aiding him in training the 4,248 future officers are 1,078 officers, 1,386 noncommissioned officers, and 1,773 civilians.

For the first time in the school's history, the Commandant of Cadets is an Academy graduate. Brig. Gen. Robert D. Beckel, class of 1959, heads the military training program.

Brig. Gen. William A. Orth serves as Dean of the Faculty. He oversees a curriculum accredited by both the North Central Association of Colleges and Secondary Schools and the Accreditation Board for Engineering and Technology.

All cadets take part in the Academy's rigorous athletic program. Physical education is required throughout the four-year program, and cadets participate in either intramural or intercollegiate athletics after classes. Col. John J. Clune is Athletic Director.

Young men and women begin the Academy program with Basic Cadet Training. This facilitates rapid adjustment to a military lifestyle. Basic cadets learn to follow orders so they'll know what it's like when they become leaders. The BCT program includes obstacle courses, drill instruction, military heritage classes, and field training designed to build confidence, morale, and teamwork.

At the conclusion of BCT, basic cadets are accepted into the cadet wing, and the military training program continues during the academic year. First- and second-class cadets manage cadet wing programs, thereby receiving practical leadership experience. Classroom training emphasizes the structure and function of the nation's military forces, professional ethics, and career opportunities. Guest speakers visit the campus and share their leadership techniques with the wing. Cadets also travel to major command exercises and squadron-level units to discover first hand what they have to look forward to after graduation.

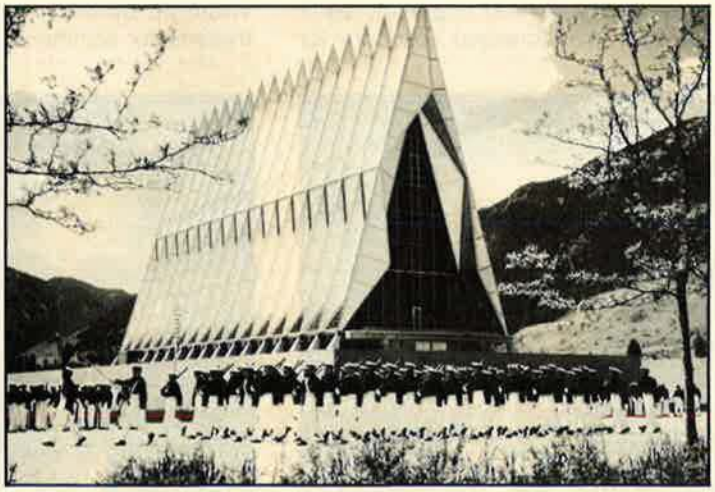
An important feature of military training is the airmanship program. Basic cadets receive orientation flights in a sailplane or a light aircraft. All cadets take classroom aviation courses, are introduced to air operations through soaring, and many also enroll in navigation programs. The Academy operates a free-fall parachute course that annually trains about 500 cadets. Senior cadets eligible for flight training after graduation take a pilot screening course involving about eighteen hours of flying time.

In the second major mission area, seventeen academic departments are organized into four divisions: basic sciences, engineering sciences, humanities, and social sciences. More than 560 military officers and eight visiting professors from civilian universities make up the faculty. All instructors have at least a master's degree, and more than one-third have earned doctorates.

Every cadet must complete an aca-

Lt. Gen. K. L. Tallman, Superintendent, USAFA.

CMSgt. Marvin G. Penfield, Senior Enlisted Advisor, USAFA.



A unit of the Cadet Wing passes the Chapel during a parade at the Air Force Academy.

demic core curriculum of 111 semester hours, made up of courses in each of the four academic divisions. While twenty-three majors are offered, and approximately half the cadets choose a basic or engineering science discipline and half a major in humanities or social sciences, all are graduated with a Bachelor of Science degree. A special honors program permits cadets to delve deeper into core courses. This year marked the Academy's twenty-third graduating class, and twenty-three cadets have earned Rhodes Scholarships.

Rounding out the preparation of future officers is the athletic program. Physical education classes help condition cadets physically and mentally, and include recreational sports. All cadets not on intercollegiate teams participate in intramural sports. During three intramural seasons, each cadet squadron fields a team in a total of seventeen sports.

Cadets take part in nineteen men's or women's intercollegiate sports, fielding forty-one varsity and junior varsity teams. Academy teams have completed their initial Western Athletic Conference seasons and look forward to the continuing challenges of league competition.

For the fourth consecutive year, the Academy's fourth-class cadets (freshmen) have hosted the Colorado State Special Olympics. The athletic department is expanding a program to conduct sports clinics during the summer months for area youngsters. In addition to special events such as these, the Academy annually entertains nearly 1,500,000 people from around the world who come to view its facilities and programs.

The Academy belongs to everyone in the Air Force. General Tallman has extended an invitation to all active-duty and retired Air Force men and women to visit. According to the Superintendent, it is very difficult to appreciate the Academy's programs until one has had a chance to see what the institution is all about. The campus is open year-round, and walking tours of the cadet area are provided from mid-June to mid-August and give visitors a chance to view Academy life close up. ■

Aerospace Defense Center

ONE of the Air Force's newest Direct Reporting Units, the Aerospace Defense Center (ADC) came into being December 1, 1979, as part of a realignment at Colorado Springs that resulted in disestablishment of the Aerospace Defense Command (ADCOM) as an Air Force major command on April 1, 1980.

ADCOM remains a specified command, however, responsible for the aerospace defense of the continental US and Alaska.

With some 1,700 military and civilian personnel, ADC provides USAF staff support to the specified ADCOM, as well as to the binational North American Aerospace Defense Command (NORAD), previously known as North American Air Defense Command, effective May 12.

Responsibilities of ADC include management and support of the NORAD combat operations center in Cheyenne Mountain. In addition, ADC operates two detachments—Detachment 1 at Tinker AFB, Okla., to support NORAD missions in the E-3A Airborne Warning and Control System, and Detachment 22 at North Bay, Ontario, Canada, in the Canadian combat operations center.

Lt. Gen. James V. Hartinger is Commander of ADC, as well as Commander in Chief of both NORAD and ADCOM, a three-hatted position he assumed January 1, 1980. As CINCNORAD/CINCAD, he exercises operational control of all forces and warning systems assigned or made available for the

Lt. Gen. James V. Hartinger, center, Commander of the Aerospace Defense Center, directs his Command Post staff inside Cheyenne Mountain. ADC provides support to NORAD and the Aerospace Defense Command.

aerospace defense of North America.

A vital support function added by ADC this past year was establishment of the NORAD Off-Site Test Facility to develop, validate, and test all software prior to incorporation in Cheyenne Mountain to preclude interference with the operational missile warning computer system.

Following a general officer review of USAF support to NORAD's missile-warning mission, a fifty-four-man System Integration Office was approved for ADC, with responsibility to manage end-to-end architecture, interface engineering, configuration control, as well as the testing of NORAD's tactical warning/attack assessment system.

The ADCOM realignment is working well. With TAC, SAC, and AFCC providing day-to-day resource management and with NORAD retaining operational control of aerospace defense assets, interface relationships are effectively executed to ensure full readiness of these forces. A most important result has been the increased advocacy for strategic defense requirements by these major commands. ■

Lt. Gen. James V. Hartinger, Commander in Chief, NORAD and ADCOM; Commander, ADC.

CMSgt. Charles P. Zimkas, Jr., Senior Enlisted Advisor, ADC.

Air Force Technical Applications Center

THE Air Force Technical Applications Center (AFTAC) at Patrick AFB, Fla., enters the 1980s with an increased awareness of the proliferation of atomic energy activities and the resulting threat to mankind. AFTAC was predicated on the terms of the 1963 Limited Test Ban Treaty, to monitor treaty terms, detect violations, and keep current knowledge of Sino-Soviet nuclear activity, capabilities, and achievements. AFTAC became a Direct Reporting Unit (DRU) on October 1, 1980.

AFTAC, employing some 1,350 men and women, operates worldwide. One squadron is located at McClellan AFB, Calif., a second one at Wheeler AFB, Hawaii, and the third at Lindsey AS, Germany. There are twenty subordinate detachments, four operating sites, and fifty equipment locations scattered around the world. Squadrons in Europe and Hawaii support operational facilities in their areas of responsibility.

To accomplish AFTAC's mission, the US Atomic Energy Detection System (AEDS) was established. The AEDS consists of a worldwide network of sensors and collection equipment, analysis laboratories, a depot for AEDS support, and a Headquarters staff for management and technical evaluation and reporting. While AFTAC collects geophysical data on natural and man-made events and effluents in the atmosphere, the Center's chief concern is the detection of foreign nuclear tests in three environments—subsurface, atmosphere, and space.

AFTAC's Central Laboratory at McClellan AFB, with a staff of some 150, includes people with graduate degrees in chemistry, physics, and nuclear engineering, and electronics engineers, staff scientists, and research directors. The scientific staff is supported by skilled Air Force laboratory technicians. The Central Laboratory is an analytical facility equipped with modern instruments that uses more than ninety-eight kinds of analytical techniques including mass spectroscopy, microprobe analysis, electron microscopy, gas chromatography, nuclear measurement techniques, conventional analytical chemistry, and radio-chemistry, plus a large number of

Col. Robert A. Meisenheimer, Commander, AFTAC.

CMSgt. James B. Payne, Senior Enlisted Advisor, AFTAC.

special physical instrumental methods.

An in-house electronic maintenance capability supports the laboratory instrumentation. An electronic data-processing facility performs all data reduction. Electronic data processing provides complete computer support, including scientific code development and data reduction, as well as providing a versatile management information system.

Because the unique system and instrumentation are only applicable to the AEDS mission, the AFTAC depot at McClellan acts as a depot distribution agent for items managed by AFTAC. The depot is reponsible for prepositioning assets for AEDS system activities and modifications, providing parts support for depot-level maintenance, and providing normal base-level support.

The depot is a secondary source of supply for common items required by AFTAC sites located in remote areas. Engineering personnel perform equipment and systems installations via Mobile Depot Assistance Teams, serve as system and item managers for AEDS items, and manage the AEDS Product Improvement Program. Maintenance personnel perform depot-level maintenance on AEDS equipment at McClellan and as members of the mobile teams at field locations.

Last year's depot fiscal management involved funds totaling more than $11.5 million, while the current supply inventory exceeded $7.5 million and Equipment Authorizations Inventory Document (EAID) assets more than $22 million.

To improve AEDS capability, a comprehensive R&D program is under way to increase the understanding of the complex technical problems associated with the detection and identification of nuclear events underground and in space. Through the Vela Seismological Center at Alexandria, Va., an extensive seismological research program on underground events—natural and man-made—is conducted. Concurrently, the Vela Satellite Program provides basic research, *e.g.*, background measurements and investigation of events in space. More than $12 million in funds was allocated last year for such R&D programs. ■

Albert F. Simpson Historical Research Center

THE Albert F. Simpson Historical Research Center, which provides unique and invaluable services to the Air Force, was established as a Direct Reporting Unit on July 1, 1979. It moved from Washington, D. C., to Maxwell AFB, Ala., in 1949 with its collection of 44,000,000 pages of material that document Air Force history from the earliest days.

Named for Dr. Albert F. Simpson, Air Force Historian from 1946 to 1969, the Center is collocated with Air University, enabling it to offer its extensive research facilities to Air Force professional military education students. It manages the nation's largest and most valuable organized collection of documentation on US military aviation history—perhaps the most extensive collection of this type in the world. Annual accessions run about 2,000,000 pages.

More than eighty-five percent of the pre-1955 holdings have been declassified. The collection is recorded on 16-mm microfilm, copies of which are at the National Archives and Records Service, Washington, D. C., and at the Office of Air Force History, Bolling AFB, D. C.

The Center's holdings consist mainly of periodic unit histories prepared regularly by major commands, numbered air forces, and other Air Force organizations. These histories provide complete coverage of Air Force activities since 1942, when a Presidential order initiated the program. Extensive supporting documentation enhances the value of the histories.

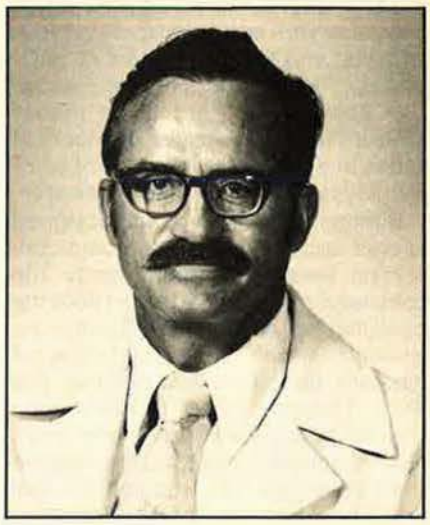
The histories are supplemented by special collections, including historical monographs and studies; end-of-tour reports; joint and combined command documents; aircraft record cards; and materials from the US Army, British Air Ministry, and the German Air Force. The Center also maintains the personal papers of key retired Air Force people.

The Center's more than 280,000 documents on the Vietnam conflict are indexed for computerized retrieval. Abstracts of all new documents since 1974 are also available at the Center. They eventually will be accessible by computer Air Force-wide.

The Center's materials are used in countless ways, ranging from student research for the professional military education program to civilian college students and to the development of official plans, programs, analyses, and evaluations. Material obtained from the Center's records finds its way into orientation and indoctrination programs, public information activities, Air Force responses to Congress and other branches of government, research papers, books, television, movie scripts, and many other products.

There are four divisions at the Center:

- *Reference:* Maintains documents and microfilm, answers inquiries about holdings, produces bibliographies, and provides other services to users.
- *Research:* Writes books, monographs, and research reports; determines lineage of Air Force units; determines combat credits of units and people; and performs other services.
- *Oral History:* Conducts oral history interviews; monitors the worldwide end-of-tour report program; and collects personal papers.
- *Technical Services:* Accessions, catalogs, and indexes documents; develops automatic data-processing and microfilming to support the Center; and coordinates systems applications for the Air Force History Program. ■



Lloyd H. Cornett, Jr., Director, Simpson Center.

Air Force Reserve

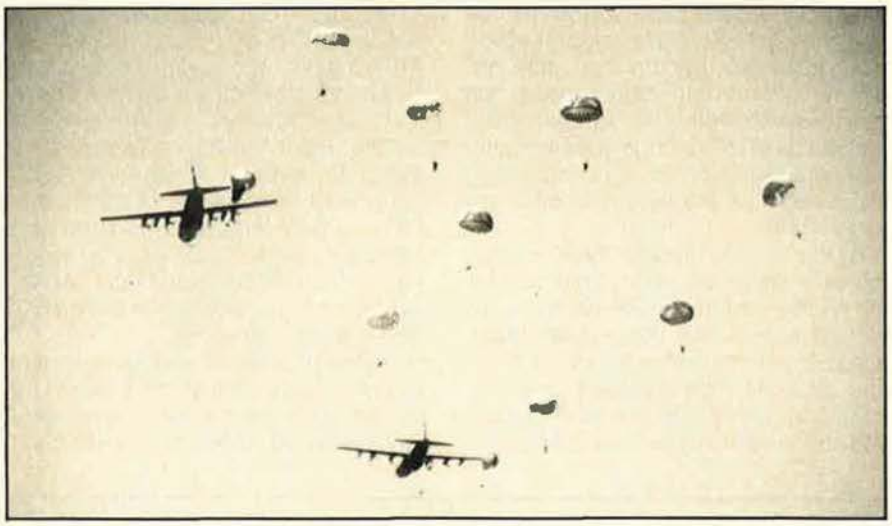
THE Air Force Reserve (AFRES) began the 1980s proving its combat readiness with a hundred percent pass rate for all Air Force Operational Readiness Inspections (ORIs). The command also demonstrated its ability to perform a variety of peacetime missions as a by-product of training and in support of Total Force requirements.

To maintain readiness, AFRES personnel took part in thirty exercises conducted by joint forces and other commands overseas and in the continental US, including Empire Glacier, Gallant Eagle, Dawn Patrol, Global Shield, Brave Shield, Bold Eagle, Coronet Mil, and Reforger. Simulated wartime environments tested the capabilities, tactics, techniques, and procedures of AFRES units and multiservice forces. Air Force Reservists also garnered honors in such other intercommand and service events as the SAREX 80 international search and rescue competition that also included Canadian, active USAF, and ANG units; the MAC aerial port competition in West Germany; and the Volant Rodeo MAC airdrop competition at Pope AFB, N. C.

A major readiness test conducted by AFRES last June—Paid Redoubt 80—realistically and economically evaluated nearly every aspect of the command's ability to perform its varied missions if mobilized. The short-notice test, the fourth and most comprehensive in the command's continuing annual Redoubt series, took place at bases across the country and in a forward operating base environment. Wider in scope than earlier exercises, the scenario included assaults by active and Reserve Army elements, actual ORIs of AFRES and participating regular units, and the deployment of SAC-gained AFRES tanker forces to Europe.

In September, Paid Crete mated AFRES search and rescue and tactical forces in a realistic evaluation of combat rescue techniques and hardware.

During 1980, all units with assigned aircraft, except those undergoing conversion, were rated combat-ready. The command will continue in the 1980s the trend that saw several AFRES units converting to newer aircraft and different missions during the last decade. The 917th Tactical Fighter Group, Barksdale AFB, La., received the command's first A-10 attack aircraft in June from the production line. This marked the first time a front-line aircraft had been delivered to AFRES straight from the factory, along with new aircraft being produced for the regular Air Force and Air National Guard. More A-10s and F-4 fighter-bombers will enter the AFRES inventory this year. Some years later, Reservists will be flying the F-16 multipurpose fighter.



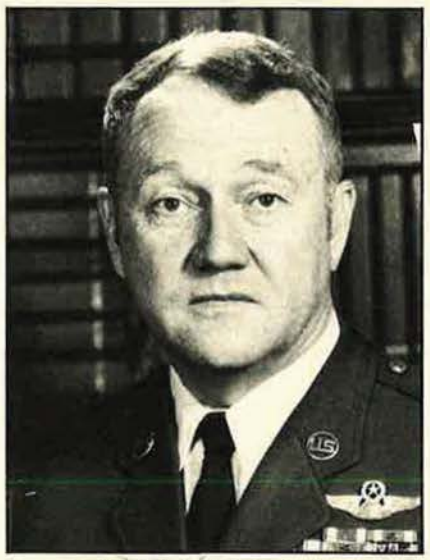
Air Force Reserve transports routinely provide airlift for US Army units. In 1980, MAC-gained aircrews logged more than 145,000 flying hours transporting some 114,000 passengers and paratroopers.

In July 1981, an AFRES associate unit for the KC-10 Extender advanced tanker/cargo aircraft to be operated by SAC will become operational. Reservists will comprise fifty percent of the crews. Other AFRES units fly KC-135 Stratotankers on full alert status, similar to active-duty SAC units.

In a related development, Reservists set another milestone by refueling a C-141B StarLifter, the new stretched version of the veteran Air Force strategic airlifter, on a coast-to-coast flight on September 19, 1980. The "all Reserve show" involved the C-141B crew from the 315th MAW (Associate), Charleston AFB, S. C., and Reserve KC-135 tanker crew from the 452d Air Refueling Wing, headquartered at March AFB, Calif.

Military Airlift Command-gained units flew worldwide airlift missions, logging more than 145,000 flying hours, transporting more than 114,000 passengers and paratroopers, and

Maj. Gen. Richard Bodycombe, Commander, AFRES.



CMSgt. Jack E. Roberts, Senior Enlisted Advisor, AFRES.

AIR FORCE RESERVE FLYING WINGS AND ASSIGNED UNITS

Air Force	Wing Hq.	Group	Squadron	Type Aircraft	Location	Gaining Command
	349th MAW (Assoc)		301st MAS (Assoc)	C-5	Travis AFB, Calif.	MAC
			312th MAS (Assoc)	C-5	Travis AFB, Calif.	MAC
			708th MAS (Assoc)	C-141	Travis AFB, Calif.	MAC
			710th MAS (Assoc)	C-141	Travis AFB, Calif.	MAC
	403d RWRW		305th ARRS	HC-130H/N, HH-3E	Selfridge ANGB, Mich.	MAC
			301st ARRS	HC-130H/N, HH-3E	Homestead AFB, Fla.	MAC
			303d ARRS	HC-130H	March AFB, Calif.	MAC
			304th ARRS	UH-1N, HH-1N	Portland IAP, Ore.	MAC
Fourth Air Force (Hq., McClellan AFB, Calif.)		920th WRG	815th WRS	WC-130H	Keesler AFB, Miss.	MAC
	433d TAW		68th TAS	C-130B	Kelly AFB, Tex.	MAC
Brig. Gen. Sloan R. Gill, Commander	440th TAW		95th TAS	C-130A	Gen. Billy Mitchell Fld, Wis.*	MAC
		927th TAG[1]	63d TAS	C-130A	Selfridge ANGB, Mich.	MAC
		928th TAG	64th TAS	C-130A	Chicago-O'Hare IAP, Ill.*	MAC
	442d TAW		303d TAS	C-130E	Richards-Gebaur AFB, Mo.*	MAC
		934th TAG	96th TAS	C-130A	Minneapolis-St. Paul IAP, Minn.*	MAC
	445th MAW (Assoc)		728th MAS (Assoc)	C-141	Norton AFB, Calif.	MAC
			729th MAS (Assoc)	C-141	Norton AFB, Calif.	MAC
			730th MAS (Assoc)	C-141	Norton AFB, Calif.	MAC
	446th MAW (Assoc)		97th MAS (Assoc)	C-141	McChord AFB, Wash.	MAC
			313th MAS (Assoc)	C-141	McChord AFB, Wash.	MAC
			302d SOS	CH-3E	Luke AFB, Ariz.	TAC
		919th SOG	711th SOS	AC-130A	Eglin AFB, Fla. (Aux. 3)	TAC
Tenth Air Force (Hq., Bergstrom) AFB, Tex.)	301st TFW		457th TFS	F-105D	Carswell AFB, Tex.	TAC
		507th TFG	465th TFS	F-4D	Tinker AFB, Okla.	TAC
		508th TFG	466th TFS	F-105D F	Hill AFB, Utah	TAC
	434th TFW		45th TFS	A-10A[1]	Grissom AFB, Ind.	TAC
		917th TFG	47th TFS	A-10A	Barksdale AFB, La.	TAC
Maj. Gen. John E. Taylor, Jr., Commander		926th TFG	706th TFS	A-37B	NAS, New Orleans, La.*	TAC
	452d AREFW(H)		336th AREFS(H)	KC-135	March AFB, Calif.	SAC
		931st ARG(H)	72d AREFS (H)	KC-135	Grissom AFB, Ind.	SAC
		940th ARG(H)	314th AREFS(H)	KC-135	Mather AFB, Calif.	SAC
			78th AREFS(H) (Assoc)	KC-10[1]	Barksdale AFB, La.	SAC
	482d TFW		93d TFS	F-4C	Homestead AFB, Fla.	TAC
		924th TFG[1]	704th TFS	F-4D[1]	Bergstrom AFB, Tex.	TAC
		932d AAG(Assoc)	73d AAS (Assoc)	C-9	Scott AFB, Ill.	MAC
	94th TAW		700th TAS	C-7A	Dobbins AFB, Ga.*	MAC
		906th TAG	355th TAS	C-123K	Rickenbacker ANGB, Ohio	MAC
		907th TAG	356th TAS	C-123K	Rickenbacker ANGB, Ohio	MAC
		908th TAG	357th TAS	C-7A	Maxwell AFB, Ala.	MAC
	315th MAW (Assoc)		300th MAS (Assoc)	C-141	Charleston AFB, S. C.	MAC
			701st MAS (Assoc)	C-141	Charleston AFB, S. C.	MAC
Fourteenth Air Force (Hq., Dobbins AFB, Ga.)			707th MAS (Assoc)	C-141	Charleston AFB, S. C.	MAC
	439th TAW		337th TAS	C-130B	Westover AFB, Mass.*	MAC
			731st TAS	C-123K	Westover AFB, Mass.*	MAC
		911th TAG	758th TAS	C-130A	Greater Pittsburgh IAP, Pa.*	MAC
Maj. Gen. James E. McAdoo, Commander		914th TAG	328th TAS	C-130A	Niagara Falls IAP, N. Y.*	MAC
	459th TAW		756th TAS	C-130E	Andrews AFB, Md.	MAC
		910th TAG	757th TAS	C-130B[1]	Youngstown Municipal AP, Ohio*	MAC
		913th TAG	327th TAS	C-130E	Willow Grove NAS, Pa.*	MAC
	512th MAW (Assoc)		326th MAS (Assoc)	C-5	Dover AFB, Del.	MAC
			709th MAS (Assoc)	C-5	Dover AFB, Del.	MAC
	514th MAW (Assoc)		335th MAS (Assoc)	C-141	McGuire AFB, N. J.	MAC
			702d MAS (Assoc)	C-141	McGuire AFB, N. J.	MAC
			732d MAS (Assoc)	C-141	McGuire AFB, N. J.	MAC

AAG(Assoc)	Aeromedical Airlift Group (Associate)	TAW	Tactical Airlift Wing
ARRS	Aerospace Rescue and Recovery Squadron	TFW	Tactical Fighter Wing
AREFW(H)	Air Refueling Wing (Heavy)	WRG	Weather Reconnaissance Group
MAW (Assoc)	Military Airlift Wing (Associate)		*Indicates AFRES Base
RWRW	Rescue and Weather Reconnaissance Wing		[1]Effective July 1, 1981
SOG	Special Operations Group		

moving 5,700 tons of cargo during the year. Aeromedical evacuation crew members participated with MAC crews in almost 2,000 live "aeromed" missions, airlifting more than 60,000 patients. Other transport aircraft with special equipment sprayed more than 105,000 acres to help eradicate harmful insects.

Another important aspect of the command's readiness was evidenced by AFRES rescue units, credited with 105 saves in 1980. Most notable was assistance during the Mount St. Helens disaster in Washington state, the MGM Grand Hotel fire in Las Vegas, Nev., and the home and land fires in San Bernardino, Calif. Flying UH-1 Huey helicopters, crews from the 304th Aerospace Rescue and Recovery Squadron, Portland IAP, Ore., assisted by an HC-130 and mobile communications jeep from the 303d ARRS, March AFB, Calif., rescued sixty-one people from the Mount St. Helens area after the volcano erupted in May. Members of the 302d Special Operations Squadron, Luke AFB, Ariz., used their CH-3E helicopters equipped with hoists to pluck seventeen people from the burning Las Vegas hotel in November.

Elsewhere, while others observed Thanksgiving Day, crews from the 433d Tactical Airlift Wing, Kelly AFB, Tex., flew two C-130s with Modular Airborne Firefighting Equipment for the US Forest Service, dropping 18,000 gallons of fire retardant over raging fires around San Bernardino, Calif. In other humanitarian efforts, the 920th Weather Reconnaissance Group at Keesler AFB, Miss., logged more than 600 flying hours while tracking six hurricanes during the 1980 storm season.

The command also proved its worth by winning the prestigious Maj. Gen. Benjamin D. Foulois Memorial Award for flying safety for the second time in three years. Formerly known as the Daedalian Flight Safety Award, the trophy is given by the Order of the Daedalians to the Air Force major command that has demonstrated the most effective aircraft accident prevention program during the past year.

For the first time in its history, the command also captured the coveted General Carl A. Spaatz Air Refueling Trophy. The 452d AREFW won the award for its contribution to SAC's worldwide air refueling efforts in support of TAC requirements.

In October, AFRES placed all MAC-gained aerial port units under Fourth and Fourteenth Air Forces and Air Force Logistics Command-gained combat logistics support squadrons under Tenth Air Force to standardize control of these units.

Reserve PRIME BEEF and Red Horse units provided fifteen percent of the Air Force's total engineering capability, and communications flights spent their annual active-duty training tours assisting active-duty units at seventeen overseas and eighteen continental US locations.

For the third consecutive year, AFRES recruiting met and surpassed its congressionally funded manning level. Accomplishing the command's diverse mission, as of year's end, were some 49,600 unit program Reservists, including about 6,400 Air Reserve Technicians (ARTs), more than 3,600 non-ART civilians, and 825 active-duty military personnel. These totals were especially noteworthy in light of tight budgetary and civilian personnel constraints.

The Air Force Reserve is managed through 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. Hq. AFRES at Robins AFB, Ga., administers the nationwide program and the operation of the command's fleet of more than 450 aircraft.

The Air Reserve Personnel Center at Denver, Colo., formerly a separate operating agency, is now an organizational element of the Air Force Reserve, managing the personnel requirements of all Air Reserve forces. Staffing of the Center at year's end totaled some 185 full-time military and 650 civilian personnel. ■

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 twofold mission requires the Air Guard to provide trained and well-equipped men and women to augment the active force during national emergencies or war and, also, to provide a disciplined force to protect life and property during natural disasters, civil disorders, or other emergencies.

When Air Guard units are in a nonmobilized status, they are commanded by the governors of the fifty states, the Commonwealth of Puerto Rico, the Territory of the Virgin Islands, and the Commanding General of the District of Columbia. All the units are responsible to the governor, who is represented in the state or territory chain of command by the Adjutant General (AG).

ANG units may be called for federal service by the President, Congress, or when otherwise authorized by law. During peacetime, all Air Guard units are assigned to such "gaining" Air Force major commands as TAC, MAC, SAC, PACAF, AAC, and AFCC. The major commands establish unit training standards, provide advisory assistance, and evaluate unit training, safety, and readiness programs.

More than 97,000 Guardsmen and women support a force of twenty-four wings, ninety-one flying squadrons, and 235 independent nonflying units.

Maj. Gen. John B. Conaway, Director, ANG.

CMSgt. Lynn E. Alexander, Senior Enlisted Advisor, ANG.

THE AIR NATIONAL GUARD BY MAJOR COMMAND ASSIGNMENT

(As of April 1, 1981)

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 AFB, 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 ANG Base, 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 ANG Base, 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	Providence, 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

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.

PACIFIC AIR FORCES

F-4 Phantom

154th	Tactical Fighter Group	Hickam AFB, Hawaii

TACTICAL AIR COMMAND

A-7D Corsair II

121st	Tactical Fighter Wing	Rickenbacker AFB, 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.
169th	Tactical Fighter Group	McEntire ANG Base, S. C.
178th	Tactical Fighter Group	Springfield, Ohio
180th	Tactical Fighter Group	Toledo, Ohio
185th	Tactical Fighter Group	Sioux City, Iowa

A-10 Thunderbolt II

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.

OA-37 Dragonfly

110th	Tactical Air Support Group	Battle Creek ANG Base, Mich.
128th	Tactical Air Support Wing	Truax Field, Wis.
182d	Tactical Air Support Group	Peoria, Ill.

F-105B Thunderchief

108th	Tactical Fighter Wing	McGuire AFB, N. J.

F-105D Thunderchief

113th	Tactical Fighter Wing	Andrews AFB, Md.
192d	Tactical Fighter Group	Richmond, Va.

F-105G Thunderchief

116th	Tactical Fighter Wing	Dobbins AFB, Ga.

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.
183d	Tactical Fighter Group	Springfield, Ill.
188th	Tactical Fighter Group	Fort Smith, Ark.

F-4D Phantom

184th	Tactical Fighter Group**	McConnell AFB, Kan.

RF-4C Phantom

117th	Tactical Reconnaissance Wing	Birmingham, Ala.
123d	Tactical Reconnaissance Wing	Louisville, Ky.
124th	Tactical Reconnaissance Group	Boise, Idaho
148th	Tactical Reconnaissance Group	Duluth, Minn.
152d	Tactical Reconnaissance Group	Reno, Nev.
155th	Tactical Reconnaissance Group	Lincoln, Neb.
186th	Tactical Reconnaissance Group	Meridian, Miss.
187th	Tactical Reconnaissance Group	Montgomery, Ala.

O-2A Super Skymaster

105th	Tactical Air Support Group	White Plains, N. Y.
111th	Tactical Air Support Group	Willow Grove NAS, Pa.
163d	Tactical Air Support Group	Ontario, Calif.

EC-130E

193d	Electronic Combat Group	Harrisburg, Pa.

AIR DEFENSE UNITS

F-101 Voodoo

107th	Fighter Interceptor Group	Niagara Falls, N. Y.
147th	Fighter Interceptor Group	Ellington AFB, Tex.*

F-106 Delta Dart

102d	Fighter Interceptor Wing	Otis AFB, Mass.*
144th	Fighter Interceptor Wing	Fresno, Calif.
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

119th	Fighter Interceptor Group	Fargo, N. D.
142d	Fighter Interceptor Group	Portland, Ore.
191st	Fighter Interceptor Group	Selfridge ANG Base, Mich.

EB-57

158th	Defense System Evaluation Group	Burlington, Vt.

*No longer a major active Air Force base.
**Replacement Training Unit (RTU).

The flying squadrons operate nineteen different types of aircraft representing seventeen percent of the USAF Total Force. Real property at 154 ANG sites is valued at $2.6 billion, including both facilities and real estate.

Currently, the Air National Guard provides sixty percent of the Air Force's fighter-interceptor force, fifty-seven percent of the tactical reconnaissance force, forty-seven percent of the tactical air support, twenty-nine percent of the tactical airlift, twenty-six percent of the fighters, seventeen percent of the air refueling tankers, and fourteen percent of the rescue and recovery capability.

Additionally, in 1980, Air Guard A-7, RF-4, and EC-130 units became integral parts of the newly formed Rapid Deployment Force (RDF). Eight A-7s of the 150th Tactical Fighter Group, New Mexico Air National Guard, were deployed to Cairo West Air Base, Egypt, in November 1980 to provide tactical air support for the first overseas RDF operation, Exercise Bright Star.

For twenty-seven years, the ANG has had an air defense alert mission. KC-135 refueling units also perform a twenty-four-hour-per-day alert mission and continue to participate in operational missions that support the European Tanker Task Force in the United Kingdom.

ANG C-130s provide airlift support for the US Southern Command in Panama on a rotational basis, perform DEW Line and Arctic icecap resupply missions, and aid the US Forest Service with Modular Airborne Fire-Fighting capabilities. All Air Guard A-7 units have a continuous rotational commitment in Panama, called Coronet Cove, which provides close air support in joint training programs with the US Army.

The ANG continues to modernize its units consistent with the Total Force. Aging F-101 interceptors will be replaced with the F-4, and two F-105 units will convert to the more modern A-7 and F-4D. OA-37s will continue to replace O-2s. The procurement of the new two-seat A-7K will allow the Air Guard to provide safer and more fuel-efficient A-7 aircrew training. New C-130Hs have entered the inventory and permitted the phaseout of the C-7 Caribous. Additional A-10 fighters are also being procured to enhance Guard close air support capabilities.

Civil Engineering flights (PRIME BEEF) continue to provide engineering and fire-fighting forces trained and equipped to deploy on short notice in support of active Air Force installations and ANG sites, as well as participate in JCS exercises. Civil Engineering Squadrons (Red Horse) provide self-sufficient, deployable engineering teams to perform heavy repair and maintenance on air bases and remote sites. A composite services force (PRIME RIBS) is being organized to provide food service, billeting, and mortuary affairs support at deployment locations.

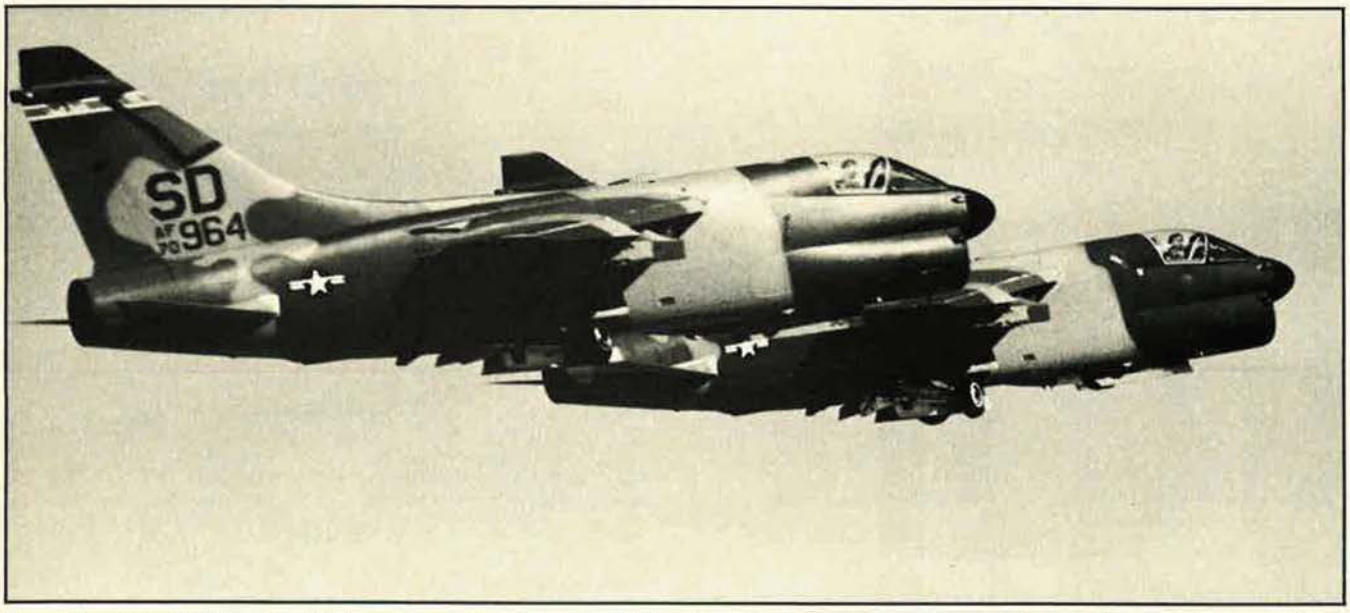
There are more than 20,000 Air Guardsmen and women in 188 communications-electronics units. These people provide fifty percent of the Air Force's electronic installation capability. They install, repair, and restore communications, navigational aid, and air traffic control equipment. ANG communications units represent seventy-five percent of the people and seventy percent of the equipment used in combat communications and air traffic services roles. Guard tactical control units comprise fifty percent of the Air Force's weapon systems control capability.

The thirty-nine ANG weather flights provide weather support to Army National Guard and Army Reserve divisions and brigades, as well as the USAF Tactical Weather System.

Sixty-five ANG medical units performed their annual training in active-duty Air Force hospitals and clinics during FY '80. Individual critical manning assistance 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 the enlisted medical specialties. Air Guard physicians, dentists, and nurses participated in Medical Red Flag Exercises at Travis AFB, Calif., and Scott AFB, Ill. Four additional Medical Red Flags are planned during FY '81.

Since 1976, the Air National Guard has participated in thirty-one overseas deployments in support of USAFE and NATO, gaining realistic training in locations where the units may be called on to fight. Realistic training is also being accomplished through joint exercises where 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.

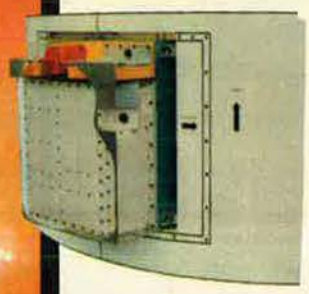
Deployments, exercises, and direct support to the Air Force on a day-to-day basis gives the Air National Guard the constant training needed to maintain a high level of readiness at minimum expense to the American taxpayer. ■



Two A-7s of the 114th Tactical Fighter Group, South Dakota ANG, take off in formation during a training mission. The Air Guard flies nineteen different types of aircraft, representing seventeen percent of USAF's Total Force.

From Minuteman to MX:

the legacy continues.



It began in 1958 when Rockwell International became associate contractor for Minuteman's guidance and control system. It continued through three generations of the weapon system, culminating in a Minuteman III guidance system that established new standards for accuracy, in-silo reliability and cost efficiency. Now Rockwell is focusing its efforts on development of the missile electronics and computer assembly, and integration of the guidance system for the newest intercontinental ballistic missile.

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GALLERY OF USAF WEAPONS

BY SUSAN H. H. YOUNG, ASSOCIATE COMPILER, JANE'S ALL THE WORLD'S AIRCRAFT
EDITED BY JOHN W. R. TAYLOR, EDITOR, JANE'S ALL THE WORLD'S AIRCRAFT

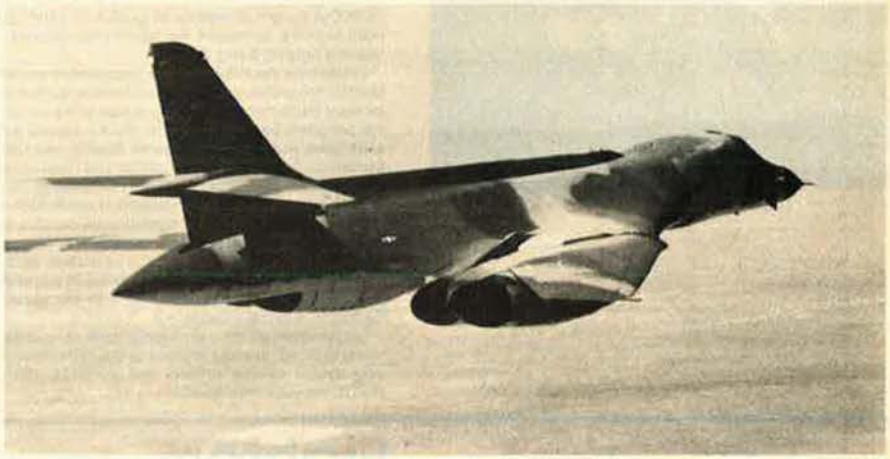
Bombers

B-1 and LRCA

Four years after President Carter canceled production plans for the original version of the B-1, a derivative version of this extremely advanced bomber has become prime contender for selection as USAF's urgently needed strategic attack aircraft for the later '80s, now known as the long-range combat aircraft (LRCA). So continues the turbulent history of a design that was considered frozen in January 1971, as a B-52 replacement able to penetrate any conceivable defense system at a cruising height below 500 ft, with optional over-the-target supersonic dash capability at height. Flight testing of three prototypes and a pre-production prototype, from December 23, 1974, demonstrated the B-1's ability to fulfill its designed role, in terms of base escape, high-altitude cruise with aerial refueling, low-altitude high-speed terrain-following penetration, simulated weapons release, and recovery. Mach 2.0 was exceeded for the first time in April 1976. Although production plans were abandoned in the following year, flight testing continued, so that the technical base would be available "in the very unlikely event that, because alternative strategic systems run into difficulty, [DoD] decides to reconsider B-1 deployment." The third prototype was modified by the addition of an advanced ECM system, and with a Doppler beam sharpening modification to the forward-looking attack radar. Testing of this and the fourth aircraft, which was fitted from the start with offensive and defensive avionics to operational standards, was carried out against simulated enemy threats, defense systems, and against US surrogate threats. Simultaneously, B-1 derivative designs were included in DoD studies to evaluate various types of aircraft as ALCM carriers. In November 1979, as a result of these studies, Rockwell was requested by USAF to submit a proposal for initial design of a prototype strategic ALCM launcher (SAL) that could be produced by modification of the third B-1 prototype. The FY '81 Congressional Authorization Bill required the DoD to present a plan by March 15, 1981, for the development of a multirole bomber with an initial operational capability not later than 1987. The Air Force Department report to the 97th Congress, in February, stated, "The current bomber program centers on an aggressive evaluation program whose goal will lead to selection of a candidate multirole bomber or long-range combat aircraft (LRCA) as we have called it. Near-term candidates include B-1 variants, a stretched version of the FB-111, and a new design based on currently available technology. Longer-term alternatives address advanced technology designs. We believe a mid-1980s initial operational capability (15 aircraft) is feasible for either B-1 or FB-111B/C candidates. It is estimated that a B-1 variant would be able to meet an IOC approximately 56–60 months from go-ahead, with final aircraft delivery by CY '89 based on a buy of 180 aircraft. The FB-111B/C is estimated to meet an IOC about 44–54 months from go-ahead, with final delivery by CY '87 based on a buy of 150 aircraft. The pursuit of the FB-111B/C option would, of course, also require replacement of the F-111D assets taken from the Tactical Air Forces by procurement of a suitable replacement. Although FB-111B/C IOC occurs earlier, the B-1 variant would have considerably greater range and weapons load. The Air Force LRCA program combines funding from the previous Cruise Missile Carrier Aircraft, Strategic Bomber Enhancement, and Bomber Penetration Evaluation programs with that appropriated by Congress for FY '81. An estimated LRCA funding requirement to support a mid-1980s IOC would include (1) an FY '81 Supplemental for $300 million to reach a total FY '81 program of $561 million, (2) an FY '82 Budget Amendment for approx $2.7 billion, and (3) FY '83 funding level of approx $3.7 billion."

Characteristics of the original B-1 design were as follows:

Contractor: Rockwell International Corporation, Aircraft Group, North American Aircraft Division.



B-1 prototype

Power Plant: four General Electric F101-GE-100 afterburning turbofan engines; each approximately 30,000 lb thrust.

Accommodation: four: two pilots and two systems operators, in pairs.

Dimensions: span spread 136 ft 8½ in, fully swept 78 ft 2½ in, length overall 150 ft 2½ in, height 33 ft 7¼ in.

Weight: gross 395,000 lb.

Performance: max speed at 50,000 ft Mach 2.1, max range without refueling intercontinental.

Armament: three internal weapon bays, accommodating 24 AGM-69 SRAMs on three rotary dispensers, or 75,000 lb of free-fall bombs. Provision for 8 more SRAMs or 40,000 lb of free-fall weapons externally.

B-52H Stratofortress

B-52 Stratofortress

Although well into its third decade of operational service, the B-52 Stratofortress still constitutes the major piloted element of SAC. Three hundred and sixteen aircraft, supported by small numbers of training, backup, and test aircraft, make up the B-52 operational force, and are capable of delivering a wide range of weapons, including conventional and nuclear bombs, 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.

Since first entering USAF service in 1955, the B-52 has undergone numerous improvement programs in order to satisfy prevailing defense requirements. More than 300 B-52s are expected to continue in the USAF inventory for the remainder of the century. Versions still operational are: **B-52D,** total of 170 built with J57-P-29W turbojet engines, with delivery from December 1956. Eighty "D"s were refurbished in 1975–77 to extend their service life. These aircraft are equipped with an MA-6A bombing/navigation system and A-3A or MD-9 fire control for the tail guns. They will be retained at least until the mid-eighties, their conventional warfare capability being greater than that of the later still-operational models. **B-52G,** introduced important changes including a redesigned wing containing integral fuel tankage, fixed underwing tanks, a new tail fin of reduced height and broader chord, a remotely controlled tail turret which allowed the gunner to be repositioned with the rest of

FB-111A

the crew; deliveries began in February 1959 and 193 were built. **B-52H,** the final version, switched to TF33 turbofan engines and had improved defensive armament, including a Vulcan multibarrel tail gun; 102 were built, with deliveries starting in May 1961. Under a major USAF program initiated in 1971, 281 B-52Gs and "H"s were modified to carry 20 AGM-69A Short-Range Attack Missiles (SRAM), six under each wing and eight in the bomb bay. Additionally, all "G"s and "H"s 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, initiated in 1974, about 270 "G"s and "H"s 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 contracted to define and design an Offensive Avionics System (OAS) to upgrade the navigation and weapons delivery of the B-52G/H. This will be a digital-based, solid-state system, and will include TERCOM (terrain comparison) guidance. Other equipment is being developed for future procurement, with relevant funding being sought.

In addition, the B-52G is being adapted as carrier aircraft for the cruise missile. Full-scale development of the relevant equipment, as an integral part of the cruise missile program, began in 1978 and three modified B-52Gs were used in the fly-off between Boeing and General Dynamics. Funding of $126.1 million has been sought in the initial FY '82 budget proposals for another 40 B-52 modifications, and it is anticipated that one B-52G cruise missile squadron should be operationally capable by December 1982. Full operational capability is planned by 1990, when 173 B-52G aircraft will be loaded, each with 12 external and 8 internal cruise missiles. In addition, the possibility of converting 96 B-52Hs to the same configuration is being considered.

Updating B-52G/Hs is anticipated until at least the end of the eighties, in order to prolong their effectiveness as both cruise missile carriers and bombers. (Data for B-52G, except where noted.)

Contractor: The Boeing Aerospace 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 488,000 lb, D model gross 480,000 lb.
Performance (approx): max speed at 20,000 ft 660 mph, service ceiling 55,000 ft, range 7,500 miles.
Armament: D/G models have 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.

FB-111A

A two-seat, medium-range, high-altitude strategic bomber version of the basic swingwing F-111, the **FB-111A** was developed originally to provide SAC with a replacement for some of its B-52C/F versions of the Stratofortress and B-58A Hustlers. It is also capable of supersonic speed at sea level. The first of 76 production aircraft flew in July 1968, and the initial delivery was made in October 1969 to the 340th Bomb Group. Operational units equipped with a total of 60 FB-111As are the 380th and 509th Bomb Wings. Since the cancellation of B-1 production in 1977, various proposals have been put forward to develop the FB-111 as a manned penetration bomber capable of carrying up to 15 nuclear weapons (see references to FB-111B/C in entry on B-1 and LRCA).
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.

Fighters

F-4E Phantoms

F-5E Tiger II

F-4 Phantom II

Continuous updating of this two-seat, twin-engine, all-weather fighter, designed in the mid-1950s, has enabled it to maintain its effectiveness in USAF's tactical inventory. At the beginning of 1981, a total of 954 F-4s equipped active and reserve tactical air forces; about 250 are based with USAFE in Europe; PACAF units in Hawaii, Korea, and the Philippines, AAC's 43d and 18th Tactical Fighter Squadrons, 57th FIS, Iceland, and several ANG and AFRES squadrons are similarly equipped. Equipment produced for USAF Phantoms includes the Pave Spike day tracking/laser ordnance designator pod, for use with "smart" weapons, and the advanced ALQ-131 ECM system capable of covering the complete range of threat radars. First Phantom version supplied to USAF was the **F-4C,** a two-seat tactical fighter developed from the basic F-4B naval version, with J79-GE-15 turbojet engines and provision for a large external weapon load. Modifications included dual controls, an inertial navigation system, and boom flight refueling, instead of drogue. The 583 aircraft completed between May 1963 and May 1966 were deployed by TAC, PACAF, and USAFE for close-support, attack, and air-superiority duties, and with ANG from January 1972. The **F-4D** was developed from the F-4C with major systems changes, including new weapon ranging and release computers to increase accuracy in air-to-air and air-to-surface weapon delivery. First F-4D flew in December 1965, with deliveries beginning in March 1966. Total of 843 built, primarily for USAF, but 32 were supplied to Iran and 36 transferred from USAF to the Republic of Korea. The **F-4E** is a multirole fighter capable of performing air-superiority, close-support, and interdiction missions. A 20-mm Vulcan multibarrel gun is fitted, together with an improved fire-control system, as a result of operational experience with earlier aircraft, some of which had been equipped with pod-mounted guns. An additional fuselage fuel tank extends the F-4E's radius of action. Leading-edge slats, to improve maneuverability, have been retrofitted to all USAF F-4Es. In addition, from early 1973, some models 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. Several hundred F-4Es were built for USAF. 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, and a digital intercept computer that includes launch computations for USAF AIM-9 and AIM-7 missiles. The **F-4G** "Advanced Wild Weasel" is a modified F-4E with sophisticated electronic warfare equipment that enables it to detect, identify, and locate enemy radars, and to direct against them weapons for their destruction or suppression. Changing EW threats are covered by use of reprogrammable software. 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 (including IIR imaging infrared version). First F-4Gs entered service with 35th TFW at George AFB, Calif., in October 1978; modification of 96 aircraft had been completed by the beginning of 1981. The AGM-88 HARM high-speed antiradiation missile will equip them in FY '85. (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.
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. To extend the range of armament options, an F-5E completed a technology flying demonstration with a 30-mm underbelly gun pod developed by General Electric. More than a thousand F-5Es and two-

seat **F-5Fs** have been delivered to fifteen countries. TAC, assisted by ATC, is training pilots and technicians of user air forces. For this purpose, 20 F-5Es were supplied to USAF, beginning in April 1973 with the 425th TF Squadron, before deliveries to foreign governments began late that year. Deliveries of the F-5F began in the summer of 1976. 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-21A turbojet engines; each 5,000 lb thrust with afterburning.

Accommodation: pilot only.

Dimensions: span 26 ft 8 in, length 48 ft 2 in, height 13 ft 4 in.

Weights: empty 9,683 lb, gross 24,676 lb.

Performance (at 13,350 lb): max level speed at 36,000 ft Mach 1.63, 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 (F-5F only) a laser designator.

F-15 Eagle

Although designed specifically for an air-superiority role, this fixed-wing all-weather fighter has an inherent air-to-surface attack capability. Since the mid-'70s, the original single-seat **F-15A** and two-seat **F-15B** have progressively replaced the F-4 as USAF's primary air-superiority aircraft. Beginning in June 1979, they have been followed by the single-seat **F-15C** and two-seat **F-15D,** embodying Production Eagle Package (PEP-2000) improvements. These include 2,000 lb of additional internal fuel, and provision for carrying conformal fuel tanks, which has increased maximum gross weight to 68,000 lb. Since the middle of last year, F-15C/Ds have been fitted with a programmable signal processor to enhance radar capability and flexibility. Planned total production of all models is 729 aircraft for USAF, plus the 20 R&D models, by 1983. Orders to date total 681 for operational use by USAF, with an additional 30 requested in the initial FY '82 budget proposals. The first F-15A flew in July 1972. TAC's 1st TFW at Langley AFB, Va., and 49th TFW at Holloman AFB, N. M., USAFE's 36th TFW at Bitburg AB, Germany, and 32d TFS at Camp New Amsterdam, the Netherlands, and PACAF's 18th TFW at Kadena AB, Okinawa, Japan, have been fully equipped. The 33d TFW at Eglin AFB, Fla., began equipping in 1979. F-15 pilot training is accomplished at Luke AFB, Ariz., in both single-seat and two-seat Eagles. Specialized equipment in the F-15 includes a lightweight Hughes radar system for long-range detection and tracking of small high-speed objects operating at all heights down to treetop level, and for ensuring effective weapons delivery, with a headup display for close-in dogfights. The IFF system embodies a Hazeltine interrogator to inform the pilot if an aircraft seen visually or on radar is friendly; an inertial navigation system is fitted.

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-15A.)

Contractor: McDonnell Aircraft Company, Division of McDonnell Douglas Corporation.

Power Plant: two Pratt & Whitney F100-PW-100 turbofan engines; each 25,000 lb thrust class.

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 F-15A 56,000 lb; F-15C 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.

Armament: one internally mounted M-61A1 20-mm multibarrel cannon; four AIM-9L Sidewinder and four AIM-7F Sparrow air-to-air missiles carried externally. Provision for carrying up to 16,000 lb of ordnance on weapon stations.

F-16 Fighting Falcon

Evolved from the USAF Lightweight Fighter Prototype Program, the F-16 incorporates advanced technologies which 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 headup display, internal chaff or flare dispensers, and a 500-round 20-mm internal gun. The aircraft also has provisions for ECM.

F-15 Eagle

To date, USAF has initiated procurement of 605 F-16s, with a total planned purchase of 1,184 **F-16A** single-seat and 204 **F-16B** two-seat versions. These will equip ten active fighter wings, as well as modernize the Air Reserve Forces. The first F-16 to enter operational service was delivered to USAF's 388th TFW at Hill AFB, Utah, in January 1979. TAC had in early 1981 a total of 162 F-16s in its inventory, and three squadrons are expected to join USAFE's 50th TFW at Hahn AB in West Germany this year. In addition, four NATO allies (Belgium, Denmark, the Netherlands, and Norway) are purchasing 370 F-16s under coproduction arrangements. The first European aircraft flew in December 1978 and was accepted by Belgium in January 1979. Deliveries have since been made to the Netherlands, Norway, and Denmark, and to Israel, which plans to purchase 75 F-16s. Egypt is to receive 40.

In late 1980, General Dynamics initiated a two-month flight test program to demonstrate the engine/airframe compatibility, and evaluate the performance, of an F-16 fitted with a J79 engine. In an additional program, USAF is using an F-16 as the test-bed for the General Electric F101 Derivative Fighter Engine (DFE). The first flight, of a 100 hr flight test program, was made in December. (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.

Accommodation: pilot only.

Dimensions: span 32 ft 10 in, length excl probe 47 ft 7.7 in, height 16 ft 5.2 in.

Weights: empty 15,137 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, air-to-air and air-to-surface munitions.

F-16 Fighting Falcon

F-101B Voodoo

The ANG has 36 of these two-seat long-range all-weather interceptors assigned to Tactical Air Command, as part of the air defense interceptor force for the continental United States. The aircraft also continues to serve with the Canadian Armed Forces under NORAD control.

Contractor: McDonnell Aircraft Corporation.

Power Plant: two Pratt & Whitney J57-P-55 turbojet engines; each 14,990 lb thrust with afterburning.

Accommodation: pilot and radar operator in tandem.

Dimensions: span 39 ft 8 in, length 67 ft 4¾ in, height 18 ft 0 in.

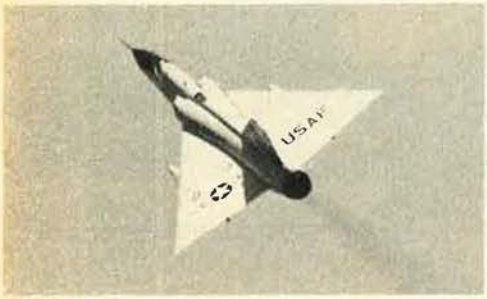
Weight: gross 46,500 lb.

Performance: max speed at 40,000 ft Mach 1.85, service ceiling 51,000 ft, max range 1,550 miles.

Armament: two AIM-4D Falcon air-to-air missiles carried externally, and two AIR-2A Genie nuclear-warhead unguided rockets carried internally.

F-101B Voodoo

F-105G Thunderchief



F-106A Delta Dart

F-111

F-105 Thunderchief

Several **F-105D** single-seat all-weather fighter-bombers remain in squadron service with the ANG and AF Reserve, equipped with NASARR monopulse radar, for use in both high- and low-level missions, and Doppler for night or bad weather operations. Also in the ANG and Reserve are a few **F-105Bs** and the **F-105F** two-seat dual-purpose trainer/tactical fighter version of the F-105D. The two squadrons of the active Air Force which flew the **F-105G** all-weather "Wild Weasel" version of the two-seat F-105, intended for suppression of surface-to-air missile sites, with electronic countermeasures pods mounted on the underfuselage, have now received F-4G "Wild Weasels." The F-105Gs have been transferred to the ANG, beginning a new mission for the Guard. Typical armament load comprises four Shrike missiles or two Standard ARMs. (Data for F-105D.)

Contractor: Fairchild Republic Division of Fairchild Industries.

Power Plant: one Pratt & Whitney J75-P-19W turbojet engine; 26,500 lb thrust with afterburning and water injection.

Accommodation: pilot only.

Dimensions: span 34 ft 11¼ in, length 67 ft 0¼ in, height 19 ft 8 in.

Weights: empty 27,500 lb, gross 52,546 lb.

Performance: max speed at 38,000 ft Mach 2.1, service ceiling 52,000 ft, max range more than 1,842 miles.

Armament: one General Electric 20-mm Vulcan multibarrel gun and more than 14,000 lb of stores under fuselage and wings.

F-106 Delta Dart

The F-106 all-weather fighter was developed in the mid-1950s. Constant updating has enabled USAF to maintain its effectiveness, and 183 continue to serve with active Air Force and ANG units. The two production versions are the **F-106A** single-seat interceptor, and the **F-106B,** a tandem two-seat dual-purpose combat trainer. The F-106's MA-1 electronic guidance and fire-control system has been updated periodically. Other modifications have included installation of supersonic drop tanks, in-flight refueling, and a 20-mm cannon, which gives greater effectiveness against low-altitude/ECM/maneuvering targets. (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 2.3, service ceiling 57,000 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 which improved engine performance above Mach 2.2. Ninety-four were built, and most of these serve with the 20th TFW, based in the UK in support of NATO. The replacement of current analog bombing and navigation systems with digital equipment is being considered. This would enable F-111A/E aircraft to handle modern guided munitions and advanced sensors, as well as future systems such as Navstar and JTIDS. The **F-111D** had from the start 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. It is being 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. The F-111F-equipped 48th TFW moved to RAF Lakenheath in 1977.

Production of the F-111 was completed in 1976. Its EW capabilities are being updated, with the ALQ-131 ECM system. In addition, the **EF-111A,** an ECM conversion of the F-111A, is in production by Grumman *(see page 146).* SAC has a strategic bomber version of the F-111, designated **FB-111A** *(see page 142).* 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.

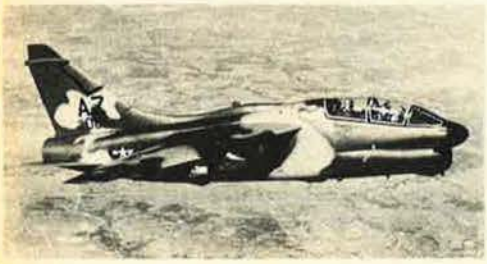
Dimensions: span spread 63 ft 0 in, fully swept 31 ft 11.4 in, length 73 ft 6 in, height 17 ft 1.4 in.

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



A-7K Corsair II

A-10 Thunderbolt II

A-7D/K Corsair II

The **A-7D** Corsair II is a single-seat, subsonic tactical fighter, 459 of which were delivered to the USAF between 1968 and 1976. The 354th TFW, first operational unit equipped with A-7Ds, demonstrated the outstanding target kill capability of the type in Southeast Asia. Accuracy is achieved with the aid of a continuous-solution navigation and weapon-delivery system, including all-weather radar bomb delivery. Additionally, 383 A-7Ds have been modified to carry a Pave Penny laser target designation pod.

Since 1973, A-7Ds have been delivered also to ANG units in ten states and Puerto Rico, representing the first new aircraft received by these units in more than 20 years. All active AF A-7s will be transferred to ANG units by the end of this year. To facilitate transition training, 30 two-seat **A-7Ks** have been funded to date, as part of a planned procurement of 42 for service from this year. The aircraft's combat capability is retained. (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 6 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 payload, long loiter, and wide combat radius. 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 CAS 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 headup display, laser seeker, target penetration aids, and associated equipment for Maverick missiles. The first operational squadron was activated at Myrtle Beach AFB, S. C., in June 1977 and achieved operational capability in October, approximately three months ahead of schedule. In early 1978, the 354th TFW began operating A-10s equipped with the Pave Penny laser target designation pod, now approved as standard equipment for the aircraft. When planned procurement of 687 A-10s has been completed in FY '81, they will equip six wings. Six squadrons have been deployed at RAF Bentwaters and Woodbridge in the UK. One squadron is planned to be set up in Alaska in FY '82.

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.
Weight: max gross weight 47,400 lb.
Performance: combat speed at S/L, clean 449 mph, range with 9,500 lb of weapons and 1.8 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.

A-37B Dragonfly and OA-37

Currently in service with the 434th TFW of the Air Force Reserve, the **A-37B** was evolved from the T-37 trainer for use in armed counterinsurgency (COIN) missions from short, unimproved airstrips. A total of 511 was built, of which many served in Southeast Asia. Others have been delivered to foreign air forces, mainly in Latin America. A new version, designated **OA-37,** is replacing the ANG O-2A in the forward air controller role. (Data for A-37B.)
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.

AC-130A/H

AC-130As serve with the Air Force Reserve; **AC-130Hs** continue in active service with TAC'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 has been 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 being modified for in-flight refueling.
Contractor: Greenville (Texas) Division of E-Systems, Inc. Other data basically as for C-130 *(page 147)*.

O-2A

A total of 346 specially equipped variants of the "push-and-pull" Cessna 337 Skymaster was ordered by USAF from 1966, originally to replace the Cessna O-1 in the forward air controller role in Vietnam. Now, OA-37s are to replace the O-2As, which equip AAC's 25th Tactical Air Support Squadron, PACAF's 15th Air Base Wing, TAC's 24th Composite Wing and 507th and 602d Tactical Air Control Wings, and four ANG units. Specialized equipment and electronics 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.

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. Versions are also in service with the USN, US Marine Corps, and foreign air forces.
Contractor: Rockwell International Corporation, North American Aircraft Group.
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 28,800 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.

A-37B Dragonflys

AC-130A gunship

OV-10A Bronco

Reconnaissance and Special-Duty Aircraft

SR-71A/C

Nine of these multisensored supersonic aircraft equip the 9th Strategic Reconnaissance Wing at Beale AFB, Calif., to support national or strategic requirements, and to support theater commanders in peacetime and during limited conflict. Fastest, highest-flying production aircraft yet built, the **SR-71A** "Blackbird" carries equipment ranging 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 at least 30 production aircraft began in January 1966. The **SR-71C** is a two-seat training version, with elevated rear cockpit.
Contractor: Lockheed Aircraft 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.
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.

TR-1 and U-2

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/B** 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) are 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, of which eight remain in first-line service.

Initial funding for the **TR-1A** single-seat tactical reconnaissance version of the U-2R was provided in the FY '79 budget, and a total of ten is requested through FY '82. It is expected that 35 will be acquired eventually by USAF for high-altitude stand-off surveillance missions, primarily in Europe. Each will be 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. Currently planned equipment includes modern ECM, an advanced synthetic aperture radar system (ASARS) for standoff imagery, and communications intelligence sensors, or the Precision Location Strike System (PLSS) for use against enemy radar emitters. Although PLSS is a strike system, it is inherently capable of elint data collection. The first TR-1A was scheduled to fly in 1980, and pilot training at Beale AFB is due to begin in August of

SR-71

U-2R

RF-4C

RC-135

EF-111A

E-3A Sentry (AWACS)

E-4B

this year, following delivery of the first aircraft there in June.

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. (Data for U-2R.)

Contractor: Lockheed Corporation.

Power Plant: one Pratt & Whitney J75-P-13 turbojet engine; 17,000 lb thrust.

Dimensions: span 103 ft 0 in, length 63 ft 0 in, height 16 ft 0 in.

Weight: gross, with slipper tanks, 29,000 lb.

Performance: max speed at 60,000 ft 430 mph, operational ceiling about 90,000 ft, range more than 3,000 miles.

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, poor-weather reconnaissance operations. The first production model flew in May 1964, and 505 were built before manufacture ended in December 1973. They are operated by six TAC, USAFE, and PACAF tactical reconnaissance squadrons, and by eight 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 an infrared (IR) sensor 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. USAF is in the process of upgrading its night mission capability by replacing the original IR sensor with the higher-resolution AAD-5 set. Twelve RF-4Cs (18 more planned) are equipped with side-looking airborne radar (SLAR) for standoff battlefield surveillance, and five (24 more planned) with a tactical electronic reconnaissance (TEREC) sensor capable of locating electronic emitters. Current modifications include the ARN-101 digital avionics package to improve navigation accuracy; Pave Tack to provide the crew with the ability to see targets at night; and data link transmission of SLAR and TEREC in near-real-time, to reduce delays between data collection and dissemination to tactical decision-makers. (Data similar to F-4.)

EC-130E

This electronic surveillance version of the Hercules has been developed for USAF to replace the ANG EC-121. Large blade antennas are added under each outer wing and above the dorsal fin, with a smaller horizontal blade antenna on each side of the rear fuselage. Bullet-shape canisters outboard of each underwing antenna and at the extreme tail of the aircraft house trailing-wire antennas that extend several hundred feet behind the EC-130E in flight. Operated by 7th Airborne Command and Control Squadron (TAC) from Keesler AFB, Miss. (Data similar to C-130.)

EC-135, etc.

Several aircraft in the KC-135 Stratotanker series were modified for specialized missions during production or at a later date. The **EC-135C** (originally designated KC-135B) is basically similar to the KC-135A but with 18,000 lb st TF33 turbofans. It is equipped as a Flying Command Post in support of SAC's airborne alert role, and is fitted with extensive communications equipment. EC-135Cs can be refueled by SAC tankers. Fourteen were built and have been adapted to provide control of Minuteman ICBMs. 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. 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,** 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), is being utilized by USAF as a test-bed in support of the HEL (High Energy Laser) research program being conducted by DARPA and the armed forces. The primary objective is to test the concept that lasers can be used to shoot down surface-to-air and, possibly, air-to-air missiles as aircraft defensive weapons. (Data basically as C-135, page 148.)

EF-111A

A modification of the basic General Dynamics F-111A airframe, the EF-111A incorporates many off-the-shelf components to accomplish its defense suppression mission role. The EF-111A is designed as a replacement for the EB-66 and EB-57, to provide worldwide support of US tactical strike forces, by denying information to the radars that provide data to hostile command and control systems. The prime jammer, the ALQ-99E, is a modification of the Navy ALQ-99, and is carried internally in the EF-111A. Other modifications include incorporation of self-protection systems from the F/FB-111 (ALQ-137/ALR-62), a new vertical stabilizer to house ALQ-99E receivers, a revised crew capsule, updated environmental cooling system, and high-capacity generators from the F-14.

Flight testing of the EF-111A began in March 1977, continuing through December 1979 to ensure that system effectiveness and reliability/maintainability had been achieved. First deliveries are expected this summer to the 366th TFW at Mountain Home AFB, Idaho. A further twelve aircraft have been requested in the initial FY '82 budget, with a total of 42 aircraft planned to equip two USAF squadrons during the early 1980s.

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 77 ft 1.6 in, height 20 ft 0 in.

Weight: gross 87,478 lb.

Performance: similar to F-111A/E.

Armament: none.

E-3A Sentry (AWACS)

Deliveries of production E-3As began in March 1977, when the first aircraft was handed over to TAC's 552d Airborne Warning and Control Wing at Tinker AFB, Okla. Of the 34 E-3A AWACS (Airborne Warning and Control System) aircraft required initially by TAC, 30 have been authorized to date. Twenty-two had been delivered by the beginning of this year. E-3As achieved initial operational status in April 1978, and have since been deployed in Alaska, Iceland, Saudi Arabia, the Mediterranean area, and the Pacific. They took up a role in US continental air defense in January 1979, when 30 NORAD personnel began augmenting TAC E-3A flight crews on all operational NORAD missions from Tinker AFB. In addition, NATO has approved purchase of 18 E-3As to upgrade the command and control of its air defense forces, deliveries to commence in 1982. AWACS was conceived essentially as 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. On October 31, 1975, the first E-3A with production electronics began engineering test and evaluation as a preliminary to formal qualification testing, which was completed in January 1977. The unique 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. In addition, Westinghouse was awarded a contract in December 1976 to develop a maritime surveillance capability which could be incorporated retrospectively in the radar of all operational E-3As. Flight testing of this system began in mid-1979 and, consequently, all E-3A aircraft, beginning with production system 22, will be equipped for maritime surveillance, including the NATO models. In addition, all USAF aircraft from No. 24, and all the NATO E-3As, will be upgraded to include a joint tactical information distribution system (JTIDS), and an improved data processing capability. AWACS can support a variety of tactical and/or air defense missions with no change in configuration.

Contractor: The Boeing Aerospace Company.

Power Plant: four Pratt & Whitney TF33-PW-100/100A turbofan engines; each 21,000 lb thrust.

Accommodation: operational crew of 17.

Dimensions: span 145 ft 9 in, length 152 ft 11 in, height 41 ft 4 in.

Weight: gross 325,000 lb.

Performance: max speed 530 mph, ceiling above 29,000 ft, endurance 6 hr on station 1,000 miles from base.

E-4A/B

SAC is the Air Force single resource manager for the E-4 airborne command post aircraft. Three **E-4As,** modified Boeing 747 aircraft, support the National Emergency Airborne Command Post (NEACP), providing an interim capability by utilizing the existing EC-135 command control and communications (C^3) equipment. The main operating base for these aircraft is Offutt AFB, Neb. The **E-4B,** the Advanced Airborne Command Post, has been under development for several years, and is expected eventually to support both the NEACP and SAC Airborne Command Post missions. It is equipped for in-flight refueling and contains a new 1,200 kVA electrical system designed to support advanced electronics, and a wide variety of new communications equipment. This includes a more powerful LF/VLF system, improved satellite communications system, and communications processing equipment. The first E-4B was delivered to SAC

in January last year. Also, 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. Two additional E-4Bs are planned, completing the required total of six aircraft.

Contractor: The Boeing Aerospace Company.

Power Plant: four General Electric CF6-50E turbofan engines, each 52,500 lb thrust.

Dimensions: span 195 ft 8 in, length 231 ft 4 in, height 63 ft 5 in.

Performance: unrefueled endurance in excess of 12 hours.

EB-57

A two-seat version of the EB-57 continues in service with ANG's 158th Defense System Evaluation Group. Equipped with the latest devices for jamming and penetrating air defenses, its task is to simulate an enemy bomber force, and attempt to find gaps in air-defense systems by day or night, at variable altitudes and from any point of the compass.

Contractor: The Martin Company.

Power Plant: two Wright J65-W-5F turbojet engines; each 7,200 lb thrust.

Dimensions: span 64 ft 0 in, length 65 ft 5 in, height 15 ft 6 in.

Performance: max speed more than 500 mph, ceiling above 45,000 ft, range more than 1,800 miles.

WC-130B/E/H

Twenty-one modified C-130 Hercules transports, designated WC-130B, E, 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 815th WRS of the Air Force Reserve. Data similar to C-130.

EB-57

Transports and Tankers

C-5 Galaxy

Largest aircraft in service anywhere in the world, the C-5 Galaxy flew for the first time in June 1968. Deliveries to MAC began in December 1969, and all 81 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, and with an in-flight refueling capability. The 77 aircraft currently in service have participated in many special airlift missions, including a nonstop flight from Chicago to Moscow in June 1977, when the first C-5 to land in the Soviet Union carried a forty-ton superconducting magnet for a joint US-Soviet magnetohydrodynamic electrical project. Under a major modification program, Lockheed is producing kits of components to extend the service life of the C-5s' 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 first C-5 to be modified has been under flight test since August 14, 1980, and 34 are funded through FY '82. All operational C-5s are expected to be modified by 1987.

Contractor: Lockheed-Georgia Company.

Power Plant: four General Electric TF39-GE-1C turbofan engines; each 40,100 lb thrust.

Accommodation: crew of five, rest area for 15 (relief crew, etc); 73 troops and 36 standard 463L pallets or assorted vehicles, or additional 270 troops.

Dimensions: span 222 ft 9 in, length 247 ft 10 in, height 65 ft 1 in.

Weights: empty 372,500 lb, gross (for 2.25*g*) 769,000 lb.

Performance: max speed at 25,000 ft 571 mph, service ceiling (at 615,000 lb) 34,000 ft, range with 144,000 lb payload 3,450 miles.

C-7A Caribou

Thirty-five of these Canadian-built STOL utility transports, taken over from the US Army in January 1967, continue in service with AF Reserve's 94th Tactical Airlift Wing and with ANG's 135th Tactical Airlift Group. Their ability to operate from short, unprepared runways in all weather conditions led to widespread use in Southeast Asia.

Contractor: de Havilland Aircraft of Canada Ltd.

Power Plant: two Pratt & Whitney R-2000-7M2 piston engines; each 1,450 hp.

Accommodation: crew of two or three; 31 troops, 25 paratroops, or 14 litters and 11 other persons.

Dimensions: span 95 ft 8 in, length 74 ft 11 in, height 31 ft 9 in.

Weights: empty 18,335 lb, gross 28,500 lb.

Performance: max speed at 6,000 ft 216 mph, service ceiling 27,100 ft, range 200 to 1,175 miles.

C-9A Nightingale and VC-9C

Based on 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 is also performing overseas theater aeromedical evacuation missions in Europe, and was used recently to bring the US hostages back to Europe, from Algeria, on their return from Iran. Three specially configured **VC-9Cs** were delivered to the Special Air Missions Wing at Andrews AFB, Md., in 1975. (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-12A

Thirty military versions of the Beechcraft Super King Air 200 were delivered to the 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.

Contractor: Beech Aircraft Corporation.

Power Plant: two Pratt & Whitney Aircraft of Canada PT6A-38 turboprop engines; each 750 shp.

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-123 Provider

Currently in service with four Air Force Reserve squadrons, as a part of USAF's tactical airlift capacity, the **C-123K** is the only version of the basic C-123 troop and supply transport still in the USAF inventory. The 52 in current use will be reduced to 18 in FY '82.

Contractor: The Fairchild Engine and Airplane Corporation.

Power Plant: two Pratt & Whitney R-2800-99W piston engines; each 2,500 hp; and two General Electric J85-GE-17 turbojet engines; each 2,850 lb thrust.

Accommodation: crew of three: 58 troops, 50 litters, or 21,000 lb of cargo.

Dimensions: span 110 ft 0 in, length 76 ft 4 in, height 34 ft 6 in.

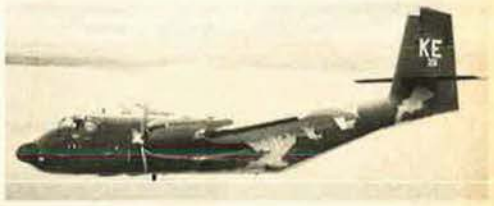
Weights: empty 35,366 lb, gross 60,000 lb.

Performance: max speed at 10,000 ft 228 mph, service ceiling above 21,000 ft, range with 15,000 lb payload 1,035 miles.

C-130 Hercules

Despite the fact that the original specification for the C-130 was drawn up 30 years ago, this aircraft is still in production and continues to perform a diversity of roles, including airlift support, DEW Line and Arctic icecap resupply, aeromedical missions, and fire-fighting duties for the US Forest Service. The initial production model was the **C-130A,** first flown in April 1955, with 3,750 ehp Allison T56-A-11 or -9 turboprops; 219 were ordered, and deliveries began in December 1956. Two **DC-130As** (originally GC-130As) were built as drone launchers/directors for ARDC (now AFSC), carrying up to four drones on underwing pylons. All special equipment was removable, permitting the aircraft to be used as freighters, assault transports, or ambulances, as required. The **C-130B** introduced 4,050 ehp Allison T56-A-7 turboprops; the first of 134 entered USAF service in April 1959. Six C-130Bs were modified in 1961 for air-snatch recovery of classified USAF satellites, to replace C-119s of 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. Fifteen were modified to **MC-130E** (Combat Talon) standard, for use by AF Special Operations Forces. This version has terrain-following radar,

C-5 Galaxy

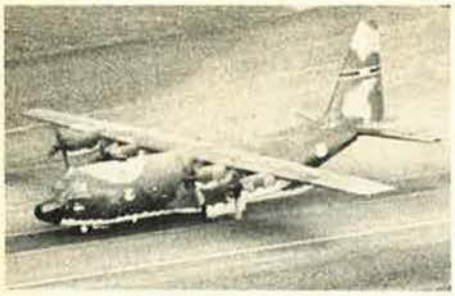


C-7A Caribou

C-9A Nightingale

C-12A

C-123 Provider



C-130 Hercules

HC-130H

KC-135 Stratotanker

VC-137B

C-140 JetStar

precision navigation/airdrop and in-flight refueling components. Basically similar to the "E," the **C-130H** has uprated T56-A-15 turboprop engines, a redesigned outer wing, and other minor improvements; delivery began in April 1975. C-130s are currently active in USAF regular, Reserve, and ANG airlift squadrons. Variants include **HC-130H/N/P** for the Aerospace Rescue and Recovery Service and for ARRS units of the ANG and Reserve, and the **AC-130A/H** and **WC-130B/E/H**, described separately.

During 1980, a USAF C-130E from Pope AFB was fitted with two light alloy and glassfibre strakes on the undersurface of the rear fuselage. Subsequent flight testing demonstrated a resulting 3% fuel saving, due to reduced drag. Evaluation continues. (Data for C-130H.)

Contractor: Lockheed-Georgia Company.

Power Plant: four Allison T56-A-15 turboprop engines; each 4,910 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 6 in.

Weights: empty 75,331 lb, gross 175,000 lb.

Performance: max speed 386 mph, service ceiling above 25,000 ft, range with 15,000 lb payload 2,100 miles.

HC-130

Constituting a major element of the Aerospace Rescue and Recovery Service, 66 extended-range C-130s, designated **HC-130H,** were 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. Twenty HC-130Hs have been modified into **HC-130Ps** for the combat rescue mission, and are capable of refueling helicopters in flight. Four were modified into **JHC-130Hs,** with added equipment for aerial recovery of reentering space capsules. Under a USAF contract dated December 1974, 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 newer 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.

KC-135 Stratotanker

As single manager of all USAF KC-135 tankers, SAC supports its own strategic bombardment and reconnaissance aircraft, and the cargo and tactical aircraft of other Air Force commands, the US Navy and Marines, and other nations. The high-speed, high-altitude capabilities of the **KC-135A** enable it to be used also as a long-range passenger and/or cargo transport. A total of 732 was built, of which the first flew in August 1956; about 600 remain operational, including those currently assigned to sixteen Air Force Reserve and ANG units, replacing older types such as the KC-97. Variants include the **KC-135Q,** adapted to refuel Lockheed SR-71s; and **KC-135R** and **KC-135T** for special reconnaissance. The lower wing skins of all aircraft are being replaced, to extend flying life by 27,000 hours, thereby enabling the aircraft to remain operational well past the year 2000. This in turn has justified the retrofitting of modern technology engines, and selection of the 22,000 lb thrust General Electric/SNECMA CFM56 for retrofit on the KC-135A was announced early last year. An unspecified number of KC-135As will be retrofitted, beginning in 1982, and redesignated **KC-135RE.** Electrical, hydraulic, and flight control systems will also be modified. Under a separate program, NASA began flight testing winglets for the KC-135A in July 1979, with a view to fuel savings as well as improved takeoff performance and a slight enhancing of fuel off-load capability. (Data for KC-135A.)

Contractor: The Boeing 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

Only 11 basic C-135 transports remain operational with MAC. The type was ordered originally to serve as an interim jet passenger/cargo transport, pending delivery of C-141s; the C-135s now operate within the Aerospace Rescue and Recovery Service. The original Stratolifter was a KC-135A with the tanker's refueling equipment deleted, and minor internal changes. Three converted KC-135As, known as C-135A "Falsies," were followed by 15 production **C-135As** with J57-P-59W turbojet engines, and 30 **C-135Bs** with Pratt & Whitney TF33-P-5 turbofans. Eleven "B"s were subsequently converted to **VC-135Bs** 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.

VC-137

Five specially modified Boeing 707 transports are operated by MAC's 89th Military Airlift Group from Andrews AFB, Md., for VIP duties. Best known is "Air Force One," a **VC-137C** for use by the President. It is basically a 707-320B with a special VIP interior. A second VC-137C is also operated, together with three smaller 707-120s, originally designated VC-137As but later modified to **VC-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: VC-137B span 130 ft 10 in, length 144 ft 6 in, height 42 ft 0 in; VC-137C span 145 ft 9 in, length 152 ft 11 in, height 42 ft 5 in.

Weights: VC-137B gross 258,000 lb; VC-137C gross 322,000 lb.

Performance (VC-137C): max speed 627 mph, service ceiling 42,000 ft, range about 7,000 miles.

C-140 JetStar

Deliveries of the C-140 JetStar began in late 1961. Four **C-140As** are used currently by Air Force Communications Command (AFCC) for inspecting worldwide military navigation aids. Six **VC-140B** transport versions are in service with the 89th Military Airlift Group, Special Missions, of MAC, operating from Andrews AFB, Md. Five **C-140Bs** are used in 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; VC-140B crew of three and 8 or 13 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 2,280 miles.

C-141 StarLifter

Initiated as the flying element of Logistics Support System 463L, with an all-weather landing system standard, the **C-141A** began squadron operations with MAC in April 1965. It was soon making virtually daily flights to Southeast Asia, and played a key role in the civilian evacuation program in both South Vietnam and Cambodia. Lockheed built 284, of which some were modified to carry Minuteman ICBMs, with local structural strengthening to accommodate this 86,207 lb load. In service, loads have often been space-limited; so, to utilize more fully the potential of its C-141s, USAF has funded modification of the entire force of 271 aircraft to **C-141B** standard, with the fuselage lengthened by 23 ft 4 in, and with

added in-flight refueling capability. The YC-141B prototype made its maiden flight in March 1977. First production C-141B was delivered to USAF in December 1979, and all 275 MAC C-141s should be modified to "B" standard by mid-1982. This will provide the equivalent of 90 additional C-141A aircraft. (Data for C-141A.)
Contractor: Lockheed-Georgia Company.
Power Plant: four Pratt & Whitney TF33-P-7 turbofan engines; each 21,000 lb thrust.
Accommodation: crew of five; 154 troops; 122 paratroops; or 64,000 lb of freight.
Dimensions: span 159 ft 11 in, length "A" model 145 ft 0 in ("B" model 168 ft 4 in), height 39 ft 3 in.
Weights: empty 136,000 lb, gross 323,100 lb.
Performance: max speed at 25,000 ft 571 mph, service ceiling 41,600 ft, range with max fuel 4,750 miles.

KC-10A Extender

Conceived to meet specific USAF requirements for an Advanced Tanker/Cargo Aircraft (ATCA), the KC-10 was selected following a competitive evaluation of the McDonnell Douglas DC-10 and the Boeing 747. The design is based on the commercial DC-10 Series 30CF, modified to include body bladder fuel cells in the lower cargo compartments, a boom operator's station, an aerial refueling boom, a refueling receptacle, and military avionics. In its primary role of increasing US air mobility, a single KC-10A will be able to combine the tasks of a tanker and a cargo aircraft by refueling fighters and simultaneously carrying the fighters' support equipment and support personnel on overseas missions. It will 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 will refuel strategic offensive and reconnaissance aircraft during long-range conventional operations; and it will augment cargo-carrying capability on a selected basis. The range of refueling equipment installed will enable the KC-10A to service USN, USMC, and NATO aircraft, as well as older types of fighters still operated by ANG and Reserve units. 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. In addition, similarity to the civilian DC-10 has led to a unique 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. Available funding over the next five years will determine the number of aircraft to be ordered by USAF, but a force of 26 aircraft is anticipated. Firm funding for 12 has been provided up to and including FY '81. The first two KC-10As were expected to be delivered to Barksdale AFB, La., in March and July this year.
Contractor: McDonnell Douglas Corporation.
Power Plant: three General Electric CF6-50C2 turbofan engines; each 52,500 lb st.
Accommodation: max cargo payload 169,529 lb.
Dimensions: span 165 ft 4 in, length 182 ft 3 in, height 58 ft 1 in.
Weight: gross 590,000 lb.
Performance (estimated): max speed at 42,000 ft 528 mph, service ceiling 42,000 ft, max range with max cargo 4,370 miles; or delivery of 193,000 lb of transfer fuel to a receiver 2,000 nm from its home base, and return.

C-141B StarLifter

KC-10A Extender

Trainers

T-33A

Although derived from the Shooting Star jet fighter, which flew for the first time nearly forty years ago, about 200 T-33As remain in service with USAF and ANG for use in combat support missions and for proficiency and radar target evaluation training. Compared with the fighter, a lengthened fuselage accommodates a second cockpit in tandem, with the canopy extended to cover both. 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 .50-caliber machine guns on some early aircraft only.

T-37B

Two-seat primary trainer, 681 of which were in service with Air Training Command in 1980. In cooperation with SAC, ATC implemented the Accelerated Copilot Enrichment (ACE) program to provide increased flying experience in T-37s and T-38s for SAC junior pilots. The original T-37A was the first USAF jet trainer designed as such from the start. From November 1959, deliveries switched to the T-37B, and all "A" models were subsequently converted 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

This lightweight twin-jet advanced trainer, which was in continuous production from 1956 to 1972, is almost identical in structure to the F-5 tactical fighter. The first T-38 flew in April 1959, and production models entered operational service in March 1961. More than 1,100 of the total 1,187 T-38s built were delivered to USAF and more than 900 remain in service throughout the Air Force, including 693 with ATC, and others with PACAF's aggressor training squadron at Clark AB, Philippines, the 479th Tactical Training Wing at Holloman AFB, N. M., and the Thunderbirds Air Demonstration Squadron.
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.

T-33A

T-37B

CT-39 Sabreliner

To meet USAF requirements for a combat-readiness trainer and operational support aircraft, Rockwell built as a private venture the prototype Sabreliner, which made its first flight in September 1958, powered by two General Electric J85 turbojets. Subsequent production models utilized by USAF are **CT-39A/B** basic utility and training aircraft with J60 turbojet engines, of which 143 were delivered for service throughout the Air Force. Of those still in the inventory, 113 are assigned to MAC for airlift support, and are stationed at 15 CONUS bases and two overseas locations. Sabreliners are also in service with PACAF and AFSC, and with AFCC facility checking squadrons which use two Sabreliners, together with four C-140As, in evaluating 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-41A Mescalero

Acquired by USAF as a trainer under the designation T-41A, this standard Cessna Model 172 light aircraft is used in a preliminary flight screening program of about 14 hours for USAF pilot candidates. An initial order for 170 aircraft in 1964 was supplemented by a further 34 in

T-38 Talons

CT-39A Sabreliner

T-43A

July 1967. Forty-five more-powerful **T-41Cs,** based on the Cessna Model R172E, are used for cadet flight training at the USAF Academy. (Data for the 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-engined 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 13 remain in the ATC inventory; the other 6 are assigned to the ANG.

Contractor: The 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.

Helicopters

UH-1F

TH/UH-1F, UH-1P, and HH-1H

Basically a military version of the Bell Model 204, the **UH-1F** was developed to take part in a design competition for a missile site support helicopter. USAF ordered 146, of which the first flew in February 1964. Deliveries began, to the 4486th Test Squadron, in September of the same year, and were completed in 1967. A few UH-1Fs were modified to **UH-1Ps** for classified psychological missions in Vietnam. **TH-1F** is a version of the UH-1F used for instrument operations training. A total of 40 of these three versions are in service. In November 1970, USAF ordered 30 larger 12/15-seat **HH-1Hs,** based on the Model 205, for local base rescue duties. Deliveries were completed in 1973. (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

UH-1N

The UH-1N is a twin-engined version of the UH-1 utility helicopter, developed originally to meet a Canadian government requirement. Initial orders on behalf of the US services included 79 for USAF, of which some 73 remain in the MAC inventory. Deliveries began in 1970.

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.

HH-3

HH-53B

CH-3E

This twin-engined amphibious transport helicopter, based on the US Navy's SH-3A, 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 both 42 new production aircraft and 41 re-engined 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 16 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 evolved 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 also are assigned to ARRS units of the Reserve and ANG. An unarmed version (HH-3F Pelican) is used by the US Coast Guard. Other 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 the type was used extensively for rescue operations in Southeast Asia.

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-53s were modified for night and adverse weather operations, with the designation HH-53H. Equipment includes a stabilized FLIR installation mounted below the refueling boom, a B-52 type 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 final modification was delivered in 1980. These helicopters were originally programmed to go to ARRS; instead, they were transferred to TAC to enhance the Special Operations Force rotary-wing capability.

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Strategic Missiles

LGM-25C Titan II

In service since 1963, this two-stage ICBM has a thermonuclear warhead with the largest yield of any carried by a US missile. Titan II has a launch reaction time of one minute from its fully hardened underground silo; it is deployed in six squadrons, each with nine missiles, based at Davis-Monthan AFB, Ariz.; McConnell AFB, Kan.; and Little Rock AFB, Ark.

Contractor: Martin Marietta Corporation.

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: AC Electronics inertial guidance system.

Warhead: thermonuclear, in General Electric Mk 6 ablative reentry vehicle.

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

This three-stage, solid-propellant, second-generation ICBM, though of similar range, is smaller and lighter than the liquid-propellant Titan and has a smaller payload. The operational missiles are housed in underground silos, for which an upgrade program was completed last year 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: 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. Under a force modernization program, SAC has provided Minuteman III with the Command Data Buffer System that permits rapid missile retargeting.

With the Minuteman force made up of the planned 450 Minuteman IIs and 550 Minuteman IIIs, production ended in December 1978; current funding, including $140.7 million dollars requested in the initial FY '82 budget proposals, is primarily for the purchase of components, guidance systems, and spares. Recent R&D has been aimed at providing improved command control and communications, and at development of the Mk 12A reentry vehicle, which increases the yield of the Minuteman III warhead, and refinements to improve accuracy. The Mk 12A is scheduled for deployment on 300 Minuteman IIIs by early 1983.

Assembly and Checkout: The 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 solid-propellant motor; 34,400 lb thrust.

Guidance: Autonetics Division of Rockwell International inertial guidance system.

Warhead: LGM-30F single thermonuclear warhead in Avco Mk11 reentry vehicle; LGM-30G multiple thermonuclear warheads, each in a General Electric Mk12 or Mk12A reentry vehicle.

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.

MX

In order to improve on current ICBM survivability, a new mobile land-based ICBM, the MX, is being developed by USAF. A force of approximately 200 is planned. Survivability is to be achieved by a multiple protective shelter (MPS) basing mode, whereby each missile will be moved periodically among a number of shelters, each a mile apart on gravel roads, with 23 shelters for each missile. On some occasions movement will be simulated; the exact location of each missile will, therefore, be concealed. This system aims at deterring potential enemy strategic attack by the sheer scale of the strike required to ensure the destruction of all 200 missiles. If deterrence fails, the MX system would survive a first strike, with sufficient warheads remaining for retaliatory action.

Confirmed funding to date totals $2,240.5 million, with a further $2,930 million requested in the initial FY '82 budget proposals. Test flying is due to begin in 1983, and shelter construction in 1984, for initial operational capability (10 missiles) in mid-1986.

Warheads: 10 warheads with a total throw-weight of about 7,900 lb.

Dimensions: length 71 ft, diameter 7 ft 8 in.

Weight: 190,000 lb.

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 had been authorized in 1971, and deliveries to equip 17 B-52 wings and two FB-111 wings at 18 SAC bases were completed in July 1975. Development of an improved propellant for SRAM's rocket motor was undertaken subsequently, aimed at ensuring a minimum service life of ten years.

The supersonic air-to-surface SRAM, which has a nuclear warhead, was designed fundamentally 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 the missile to reduce drag.

Contractor: The Boeing Aerospace Company.

Power Plant: Lockheed Propulsion Company LPC-415 restartable solid-propellant two-pulse rocket engine.

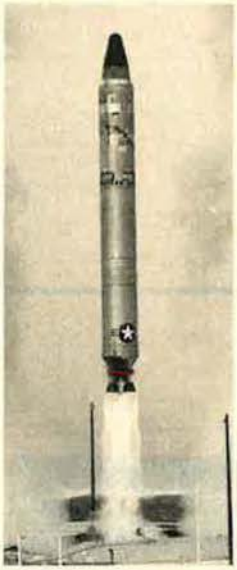
Guidance: General Precision/Kearfott inertial system, permitting attack at high or low altitude, and dogleg courses.

Warhead: nuclear, of similar yield to that of single Minuteman III warhead.

Dimensions: length 14 ft 0 in, body diameter 1 ft 5½ in.

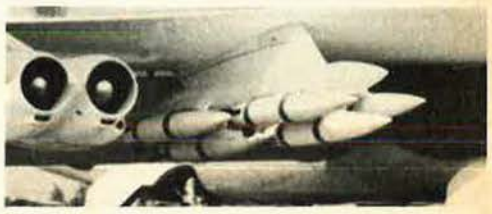
Weight: launch weight approx 2,230 lb.

Performance: speed up to Mach 2.5, range 100 miles at high altitude, 35 miles at low altitude.

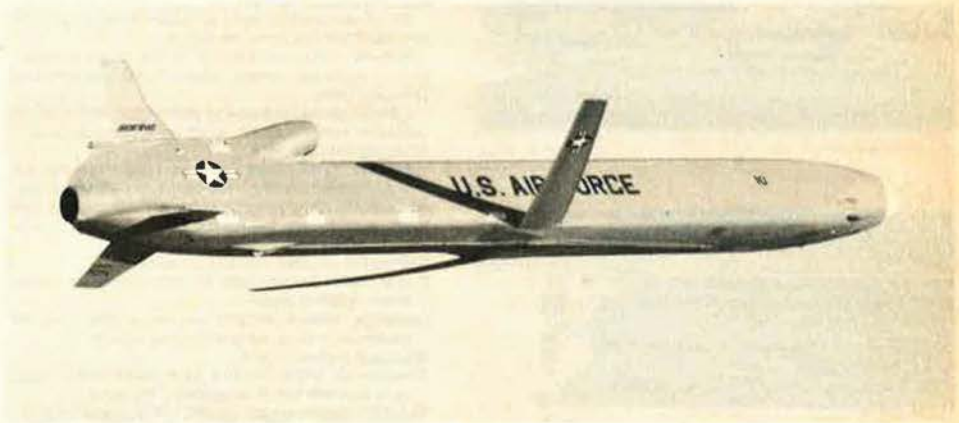


LGM-25C Titan II

LGM-30G Minuteman III



AGM-69 SRAMs aboard B-52



AGM-86B ALCM

AGM-86B ALCM

On March 25 last year, Boeing Aerospace was declared winner of an eight-month competitive fly-off between the Boeing AGM-86B and General Dynamics AGM-109 candidate missiles, and became prime contractor for the Air-Launched Cruise Missile Program. Its AGM-86B 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. Guidance is by a combination of inertial and terrain comparison techniques. Small radar signature and low-level flight capability enhance the missile's effectiveness. Production is expected to total 3,418 missiles between FY '80 and FY '87, with deliveries to be completed in FY '89. Funding for 225 ALCMs was provided in FY '80; 480

more were approved in FY '81, and 440 have been requested in the initial FY '82 budget proposals. The first operational B-52G is scheduled to be fitted with ALCMs in September of this year, at Griffiss AFB, N. Y. The first SAC squadron of 14 B-52Gs fitted externally with 12 ALCMs is due to become operational in December 1982. Other units to receive ALCMs are at Wurtsmith AFB, Mich.; Grand Forks AFB, N. D.; and Ellsworth AFB, S. D. Ultimately, each bomber is intended to be modified to have a bomb-bay rotary launcher for eight more ALCMs, eight SRAMs, or a mix of both. The FY '82 budget request includes R&D funding for cruise missile carriage on the B-52H.

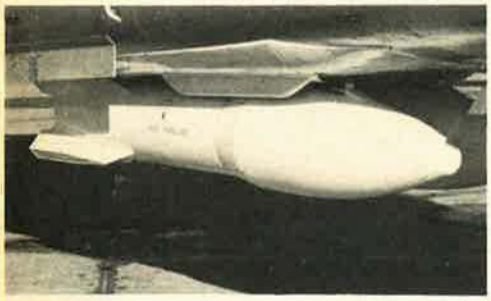
Contractor: Boeing Aerospace Company.
Power Plant: Williams Research Corporation F107-WR-100 turbofan engine; 600 lb st.
Dimensions: length 20 ft 9 in, body diameter 24½ in, wing span 12 ft.
Weight: 2,825 lb.
Performance (approx): speed 500 mph, range 1,550 miles.

GLCM

A small, long-range, mobile, ground-to-ground cruise missile, the GLCM is being developed as part of the Department of Defense's plans to modernize Theater Nuclear Forces (TNF), thereby strengthening "the linkage of US strategic forces to the defense of Europe." Special characteristics include a small radar cross-section, very low-altitude flight profile, and all-weather capabilities. Operational range is around 1,500 miles. First test was conducted in May last year at the Utah Test and Training Range, using a prototype of the Transporter Erector Launcher (TEL) that is to be operated by USAF and based in the UK and the European continent from late 1983. A GLCM mobile flight will comprise four trailer/erector/launchers, each carrying four missiles, and two launch control and communications vehicles. A total of 464 missiles is expected to be purchased, with eleven already provided for in FY '81, and 54 requested in the initial FY '82 budget proposals.

Contractors: General Dynamics (Convair), Williams Research Corporation, McDonnell Douglas Corporation.

Airborne Tactical and Defense Missiles



AIR-2A Genie

AIM-4D Falcon

AIM-7F Sparrows aboard F-15

AIM-9J Sidewinder

AIR-2A Genie

Continuing in first-line service with the F-106 squadrons of USAF, as well as the F-101Bs of the Canadian Armed Forces, the AIR-2A Genie was produced in many thousands before production ended in 1962. 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 kilotons.
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-4A/C/D Falcon

Falcon was the first air-to-air guided weapon to come into USAF service. Versions include:

AIM-4A: improved version of the original radar-homing production model; about 12,000 built between 1956 and 1959.

AIM-4C: similar airframe to AIM-4A but with infrared guidance system. About 9,500 were delivered simultaneously with the "A"s.

AIM-4D: "cross-bred" version, combining the improved infrared homing head of the AIM-4G Super Falcon with the basic airframe of the AIM-4C. Used to arm F-101 interceptors. Thousands of older Falcons were converted to AIM-4D standard.

Contractor: Hughes Aircraft Company.
Power Plant: Thiokol M58-E4 solid-propellant rocket motor; 6,000 lb thrust.
Guidance: AIM-4A: Hughes semiactive radar homing system; AIM-4C/D: infrared homing system.
Warhead: high-explosive.
Dimensions: length AIM-4A 6 ft 6 in, AIM-4C/D 6 ft 7½ in, body diameter 6.4 in, wing span 1 ft 8 in.
Weights: launch weight AIM-4A 110 lb; AIM-4C 122 lb; AIM-4D 134 lb.
Performance (AIM-4D): max speed Mach 4, range 6 miles.

AIM-4F/G Super Falcon

A developed version of the AIM-4A/C Falcon, with 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. The two versions were introduced simultaneously in 1960, superseding the interim AIM-4E.

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 air forces and their allies, the Sparrow is a radar-homing air-to-air missile with all-weather, all-altitude capability. Some 34,000 of the AIM-7C, D, and E versions were produced. The **AIM-7E** is standard armament of the F-4 Phantom II and is suited also for use against shipping targets from aircraft or ships. The **AIM-7E-2** is similar but has better maneuverability to improve its "dogfight" capability. A later version for both USAF and USN is the advanced solid-state **AIM-7F,** with larger motor, Doppler guidance, and good capability over both dogfight and medium ranges. This version was approved for deployment in early 1977. General Dynamics was brought in as a second source contractor. Development of a monopulse seeker for the AIM-7F was started in 1975, aimed at reducing cost and improving performance in the ECM and look-down/clutter areas. The version with this seeker has been redesignated **AIM-7M.** Production began in FY '80; in FY '81 all Sparrow production is switching to the AIM-7M, which should enter operational service during FY '82. (Data for AIM-7F.)

Contractor: Raytheon Company.
Power Plant: Hercules Mk 58 Mod O solid-propellant rocket motor.
Guidance: Raytheon semiactive Doppler radar homing system.
Warhead: high-explosive.
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 more than 25 miles.

AIM-9 Sidewinder

The AIM-9 Sidewinder is a close-range air-to-air missile using infrared guidance. Versions currently under development 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 both increased range and improved maneuvering capability for dogfighting. 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, under development by Ford Aerospace. Increased target acquisition envelope, solid-state electronics, and increased lethality due to seeker improvements. Proposed production by conversion of existing AIM-9Es and 9Js.

AIM-9P-3: improved version of AIM-9P, with increased lethality due to fuze improvements. Reduced-smoke rocket motor.

AIM-9L: third-generation Sidewinder for USAF and USN, with all-aspect intercept capability. New Mk 36 Mod 7/8 solid-propellant motors. 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 counter-

measures.

AIM-9M: improved version of AIM-9L with increased ECCM capability, improved background discrimination, reduced-smoke rocket motor. A pilot production contract for 50 units was awarded to Raytheon, for delivery in 1979–80. Full production is scheduled for this year. From FY '83 the AIM-9M will incorporate a new closed-cycle IR cooling unit claimed to be easier to service and more effective than the open-cycle gas unit used in earlier versions. Eventual production total of AIM-9L/M missiles for the USAF and USN is expected to be 15,000. (Data for AIM-9H, L.)

Contractor: Naval Weapons Center.
Power Plant (AIM-9L): Rocketdyne/Bermite Mk 36 Mod 6 solid-propellant motor.
Guidance (AIM-9H): solid-state infrared homing guidance.
Warhead: high-explosive.
Dimensions: length 9 ft 5 in, body diameter 5 in, fin span 2 ft 0¾ in.
Weight: launch weight 190 lb.
Performance: max speed Mach 2.5, range 6.2–11 miles.

AGM-45A Shrike

Twelve versions of this supersonic air-to-surface missile have been 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. Latest models equip "Wild Weasel" F-4Gs.

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** is a launch-and-leave TV-guided air-to-surface missile. This enables the pilot of the launch aircraft to seek other targets or leave the target area once Maverick 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. The AGM-65A can be carried by the A-7D, A-10, F-4D/E, F-5E/F, F-111F, and F-16, normally in three-round underwing clusters, and is intended 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 which 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 is being developed:

AGM-65D: with imaging infrared seeker (IIR). The AGM-65D entered engineering development in October 1978. Developmental and operational flight testing began in July/August last year, respectively, and the initial FY '82 budget requests production of the first 490 operational missiles.

Under development is an alternate blast/penetrator warhead in the 300 lb class, for use against larger hardened targets such as command bunkers. (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 1 in, body diameter 1 ft 0 in, wing span 2 ft 4 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 entered production in 1968, and several advanced models were developed subsequently, some highly classified. The AGM-78A used the passive homing target-seeking head of the Shrike missile; subsequent 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-105 and F-4G, and also 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

Since 1974, this High-speed Anti-Radiation Missile has been under development by Texas Instruments. Emphasis on speed reflects experience gained in Vietnam, where Soviet-built surface-to-air missile radar systems sometimes detected the approach of first-generation Shrike antiradiation missiles and ceased operation before the missiles could lock on to them. Equipping the F-4G "Wild Weasel" with the AGM-88A will greatly increase its lethality, but full-scale production has been delayed until FY '83 due to fiscal restraints.

Contractor: Texas Instruments, Inc.
Power Plant: Thiokol smokeless 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 13 ft 8½ in, body diameter 10 in, wing span 3 ft 8½ in.
Weight: 798 lb.
Performance: altitude limits S/L to 40,000 ft, range over 10 miles.

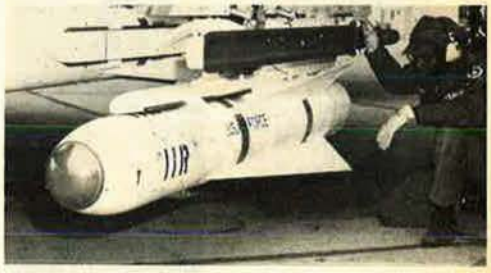
Modular Glide Weapon System (GBU-15)

The Modular Glide Weapon System was conceived as a family of glide bombs that could be equipped with alternative aerodynamic components, warheads, and guidance units. Initial versions are TV-guided, with datalink to enable the weapon to be controlled from the cockpit of the launch aircraft. Provisions are made for the addition of advanced seekers to provide night and adverse weather capabilities, including an imaging infrared seeker, and a mid-course system that includes distance measuring equipment (DME), for increased accuracy.

The TV-guided cruciform wing **GBU-15,** optimized for low-altitude attack, is in production, with initial deliveries to the Air Force planned for early 1982. A planar wing variant, optimized for high-altitude launch, is designated **GBU-20.** Development of that variant is currently suspended. (Data for GBU-15.)

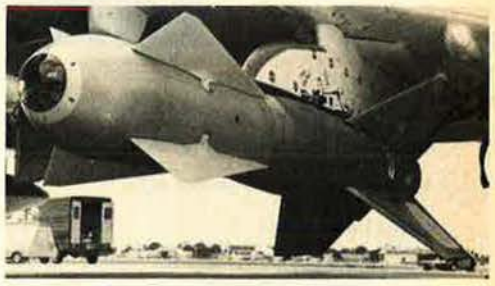
Contractor: Rockwell International Corporation.
Guidance: TV.
Warhead: Mk 84 bomb (2,000 lb unitary) or CBU-75 (cluster).
Dimensions: length 12 ft 10 in, body diameter 1 ft 6 in, wing span 4 ft 11 in.
Weight: approximately 2,500 lb.

AGM-45A Shrike



AGM-65D Maverick

AGM-78 Standard ARM



Modular Glide Weapon System (GBU-15)

Launch Vehicles

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.

Agena

Atlas

Scout

Titan III

Space Shuttle

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 with lengthened propellant tanks. Evolved primarily for use with the Agena upper stage, but able to serve as a direct-ascent vehicle or in conjunction with other upper stages. Of the fourteen SLV-3As produced under initial contracts, seven were for use by the USAF and the remainder for NASA.

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, retains the same propulsion and structural features as its predecessor, Centaur D, but has several redesigned or repackaged astrionics components. Used in conjunction with the Atlas SLV-3D or the Titan IIIE, Centaur 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 which, in turn, generates most of the electronic command and control systems for the launch vehicle; the Centaur D-1T also provided guidance for its Titan booster. A 10 ft diameter fairing protects payloads for Centaur D-1A, for which launch missions have been assigned into 1984. Titan IIIE production has ended. Centaur's multiburn and extended coast capability were tested after the 1976 launch of a Helios solar probe, and were 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 15,000 lb thrust.
Guidance: inertial guidance system.
Dimensions: Centaur; length 30 ft 0 in, diameter 10 ft 0 in.
Launch Weight (approx): 35,000 lb.

Scout

More than 100 launchings have been accomplished by this vehicle, which was designed to make possible space, orbital, and reentry research by NASA and the Department of Defense 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 latest 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 the Department of Defense, 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

As the standard US heavy-duty space "workhorse" booster, 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 will use the Boeing-Inertial Upper Stage that is being developed for the Space Shuttle. Designated Titan III(34)D, these vehicles will be used for some primary launches, as well as for backup of the Space Shuttle during the transition period. The Titan III(34)D is expected to replace current Titans, with an estimated requirement for 15 in the 1980s.

Titan IIIs have achieved more than 110 successful launchings.
Prime Contractor: Martin Marietta Corporation.
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 142,000 ft, 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 could 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 will carry 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.

Orbiter OV-101 *Enterprise* completed approach and landing tests, after air-launch from a specially modified Boeing 747, in 1977. The first operational mission was successfully flown by the second Orbiter, OV-102 *Columbia*, from the Kennedy Space Center, Fla., last month, following a series of test flights. Orbiters *Challenger*, *Discovery*, and *Atlantis* will be the other three operational vehicles in the current program.
Prime Contractors: Rockwell International (Orbiter), Martin Marietta (propellant tank), Thiokol (boosters).
Power Plant: three Rocketdyne main engines, each 375,000 lb thrust at liftoff. Two Thiokol solid-propellant rocket boosters, each 2,650,000 lb thrust at liftoff.
Guidance: automatic and manual control.
Dimensions: Orbiter: length 121 ft 6 in, wing span 78 ft 0.7 in, height 56 ft 7 in.
Launch Weights: Orbiter 225,000 lb; propellant tank 1,650,000 lb; boosters, each 2,580,000 lb.

Inertial Upper Stage (IUS)

The IUS will serve as an upper stage for both the Titan III(34)D and the Space Shuttle, boosting payloads into orbits not attainable by the Shuttle Orbiter. Several versions are projected, with two or three solid-propellant stages of various sizes. Two-stage versions 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. A three-stage IUS will be used as the injection vehicle for interplanetary missions.
Prime Contractor: Boeing Aerospace Company.
Power Plant: various combinations of solid-propellant rocket motors manufactured by Chemical Systems Division, United Technologies.
Guidance: inertial.
Dimensions (two-stage IUS): basic length 16 ft 4¾ in, diameter 7 ft 7¼ in.
Launch Weight (basic two-stage IUS): 32,000 lb.

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AN AIR FORCE ALMANAC

THE UNITED STATES AIR FORCE IN FACTS AND FIGURES

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 always 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—HOW IT GOT ITS NAME

DESIGNATION	FROM	TO
Aeronautical Div., US Signal Corps	Aug. 1, 1907	July 18, 1914
Aviation Section, US Signal Corps	July 18, 1914	May 24, 1918
Army Air Service	May 24, 1918	July 2, 1926
Army Air Corps	July 2, 1926	June 20, 1941
Army Air Forces	June 20, 1941	Sept. 18, 1947
United States Air Force	Sept. 18, 1947	

UNITED STATES AIR FORCE PERSONNEL STRENGTH—1907 THROUGH 1982

YEAR	STRENGTH	YEAR	STRENGTH	YEAR	STRENGTH	YEAR	STRENGTH
1907	3	1926	9,674	1945	2,282,259	1964	855,802
1908	13	1927	10,078	1946	455,515	1965	823,633
1909	27	1928	10,549	1947	305,827	1966	886,350
1910	11	1929	12,131	1948	387,730	1967	897,426
1911	23	1930	13,531	1949	419,347	1968	904,759
1912	51	1931	14,780	1950	411,277	1969	862,062
1913	114	1932	15,028	1951	788,381	1970	791,078
1914	122	1933	15,099	1952	973,474	1971	755,107
1915	208	1934	15,861	1953	977,593	1972	725,635
1916	311	1935	16,247	1954	947,918	1973	690,999
1917	1,218	1936	17,233	1955	959,946	1974	643,795
1918	195,023	1937	19,147	1956	909,958	1975	612,551
1919	25,603	1938	21,089	1957	919,835	1976	585,207
1920	9,050	1939	23,455	1958	871,156	1977	570,479
1921	11,649	1940	51,165	1959	840,028	1978	569,491
1922	9,642	1941	152,125	1960	814,213	1979	559,450
1923	9,441	1942	764,415	1961	820,490	1980	557,969
1924	10,547	1943	2,197,114	1962	883,330	1981	564,000
1925	9,670	1944	2,372,292	1963	868,644	1982	569,000*

*Projected

USAF AND AIR RESERVE FORCES PERSONNEL BY CATEGORIES

CATEGORY	FY '64	FY '74	FY '79	FY '80	FY '81	FY '82[1]
AIR FORCE MILITARY						
Officers	133,000	110,000	96,000	98,000	99,000	100,000
Airmen	720,000[2]	529,000	459,000	456,000	461,000	465,000
Cadets	3,000	4,000	4,000	4,000	4,000	4,000
TOTAL, AIR FORCE MILITARY	**857,000**	**644,000**	**559,000**	**558,000**	**564,000**	**569,000**
Career Reenlistments	59,300	46,800	36,200	38,000	38,000	35,000
Rate	90%	90%	82%	82%	82%	83%
First-Term Reenlistments	17,400	19,300	15,900	15,000	17,000	15,000
Rate	30%	31%	38%	36%	41%	41%
CIVILIAN PERSONNEL						
Direct Hire (Including Technicians)	290,000	274,000	232,000	231,000	227,000	231,000
Indirect Hire—Foreign Nationals	33,000	16,000	13,000	13,000	13,000	13,000
TOTAL, CIVILIAN PERSONNEL	**322,000**	**289,000**	**245,000**	**244,000**	**240,000**	**244,000**
TOTAL MILITARY AND CIVILIAN[3]	**1,179,000**	**932,000**	**804,000**	**802,000**	**804,000**	**813,000**
Technicians (included above as Direct Hire Civilians)						
AFRES Technicians	—	6,000	7,000	6,736	7,600	7,510
ANG Technicians	15,000	22,000	22,000	21,815	21,487	21,830
AIR RESERVE FORCES						
Air National Guard, Selected Reserve	73,000	94,000	93,000	96,000	98,000	98,300
Air Force Reserve, Paid	67,000	48,000	58,000	60,000	62,000	64,000
Air Force Reserve, Nonpaid	97,000	119,000	43,000	45,000	42,000	40,000
TOTAL, READY RESERVE	**237,000**	**261,000**	**194,000**	**201,000**	**202,000**	**202,300**
Standby	130,000	46,000	43,000	44,000	44,000	44,000
TOTAL, AIR RESERVE FORCES[4]	**367,000**	**307,000**	**237,000**	**245,000**	**246,000**	**246,300**

[1]President's Budget Request.
[2]Excludes Aviation Cadets.
[3]FY '64–80 are actuals; FY '81–82 are estimates; excludes nonchargeable personnel.
[4]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, 1980)

MAJOR COMMANDS	MILITARY	CIVILIAN	TOTAL
Air Force Communications Command (AFCC)	41,225	6,870	48,095
Air Force Logistics Command (AFLC)	9,770	79,783	89,553
Air Force Systems Command (AFSC)	25,882	25,954	51,836
Air Training Command (ATC)	84,625	15,699	100,324
Alaskan Air Command (AAC)	7,280	1,116	8,396
Electronic Security Command (ESC)	10,080	877	10,957
Military Airlift Command (MAC)	70,996	16,287	87,283
Pacific Air Forces (PACAF)	24,874	9,776	34,650
Strategic Air Command (SAC)	103,991	13,698	117,689
Tactical Air Command (TAC)	97,923	12,141	110,064
United States Air Forces in Europe (USAFE)	55,373	10,149	65,522
TOTALS	**532,019**	**192,350**	**724,369**
SEPARATE OPERATING AGENCIES (SOAs)	**MILITARY**	**CIVILIAN**	**TOTAL**
Air Force Accounting and Finance Center (AFAFC)	239	1,821	2,060
Air Force Audit Agency (AFAA)	253	671	924
Air Force Commissary Service (AFCOMS)	678	8,944	9,622
Air Force Engineering and Services Center (AFESC)	322	341	663
Air Force Inspection and Safety Center (AFISC)	368	134	502
Air Force Intelligence Service (AFIS)	447	144	591
Air Force Legal Service Center (AFLSC)	375	138	513
Air Force Manpower and Personnel Center (AFMPC)	1,837	822	2,659
Air Force Medical Service Center (AFMSC)	86	67	153
Air Force Office of Security Police (AFOSP)	14	23	37
Air Force Office of Special Investigations (AFOSI)	1,625	351	1,976
Air Force Service Information and News Center (AFSINC)	84	50	134
Air Force Test and Evaluation Center (AFTEC)	367	92	459
DIRECT REPORTING UNITS (DRUs)			
Aerospace Defense Center (ADC)	1,322	311	1,633
AFRES/Air Reserve Personnel Center (ARPC)	631	10,634	11,265
Albert F. Simpson Historical Research Center (AFSHRC)	17	58	75
Office Secretary of the AF/Air Staff/National Guard Bureau (NGB)	1,947	1,920	3,867
United States Air Force Academy (USAFA)*	2,458	1,729	4,187
Other	8,469	23,745	32,214
TOTALS, SOAs and DRUs	**21,539**	**51,995**	**73,534**
TOTALS, COMMANDS, SOAs, and DRUs	**553,558**	**244,345**	**797,903**

*4,411 cadets not included.

USAF TOTAL ACTIVE-DUTY STRENGTH BY GRADE

(As of September 30, 1980)

AIRMEN GRADE	NUMBER	OFFICERS GRADE	NUMBER
CHIEF MASTER SERGEANT	4,574	GENERAL	13
SENIOR MASTER SERGEANT	9,080	LIEUTENANT GENERAL	39
MASTER SERGEANT	33,304	MAJOR GENERAL	121
TECHNICAL SERGEANT	51,827	BRIGADIER GENERAL	181
STAFF SERGEANT	99,160	COLONEL	5,139
SERGEANT/SENIOR AIRMAN	103,462	LIEUTENANT COLONEL	12,644
AIRMAN FIRST CLASS	98,162	MAJOR	18,163
AIRMAN	28,461	CAPTAIN	35,292
AIRMAN BASIC	27,879	FIRST LIEUTENANT	10,456
		SECOND LIEUTENANT	15,601
TOTAL	**455,909**	**TOTAL**	**97,649**
		CADETS	4,411
		AIRMEN	455,909
		TOTAL STRENGTH	557,969

USAF MILITARY PERSONNEL BY GRADE, RACE, AND SEX

(As of September 30, 1980)

OFFICERS

GRADE	FORCE	BLACK*	OTHER**	WOMEN***
GENERAL	354	10	3	3
COLONEL	5,139	93	48	60
LIEUTENANT COLONEL	12,644	269	160	312
MAJOR	18,163	430	353	735
CAPTAIN	35,292	1,589	493	2,889
FIRST LIEUTENANT	10,456	881	202	1,918
SECOND LIEUTENANT	15,601	1,319	348	2,591
TOTALS	**97,649**	**4,591**	**1,607**	**8,508**

AIRMEN

GRADE	FORCE	BLACK*	OTHER**	WOMEN***
CHIEF MASTER SERGEANT	4,574	435	44	12
SENIOR MASTER SERGEANT	9,080	1,097	116	28
MASTER SERGEANT	33,304	4,647	494	111
TECHNICAL SERGEANT	51,827	7,922	829	458
STAFF SERGEANT	99,160	18,957	2,576	7,339
SERGEANT/SENIOR AIRMAN	103,462	16,908	3,658	15,171
AIRMAN FIRST CLASS	98,162	16,480	3,428	17,468
AIRMAN	28,461	4,571	956	6,073
AIRMAN BASIC	27,879	3,936	847	4,737
TOTALS	**455,909**	**74,953**	**12,948**	**51,397**
TOTALS, INCLUDING OFFICERS	**553,558**	**79,544**	**14,555**	**59,905**

*Includes 10,236 women.
**Includes 2,411 women.
***Includes women from black and other categories.

AVERAGE AGES OF MILITARY PERSONNEL

(As of September 30, 1980)

Officers	Average 34 years of age
Airmen	Average 27 years of age

NUMBER OF OFFICERS IN EACH MAJOR CAREER FIELD*

CODE	UTILIZATION FIELD TITLE	ASSIGNED
00**	Commanders and Directors	3,150
02	International-Politico-Military Affairs	200
05	Disaster Preparedness	20
10–14	Pilot	19,301
15 & 22	Navigator	8,878
16	Air Traffic Control	441
17	Air Weapons Director	2,033
18	Missile Operations	3,202
20	Space Systems	558
23	Audiovisual	120
25	Weather	1,359
26	Scientific	1,279
27	Acquisition Program Management	1,819
28	Development Engineer	4,481
29	Program Management	172
30	Communications-Electronics	3,396
31	Missile Maintenance	466
40	Aircraft Maintenance & Munitions	3,952
51	Computer Technology	2,739
55	Civil Engineering	1,844
57	Cartography/Geodesy	82
60	Transportation	989
62	Supply Service	390
64	Supply Management	1,404
65	Procurement/Manufacturing Management	1,427
66	Logistics Plans & Programs	877
67	Financial	1,253
69	Management Analysis	219
70	Administration	2,915
73	Personnel	2,142
74	Manpower Management	614
75	Education & Training	713
79	Public Affairs	608
80	Intelligence	2,785
81	Security Police	1,014
82	Special Investigations & Counterintelligence	473
87	Band	28
88	Legal	1,185
89	Chaplain	832
90	Health Services Management	1,035
91 & 92	Biomedical Sciences	1,820
93–95	Physician	3,414
96	Medical Research	13
97	Nurse	4,092
98	Dental	1,578
99	Veterinary	265

*These figures do not include 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	1,540
11	Aircrew Operations	7,052
20	Intelligence	11,936
22	Photomapping	118
23	Audiovisual	3,312
24	Safety	1,161
25	Weather	2,940
27	Command Control Systems Operations	17,012
29	Communications Operations	10,325
30	Communications-Electronics Systems	26,008
31	Missile Electronic Maintenance	4,652
32	Avionics Systems	26,215
34	Training Devices	2,378
36	Wire Communications Systems Maintenance	4,825
39	Maintenance Management Systems	2,920
40	Intricate Equipment Maintenance	1,246
42	Aircraft Systems Maintenance	39,008
43	Aircraft Maintenance	42,255
44	Missile Maintenance	3,768
46	Munitions & Weapons Maintenance	20,304
47	Vehicle Maintenance	5,071
51	Computer Systems	6,518
54	Mechanical/Electrical	9,052
55	Structural/Pavements	12,329
56	Sanitation	1,553
57	Fire Protection	5,922
59	Marine	117
60	Transportation	13,655
61	Supply Services	1,517
62	Food Services	4,800
63	Fuels	6,585
64	Supply	25,346
65	Procurement	1,398
66	Logistics Plans	792
67	Accounting & Finance, and Auditing	5,497
69	Management Analysis	480
70	Administration	29,159
73	Personnel	11,160
74	Morale, Welfare & Recreation	1,905
75	Education & Training	3,097
79	Public Affairs	1,166
81	Security Police	34,795
82	Special Investigations & Counterintelligence	811
87	Band	1,102
90 & 91	Medical	21,416
92	Aircrew Protection	2,519
98	Dental	3,588
99	Miscellaneous (Special Duty, Patients, Unclassified, etc.)	15,584

AIR FORCE MILITARY PERSONNEL DISTRIBUTION BY GEOGRAPHIC AREA

(As of September 30, 1980)

TOTAL MILITARY PERSONNEL	**557,969**		
CONUS, US TERRITORY, AND SPECIAL LOCATIONS	**445,885**		
TOTAL IN FOREIGN COUNTRIES	**112,084**		
Western and Southern Europe (Major concentrations in Germany—36,043, UK—21,629, Spain—4,973, Italy—4,115, Turkey—4,003)	77,814	Africa, Near East, S. Asia (Major concentrations in Egypt—434, Saudi Arabia—150)	674
East Asia and Pacific (Major concentrations in Japan/Okinawa—14,380, Philippines—7,757, South Korea—8,770)	31,212	Western Hemisphere (Major concentrations in Canada—249, Panama (Republic)—1,888)	2,213
		Eastern Europe	24
		Undistributed	147

AIR FORCE FULL-TIME CIVILIAN EMPLOYMENT BY GRADE

(As of December 31, 1980)

GS/OTHER		WG		WL		WS	
GR	POP	GR	POP	GR	POP	GR	POP
1	300	1	376	1	3	1	27
2	1,360	2	1,521	2	32	2	51
3	8,874	3	955	3	5	3	156
4	17,136	4	1,782	4	68	4	247
5	20,982	5	5,556	5	48	5	401
6	7,388	6	4,435	6	37	6	521
7	11,298	7	6,110	7	40	7	1,012
8	2,214	8	8,340	8	178	8	839
9	15,593	9	7,184	9	268	9	1,349
10	900	10	20,827	10	839	10	1,621
11	14,657	11	5,047	11	91	11	629
12	14,356	12	2,413	12	15	12	413
13	7,599	13	392	13	3	13	324
14	2,796	14	114	14	0	14	232
15	907	15	2	15	0	15	116
16	2					16	37
17	1					17	13
18	0					18	3
ST	5					19	1
SES	170						
TOTALS	**126,538**		**65,054**		**1,627**		**7,992**

Note: Table does not include ANG Technicians

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

FEDERAL CIVILIAN PAY SCALE

General Schedule

(Effective October 1, 1980)

GRADE	1	2	3	4	5	6	7	8	9	10
GS-1	$7,960	$8,225	$8,490	$8,755	$9,020	$9,175	$9,437	$9,699	$9,712	$9,954
GS-2	8,951	9,163	9,459	9,712	9,820	10,109	10,398	10,687	10,976	11,265
GS-3	9,766	10,092	10,418	10,744	11,070	11,396	11,722	12,048	12,374	12,700
GS-4	10,963	11,328	11,693	12,058	12,423	12,788	13,153	13,518	13,883	14,248
GS-5	12,266	12,675	13,084	13,493	13,902	14,311	14,720	15,129	15,538	15,947
GS-6	13,672	14,128	14,584	15,040	15,496	15,952	16,408	16,864	17,320	17,776
GS-7	15,193	15,699	16,205	16,711	17,217	17,723	18,229	18,735	19,241	19,747
GS-8	16,826	17,387	17,948	18,509	19,070	19,631	20,192	20,753	21,314	21,875
GS-9	18,585	19,205	19,825	20,445	21,065	21,685	22,305	22,925	23,545	24,165
GS-10	20,467	21,149	21,831	22,513	23,195	23,877	24,559	25,241	25,923	26,605
GS-11	22,486	23,236	23,986	24,736	25,486	26,236	26,986	27,736	28,486	29,236
GS-12	26,951	27,849	28,747	29,645	30,543	31,441	32,339	33,237	34,135	35,033
GS-13	32,048	33,116	34,184	35,252	36,320	37,388	38,456	39,524	40,592	41,660
GS-14	37,871	39,133	40,395	41,657	42,919	44,181	45,443	46,705	47,967	49,229
GS-15	44,547	46,032	47,517	49,002	50,487*	51,972*	53,457*	54,942*	56,427*	57,912*
GS-16	52,247*	53,989*	55,731*	57,473*	59,215*	60,957*	62,699*	64,441*	66,183*	
GS-17	61,204*	63,244*	65,284*	67,324*	69,364*					
GS-18	71,734*									

Senior Executive Service**

LEVEL	1	2	3	4	5	6
	$52,247	$53,996	$55,804	$57,673	$59,604	$61,600

*Pay limited to Level V of the Executive Schedule, $50,112.50.
**Basic pay for employees at these rates is limited to $50,112.50, in accordance with 5 U.S.C. 5308 and section 101(c) of Public Law 96-369.

AIR FORCE CIVILIAN PERSONNEL AVERAGE AGE AND LENGTH OF SERVICE

(As of December 31, 1980)

Average age	43.4 years
Average length of service	15.3 years

MONTHLY MILITARY BASIC RATES OF PAY

(Effective October 1, 1980)

YEARS OF SERVICE

PAY GRADE	UNDER 2	2	3	4	6	8	10	12	14	16	18	20	22	26
COMMISSIONED OFFICERS														
O-10	$3,942	$4,081	$4,081	$4,081	$4,081	$4,238*	$4,238*	$4,562*	$4,562*	$4,889*	$4,889*	$5,216*	$5,216*	$5,541*
O-9	3,494	3,586	3,662	3,662	3,662	3,755	3,755	3,911	3,911	4,238*	4,238*	4,562*	4,562*	4,889*
O-8	3,165	3,259	3,337	3,337	3,337	3,586	3,586	3,755	3,755	3,911	4,081	4,238*	4,407*	4,407*
O-7	2,629	2,808	2,808	2,808	2,934	2,934	3,105	3,105	3,259	3,586	3,832	3,832	3,832	3,832
O-6	1,949	2,142	2,281	2,281	2,281	2,281	2,281	2,281	2,359	2,732	2,872	2,934	3,105	3,367
O-5	1,559	1,830	1,957	1,957	1,957	1,957	2,016	2,124	2,267	2,436	2,577	2,654	2,747	2,747
O-4	1,314	1,599	1,707	1,707	1,738	1,815	1,939	2,048	2,142	2,235	2,297	2,297	2,297	2,297
O-3	1,221	1,365	1,459	1,614	1,692	1,753	1,847	1,939	1,986	1,986	1,986	1,986	1,986	1,986
O-2	1,064	1,163	1,397	1,444	1,474	1,474	1,474	1,474	1,474	1,474	1,474	1,474	1,474	1,474
O-1	924	962	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163
COMMISSIONED OFFICERS WITH MORE THAN 4 YEARS OF ACTIVE ENLISTED OR WARRANT OFFICER SERVICE														
O-3	—	—	—	1,614	1,692	1,753	1,847	1,939	2,016	2,016	2,016	2,016	2,016	2,016
O-2	—	—	—	1,444	1,474	1,521	1,599	1,661	1,707	1,707	1,707	1,707	1,707	1,707
O-1	—	—	—	1,163	1,242	1,288	1,334	1,381	1,444	1,444	1,444	1,444	1,444	1,444
ENLISTED MEMBERS														
E-9	—	—	—	—	—	—	1,413	1,445	1,478	1,512	1,546	1,576	1,659	1,820
E-8	—	—	—	—	—	1,185	1,219	1,251	1,284	1,317	1,348	1,381	1,462	1,626
E-7	828	893	927	959	992	1,023	1,056	1,089	1,138	1,170	1,203	1,219	1,301	1,462
E-6	715	779	812	846	878	910	943	992	1,023	1,056	1,072	1,072	1,072	1,072
E-5	627	683	716	747	796	828	862	893	910	910	910	910	910	910
E-4	603	637	674	727	756	756	756	756	756	756	756	756	756	756
E-3	580	612	636	662	662	662	662	662	662	662	662	662	662	662
E-2	558	558	558	558	558	558	558	558	558	558	558	558	558	558
E-1	501	501	501	501	501	501	501	501	501	501	501	501	501	501

NOTE: Amounts less than $1 have been omitted.

Basic pay while serving as Chairman of the Joint Chiefs of Staff or Chief of Staff of the Air Force is $6,114.30, regardless of cumulative years of service.

*Basic pay is limited to $4,176.00 by Level V of the Executive Schedule.

Basic pay while serving as Chief Master Sergeant of the Air Force is $2,212.80, regardless of cumulative years of service.

BASIC ALLOWANCE FOR QUARTERS (BAQ)

Pay Grade	Without Dependents		With Dependents
	Full*	Partial**	
C/S and O-10	$427.80	$50.70	$535.20
O-9	427.80	50.70	535.20
O-8	427.80	50.70	535.20
O-7	427.80	50.70	535.20
O-6	384.00	39.60	468.60
O-5	354.00	33.00	426.30
O-4	315.30	26.70	380.40
O-3	277.20	22.20	342.00
O-2	240.60	17.70	304.50
O-1	187.80	13.20	244.50
CMSAF and E-9	299.20	18.60	322.50
E-8	211.20	15.30	297.90
E-7	179.70	12.00	277.20
E-6	163.20	9.90	255.00
E-5	156.90	8.70	234.30
E-4	138.30	8.10	206.10
E-3	123.60	7.80	179.70
E-2	109.20	7.20	179.70
E-1	103.20	6.90	179.70

*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.

MONTHLY INCENTIVE PAY RATES*

(Effective September 1, 1980)

PHASE I

Monthly Rate	Years of Aviation Service as an Officer (including flight training)
$125	2 or less
$156	over 2
$188	over 3
$206	over 4
$306	over 6

PHASE II

Monthly Rate	Years of Service as an Officer as Computed under 37 U.S.C. 205
$281	over 18
$256	over 20
$206	over 24 but not over 25
0	over 25

*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 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
$82.58	$3.94	$4.45	$5.89

COMPARISON OF DoD BUDGETS BY MILITARY PROGRAMS FOR FY 1979–84

(Billions of Dollars)

Military Program	Total Obligational Authority in Current Dollars					
	1979	1980	1981	1982	1983*	1984*
Strategic Forces	$ 8.0	$ 11.1	$ 12.6	$ 15.0	$ 18.9	$ 22.8
General-Purpose Forces	47.4	52.2	65.4	73.5	85.1	95.4
Intelligence and Communications	8.0	9.1	10.9	13.0	15.5	16.8
Airlift and Sealift	1.7	2.1	2.8	3.5	4.0	5.3
Guard and Reserve Forces	6.9	7.9	9.4	10.3	11.2	12.8
Research and Development[1]	10.9	11.9	13.8	17.3	18.2	21.0
Central Supply and Maintenance	13.0	16.0	16.6	18.8	21.2	24.1
Training, Medical, and Other General Personnel Activities	26.4	29.2	34.6	39.2	44.1	48.8
Administrative and Associated Activities	2.3	2.5	3.3	4.0	4.1	4.5
Support of Other Nations	0.4	0.6	0.9	1.0	0.9	0.0
TOTAL BUDGET AUTHORITY	**$125.0**	**$142.6**	**$170.3**	**$195.7**	**$223.3**	**$252.4**
Prior-year funds and other financial adjustments	−0.2	−0.4	+0.9	+0.7	+0.7	+0.7
TOTAL OBLIGATIONAL AUTHORITY	**$124.8**	**$142.2**	**$171.2**	**$196.4**	**$224.0**	**$253.1**

NOTE: Total may not add due to rounding.
[1]Excludes R&D in other program areas on systems approved for production.
*Estimate

DoD FINANCIAL SUMMARY BY COMPONENT FOR FY 1980–82

(TOA in Billions of Dollars)

Component	FY '80 Current	FY '80 FY '82 $	FY '81 Current	FY '81 FY '82 $	FY '82* Current	FY '82* FY '82 $
Army	$ 34.6	$ 42.2	$ 41.3	$ 45.1	$ 47.6	$ 47.6
Navy	47.1	57.0	56.7	61.7	63.3	63.3
Air Force	41.7	50.9	50.5	55.1	59.8	59.8
Defense Agencies/OSD	5.3	6.2	6.3	6.8	7.3	7.3
Defense-wide	13.6	16.6	16.3	17.8	18.5	18.5
TOTALS	**$142.2**	**$172.9**	**$171.2**	**$186.5**	**$196.4**	**$196.4**

NOTE: Totals may not add due to rounding
*Includes $3.5 billion estimate for contingencies (Air Force share $1.1 billion)

EDUCATIONAL LEVELS—USAF LINE OFFICERS

Level	End of September 1980 Number	Percent
Below baccalaureate/unknown	875	1.0
Baccalaureate, no master's degree	49,280	59.0
Master's degree, no doctorate	31,945	38.3
Doctoral and professional degrees	1,408	1.7
TOTALS	**83,508**	**100.0**

EDUCATION LEVELS—USAF ENLISTED FORCE

Level	End of September 1980 Number	Percent
Below high school (no GED)	6,147	1.4
GED passed (old system)—no diploma or civilian equivalency certificate	4,286	0.9
Recognized high school diploma or certificate	347,035[1]	76.2
Some post-secondary education, but below bachelor's	88,596	19.4
Baccalaureate	8,492	1.9
Master's degree or higher	997	0.2
TOTALS	**455,553[2]**	**100.0**

[1]Includes 22,813 with high school diplomas or equivalency certificate based on GED (new system) and 324,222 with high school completion (diploma or certificate)
[2]Does not include 356 coded "unknown."

INSTALLATIONS OF THE US AIR FORCE

MAJOR INSTALLATIONS	FY '64	FY '75	FY '76	FY '77	FY '78	FY '79	FY '80	FY '81
US and Possessions*	160	113	111	107	107	107	107	107
Foreign	56	35	29	27	27	27	27	27
Worldwide	**216**	**148**	**140**	**134**	**134**	**134**	**134**	**134**
OTHER INSTALLATIONS								
US and Possessions	3,650	2,323	2,372	2,305	2,202	2,169	2,168	2,097
Foreign	1,168	720	658	664	661	645	645	642
Worldwide	**4,818**	**3,043**	**3,030**	**2,969**	**2,863**	**2,814**	**2,813**	**2,739**
"Other Installations" includes:								
Auxiliary	2,849	—	—	—	—	—	—	—
Ballistic Missile	1,083	1,157	1,157	1,157	1,157	1,157	1,157	1,157
Industrial	55	—	—	—	—	—	—	—
Radar	331	—	—	—	—	—	—	—
Air National Guard	103	125	127	128	127	128	128	131
Tenant, Non-Air Force	348	—	—	—	—	—	—	—
War Only	49	—	—	—	—	—	—	—
Electronics Station or Site	—	599	579	569	545	530	530	484
General Support Annex	—	1,140	1,146	1,095	1,016	981	980	950
Auxiliary Airfield	—	22	21	20	18	18	18	17

*Includes Air Reserve Forces (AFRES and ANG).

AIR FORCE BUDGET AND FINANCE—FISCAL YEARS 1964–82

(Figures in millions of dollars)

	FY '64	FY '74	FY '79	FY '80	FY '81	FY '82
Gross National Product	$618,400	$1,381,500	$2,357,800	$2,567,500	$2,843,700	$3,214,800
Federal Budget, Outlays	118,600	269,600	493,600	579,600	662,700	739,300
DoD Budget, Outlays	49,470	77,550	115,013	132,840	157,600	180,000
DoD Percent of: GNP	8.0%	5.6%	4.9%	5.2%	5.5%	5.6%
Federal Budget	41.7%	28.8%	23.3%	22.9%	23.8%	24.3%
Air Force Budget Outlays						
Current Dollars	20,456	23,928	32,277	38,976	46,348	54,302
Constant FY '82 Prices	68,430	47,775	44,905	47,864	50,766	54,302
AF Percent of: GNP	3.3%	1.7%	1.4%	1.5%	1.6%	1.7%
Federal Budget	17.2%	8.9%	6.5%	6.7%	7.0%	7.3%
DoD Budget	41.4%	30.9%	28.1%	29.3%	29.4%	30.2%
Total Obligational Authority						
DoD—Current Dollars	49,547	85,054	124,649	142,209	171,202	196,400
Constant FY '82 Prices	176,452	166,501	168,053	172,940	186,474	196,400
AF —Current Dollars	19,958	24,779	34,864	41,690	50,543	59,769
Constant FY '82 Prices (With anticipated supplementals)	68,972	49,388	48,040	50,904	55,108	59,769
Aircraft Procurement (3010)	3,620	2,837	6,925	8,018	9,674	9,470
Missile Procurement (3020)	2,220	1,419	1,456	2,159	3,141	4,275
Other Procurement (3080)	876	1,652	2,333	2,655	3,003	4,049
Procurement Subtotal	6,716	5,908	10,722	12,832	15,818	17,794
Military Construction—AF (3500)	497	321	481	572	891	2,149
Military Construction—AFRES (3730)	3	11	13	12	22	35
Military Construction—ANG (3830)	17	19	45	36	83	90
Military Construction Subtotal	517	351	539	620	996	2,274
RDT&E (3600)	3,627	3,063	4,359	5,001	6,776	8,691
TOTAL, INVESTMENT	**10,860**	**9,321**	**15,620**	**18,453**	**23,590**	**28,759**
Military Personnel—AF (3500)	4,423	7,479	7,959	8,496	9,946	11,066
Reserve Personnel—AF (3700)	57	126	197	226	278	323
National Guard Personnel—AF (3850)	60	182	266	299	382	437
Military Personnel Subtotal	4,540	7,787	8,422	9,021	10,606	11,826
Operation & Maintenance—AF (3400)	4,339	6,882	9,465	12,421	14,214	16,751
Operation & Maintenance—AFRES (3740)	—	239	391	511	598	682
Operation & Maintenance—ANG (3840)	220	551	949	1,283	1,507	1,708
Stock Fund (4921)	—	—	27	—	28	43
Operation & Maintenance Subtotal	4,559	7,672	10,832	14,215	16,347	19,184
TOTAL, OPERATING	**9,099**	**15,459**	**19,254**	**23,236**	**26,953**	**31,010**
Programs, TOA (Current $)						
I Strategic Forces	6,525	4,315	4,898	6,667	7,916	9,549
II General-Purpose Forces	3,030	5,611	10,264	11,751	14,274	16,087
III Intelligence & Communications	2,979	3,340	4,040	4,746	5,689	6,682
IV Airlift & Sealift Forces	1,010	756	1,735	2,076	2,800	3,438
V Reserve & Guard Forces	502	1,223	2,440	3,074	3,509	3,389
VI Research & Development	2,063	2,401	3,761	4,177	5,526	7,051
VII Central Supply & Maintenance	1,767	2,763	3,820	4,508	5,066	5,721
VIII Training, Medical & Other General Activities	1,726	3,441	3,288	3,881	4,539	5,204
IX Administration & Associated Activities	342	568	506	529	794	1,090
X Support of Other Nations	12	303	113	281	430	438
FY '82 Pay Raise in DoD Contingency Accounts for Supplemental Requests	—	—	—	—	—	1,120

NOTE: Totals may not add due to rounding. FY '81 column is a revised estimate. FY '82 is President's budget request.

USAF AIRCRAFT PROCUREMENT—FY 1973–81

CATEGORY	FY '73	FY '74	FY '75	FY '76	FY '77	FY '78	FY '79	FY '80	FY '81
Fixed-Wing Aircraft									
Total Budgeted	161	165	193	181	216	356	392	407	306
Accepted/Scheduled Acceptances	289	118	99	275	190	187	287	349	384
Helicopters									
Total Budgeted	6	0	0	0	0	0	0	0	0
Accepted/Scheduled Acceptances	29	1	5	0	0	0	0	0	0

NOTE: FY '73–80 columns are actual. FY '81 data are planned.

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

(Current as of September 30, 1980)

	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	—	7	59	18	2	—	—	—	—	86	8 yrs., 1 mo.
A-10	250	59	—	—	—	—	—	—	—	309	1 yr., 10 mos.
A-37	—	1	2	—	1	—	—	—	—	4	8 yrs., 8 mos.
B-1	1	1	—	—	—	—	—	—	—	2	2 yrs., 7 mos.
B-52	—	—	—	—	—	4	189	153	1	347	20 yrs., 11 mos.
FB-111	—	—	—	64	1	—	—	—	—	65	9 yrs., 11 mos.
C-5	—	1	32	44	—	—	—	—	—	77	9 yrs., 0 mos.
C-6	—	—	—	—	1	—	—	—	—	1	14 yrs., 10 mos.
C-9	—	3	9	8	3	—	—	—	—	23	9 yrs., 6 mos.
C-12	—	14	—	—	—	—	—	—	—	14	4 yrs., 5 mos.
C-130	—	57	24	58	28	177	12	9	—	365	13 yrs., 0 mos.
C-131	—	—	—	—	—	—	—	—	1	1	25 yrs., 6 mos.
C-135	—	—	—	—	1	210	222	184	—	617	19 yrs., 2 mos.
C-137	—	—	1	—	—	1	—	3	—	5	17 yrs., 11 mos.
C-140	—	—	—	—	—	7	8	—	—	15	17 yrs., 11 mos.
C-141	—	—	—	—	229	46	—	—	—	275	14 yrs., 1 mo.
E-3	14	9	—	—	—	—	—	—	—	23	2 yrs., 4 mos.
E-4	—	2	2	—	—	—	—	—	—	4	6 yrs., 4 mos.
F-4	—	109	81	436	562	76	—	—	—	1,264	11 yrs., 5 mos.
F-5	2	76	27	—	—	—	—	—	—	105	5 yrs., 1 mo.
F-15	286	211	8	—	—	—	—	—	—	505	2 yrs., 7 mos.
F-16	152	4	—	—	—	—	—	—	—	156	0 yrs., 8 mos.
F-101	—	—	—	—	—	—	12	8	—	20	20 yrs., 8 mos.
F-106	—	—	—	—	—	—	103	39	—	142	20 yrs., 8 mos.
F-111	—	16	155	147	38	—	—	—	—	356	9 yrs., 6 mos.
H-1	—	—	24	68	35	2	—	—	—	129	10 yrs., 6 mos.
H-3	—	—	—	10	32	11	—	—	—	53	13 yrs., 4 mos.
H-53	—	2	6	31	9	—	—	—	—	48	10 yrs., 1 mo.
O-2	—	—	—	99	8	—	—	—	—	107	10 yrs., 10 mos.
OV-10	—	—	—	40	39	—	—	—	—	79	11 yrs., 11 mos.
T-33	—	—	—	—	—	—	—	109	13	122	22 yrs., 6 mos.
T-37	—	—	—	87	75	40	212	234	—	648	18 yrs., 4 mos.
T-38	—	—	15	177	242	327	82	—	—	843	14 yrs., 6 mos.
T-39	—	—	—	—	—	60	72	—	—	132	18 yrs., 1 mo.
T-41	—	—	—	7	45	—	—	—	—	52	12 yrs., 5 mos.
T-43	—	—	13	—	—	—	—	—	—	13	6 yrs., 7 mos.
UV-18	—	2	—	—	—	—	—	—	—	2	3 yrs., 0 mos.
TOTALS	**705**	**574**	**458**	**1,294**	**1,351**	**961**	**912**	**739**	**15**	**7,034**	**12 yrs., 8 mos.**
PERCENT	**10%**	**8%**	**7%**	**18%**	**19%**	**14%**	**13%**	**11%**	**—**		

Less than 9 years old: 1,737 aircraft (25%)
More than 9 years old: 5,272 aircraft (75%)

AIR NATIONAL GUARD AIRCRAFT—HOW MANY, HOW OLD?

(Current as of September 30, 1980)

	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	—	45	143	97	—	—	—	—	—	285	7 yrs., 11 mos.
A-10	72	—	—	—	—	—	—	—	—	72	0 yrs., 11 mos.
A-37	—	20	8	27	—	—	—	—	—	55	8 yrs., 1 mo.
B-57	—	—	—	—	—	—	—	—	18	18	25 yrs., 8 mos.
C-7	—	—	—	—	1	—	1	—	—	2	16 yrs., 8 mos.
C-130	16	—	—	—	8	46	44	71	10	195	18 yrs., 6 mos.
C-131	—	—	—	—	—	—	—	3	30	33	25 yrs., 1 mo.
C-135	—	—	—	—	—	—	21	83	—	104	21 yrs., 7 mos.
F-4	—	—	—	—	211	213	—	—	—	424	15 yrs., 0 mos.
F-101	—	—	—	—	—	—	49	8	—	57	20 yrs., 5 mos.
F-105	—	—	—	—	—	44	35	15	—	94	18 yrs., 4 mos.
F-106	—	—	—	—	—	—	39	39	—	78	20 yrs., 11 mos.
H-3	—	—	—	4	6	1	—	—	—	11	13 yrs., 11 mos.
O-2	—	—	—	30	48	—	—	—	—	78	12 yrs., 2 mos.
T-33	—	—	—	—	—	—	—	13	35	48	24 yrs., 10 mos.
T-43	—	—	6	—	—	—	—	—	—	6	6 yrs., 6 mos.
TOTALS	**88**	**65**	**157**	**158**	**274**	**304**	**189**	**232**	**93**	**1,560**	**14 yrs., 11 mos.**
PERCENT	**6%**	**4%**	**10%**	**10%**	**18%**	**19%**	**12%**	**15%**	**6%**		

Less than 9 years old: 310 aircraft (19.9%)
More than 9 years old: 1,250 aircraft (80.1%)

AIR FORCE RESERVE AIRCRAFT—HOW MANY, HOW OLD?

(Current as of September 30, 1980)

	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	5	—	—	—	—	—	—	—	—	5	0 yrs. 1 mo.
A-37	—	35	13	33	—	—	—	—	—	81	7 yrs. 7 mos.
C-7	—	—	—	—	30	—	6	—	—	36	14 yrs. 7 mos.
C-123	—	—	—	—	—	—	—	13	41	54	24 yrs. 2 mos.
C-130	—	—	—	4	8	46	32	49	14	153	19 yrs. 7 mos.
C-135	—	—	—	—	—	—	4	20	—	24	21 yrs. 6 mos.
F-4	—	—	—	—	18	13	—	—	—	31	14 yrs. 7 mos.
F-105	—	—	—	—	—	23	37	4	—	64	18 yrs. 5 mos.
H-1	—	—	5	5	—	—	—	—	—	10	8 yrs. 6 mos.
H-3	—	—	—	2	10	2	—	—	—	14	13 yrs. 4 mos.
T-33	—	—	—	—	—	—	—	2	—	2	22 yrs. 0 mos.
TOTALS	**5**	**35**	**18**	**44**	**66**	**84**	**79**	**88**	**55**	**474**	**16 yrs., 4 mos.**
PERCENT	**1%**	**7%**	**4%**	**9%**	**14%**	**18%**	**17%**	**18%**	**12%**		

Less than 9 years old: 58 aircraft (12.2%)
More than 9 years old: 416 aircraft (87.8%)

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

(Figures in thousands)

	FY '64	FY '72	FY '76	FY '79	FY '80	FY '81	FY '82
Active-Duty Military							
Army	972	811	779	758	777	775	786
Navy	667	588	525	522	527	537	555
Marine Corps	190	198	192	185	188	188	192
Air Force	856	726	585	559	558	565	587
Total	**2,685**	**2,322**	**2,081**	**2,024**	**2,050**	**2,065**	**2,120**
Reserve Components (in paid status)							
Army National Guard	382	388	362	346	367	386	398
Army Reserve	269	235	195	190	207	220	242
Naval Reserve	123	124	97	88	87	87	88
Marine Corps Reserve	46	41	30	33	35	37	39
Air National Guard	73	89	91	93	96	98	99
Air Force Reserve	61	48	48	57	59	61	64
Total	**953**	**925**	**823**	**807**	**851**	**889**	**930**
Direct Hire Civilian							
Army*	360	367	329	359	312	313	319
Navy	332	342	311	310	298	307	302
Air Force*	305	280	248	245	231	231	234
Defense Agencies	38	61	72	77	75	80	81
Total*	**1,035**	**1,050**	**960**	**991**	**916**	**930**	**936**

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. The FY '64 totals have been adjusted to include approximately 38,000 technicians.

USAF SQUADRONS BY TYPE AND NUMBER

MAJOR AIR FORCE SQUADRONS	FY '64	FY '74	FY '79	FY '80	FY '81	FY '82
Bomber	75	28	25	25	25	24
ECM/Reconnaissance	5	1	1	4	4	4
IRBM/ICBM	35	26	26	26	26	26
Tanker	55	38	34	33	33	33
Interceptor	40	7	6	6	6	5
Bomarc	8	—	—	—	—	—
Command, Control & Surveillance	13	8	6	6	6	6
Tactical Bomber	2	—	—	—	—	—
Mace/Matador	8	—	—	—	—	—
Fighter	75	74	79	78	77	79
Reconnaissance	8	13	7	6	6	6
Tanker/Cargo	—	—	—	—	1	1
Tactical Air Control System	1	11	13	9	9	9
Special Operations Force	6	5	5	5	5	5
Tactical Airborne Command Control System	—	—	5	5	5	5
Tactical Electronic Warfare Support	—	—	—	—	1	2
Tactical Airlift	26	17	14	14	14	14
Strategic Airlift	35	17	17	17	17	17
Aeromed Evacuation	5	3	3	3	3	3
Special Mission	2	2	1	1	1	1
Mapping	2	1	—	—	—	—
Weather	6	3	2	2	2	2
Air Rescue & Recovery	12	12	7	7	7	7
Intelligence	—	9	5	6	6	6
Other	20	13	23	23	23	22
TOTAL, USAF	**439**	**288**	**279**	**276**	**277**	**277**
Air National Guard	92	91	91	91	91	91
Air Force Reserve	50	53*	53*	53*	54*	54*
TOTAL, MAJOR FORCE SQUADRONS	**581**	**432**	**423**	**420**	**422**	**422**

NOTE: Data in FY '64–80 columns are actual; FY '81 and FY '82 data are estimated
*Includes Associate Squadrons

NUMBER OF AIRCRAFT PER ACTIVE-DUTY USAF SQUADRON

Aircraft Type	Number*
A-7	24
A-10	18 or 24
B-52	14, 15, 16, 17, or 20
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	10
F-4	18 or 24
RF-4	18
F-5	22
F-15	18 or 24
F-16	18 or 24
F-106	18
F-111	18 or 24
FB-111	13

*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 '64	FY '74	FY '79	FY '80	FY '81	FY '82
Bomber, Strategic	1,364	500	417	414	412	409
Bomber, Other	145	—	—	—	—	—
Tanker	998	657	525	529	537	540
Fighter/Interceptor/Attack	3,538	2,387	2,622	2,769	2,889	2,982
Reconnaissance/Electronic Warfare	595	610	366	354	349	363
Cargo/Transport	2,327	1,253	841	836	841	840
Search & Rescue (Fixed Wing)	100	56	35	35	35	37
Helicopter (includes Rescue)	401	317	230	230	230	229
Special Research	3	—	—	—	—	—
Trainer	2,873	1,996	1,704	1,678	1,677	1,690
Utility/Observation	345	154	210	189	186	196
TOTAL, USAF	**12,689**	**7,930**	**6,950**	**7,034**	**7,156**	**7,286**
Air National Guard total	1,806	1,798	1,522	1,560	1,669	1,662
Air Force Reserve total	719	428	487	474	472	461
Free World Military Forces total	—	1,976	—	—	—	—
Earmarked (MAP, USN, and Other Non-Air Force)	166	—	—	—	—	—
TOTAL, ACTIVE AIRCRAFT, USAF, ANG, AFRES	**15,380**	**12,132**	**8,959**	**9,068**	**9,297**	**9,409**
Active aircraft including foreign government owned		(12,132)	(9,100)	(9,209)	(9,443)	(9,551)
FLYING HOURS (000)						
USAF	6,028	3,272	2,646	2,596	2,628	2,832
Air National Guard	432	405	381	393	410	413
Air Force Reserve	202	128	139	136	134	133
TOTAL FLYING HOURS	**6,662**	**3,805**	**3,166**	**3,125**	**3,172**	**3,378**

NOTE: Data in FY '64–80 columns are actual; FY '81 and FY '82 data are estimated

UNITED STATES AIR FORCE MEDAL OF HONOR RECIPIENTS—1918–1981

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.	Superior, 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	Birmingham, Ala.
Fernoyer, 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	Santa Barbara, Calif. (Ret. Maj. Gen.)
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. 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	Albany, N.Y.
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	Poland, 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. 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. Maj.)

SOME FAMOUS FIRSTS AMONG US BOMBARDMENT UNITS

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

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

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

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

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

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

USAF LEADERS THROUGH THE YEARS

SECRETARIES OF THE AIR FORCE

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

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	

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	

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	

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	

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	

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	

Air University became part of Air Training Command May 15, 1978.

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	

ELECTRONIC SECURITY COMMAND

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

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	

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	

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

STRATEGIC AIR COMMAND

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

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	

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	

AEROSPACE DEFENSE CENTER

Lt. Gen. George E. Stratemeyer	Mar. 21, 1946	Nov. 30, 1948
Maj. Gen. Gordon P. Saville	Dec. 1, 1948	Dec. 31, 1950
Lt. Gen. Ennis C. Whitehead	Jan. 1, 1951	Aug. 25, 1951
Gen. Benjamin W. Chidlaw	Aug. 25, 1951	May 31, 1955
Maj. Gen. Frederic H. Smith, Jr. (acting)	May 31, 1955	July 19, 1955
Gen. Earle E. Partridge	July 20, 1955	Sept. 17, 1956
Lt. Gen. Joseph H. Atkinson	Sept. 17, 1956	Aug. 15, 1961
Lt. Gen. Robert M. Lee	Aug. 15, 1961	July 31, 1963
Lt. Gen. Herbert B. Thatcher	Aug. 1, 1963	July 31, 1967
Lt. Gen. Arthur C. Agan	Aug. 1, 1967	Feb. 28, 1970
Lt. Gen. Thomas K. McGehee	Mar. 1, 1970	July 1, 1973
Gen. Seth J. McKee	July 1, 1973	Oct. 1, 1973
Gen. Lucius D. Clay, Jr.	Oct. 1, 1973	Aug. 31, 1975
Gen. Daniel James, Jr.	Sept. 1, 1975	Dec. 5, 1977
Gen. James E. Hill	Dec. 6, 1977	Jan. 1, 1980
Lt. Gen. James V. Hartinger	Jan. 1, 1980	

Formerly Air Defense Command.
Redesignated Aerospace Defense Command Jan. 1, 1968.
Redesignated Aerospace Defense Center Dec. 1, 1979.

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	

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 Albert F. Simpson 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 Albert F. Simpson 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	Godfrey, Capt. John T.	16.33
McGuire, Maj. Thomas B., Jr.	38	Carson, Capt. Leonard K.	18.50	Anderson, Capt. Clarence E., Jr.	16.25
Gabreski, Lt. Col. Francis S.	28*	Eagleston, Maj. Glenn T.	18.50*	Dunham, Lt. Col. William D.	16
Johnson, Capt. Robert S.	27	Hill, Col. David L. (AVG/USAF) (12.25)	18.25**	Harris, Lt. Col. Bill	16
MacDonald, Col. Charles H.	27	Older, Lt. Col. Charles H. (AVG/USAF) (11.25)	18.25**	Welch, Capt. George S.	16
Preddy, Maj. George E.	26.83	Beckham, Maj. Walter C.	18	Beerbower, Capt. Donald M.	15.50
Meyer, Lt. Col. John C.	24*	Green, Maj. Herschel H.	18	Brown, Maj. Samuel J.	15.50
Schilling, Col. David C.	22.50	Herbst, Col. John C.	18	Peterson, Capt. Richard A.	15.50
Johnson, Lt. Col. Gerald R.	22	Zemke, Lt. Col. Hubert	17.75	Whisner, Capt. William T., Jr.	15.50*
Kearby, Col. Neel E.	22	England, Maj. John B.	17.50	Blakeslee, Col. Donald J. M. (ES/USAF) (3.5)	15**
Robbins, Maj. Jay T.	22	Beeson, Capt. Duane W.	17.33	Bradley, Lt. Col. Jack T.	15
Christensen, Capt. Fred J.	21.50	Thornell, 1st Lt. John F., Jr.	17.25	Cragg, Maj. Edward	15
Wetmore, Capt. Ray S.	21.25	Reed, Lt. Col. William N. (AVG/USAF) (11)	17**	Foy, Maj. Robert W.	15
Voll, Capt. John J.	21	Varnell, Capt. James S., Jr.	17	Hofer, 2d Lt. Ralph K.	15
Mahurin, Maj. Walker M.	20.75*	Johnson, Maj. Gerald W.	16.50	Homer, Capt. Cyril F.	15
Lynch, Lt. Col. Thomas J.	20			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 Simpson 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	Low, 1st Lt. James F.	9	Whisner, Maj. William T., Jr.	5.50*
Jabara, Maj. James	15*	Hagerstrom, Maj. James P.	8.50*	Baldwin, Col. Robert P.	5
Fernandez, Capt. Manuel J.	14.5	Risner, Capt. Robinson	8	Becker, Capt. Richard S.	5
Davis, Maj. George A., Jr.	14*	Ruddell, Lt. Col. George I.	8*	Bettinger, Maj. Stephen L.	5
Baker, Col. Royal N.	13*	Buttlemann, 1st Lt. Henry	7	Creighton, Maj. Richard D.	5*
Blesse, Maj. Frederick C.	10	Jolley, Capt. Clifford D.	7	Curtin, Capt. Clyde A.	5
Fischer, 1st Lt. Harold E.	10	Lilley, Capt. Leonard W.	7	Gibson, Capt. Ralph D.	5
Garrison, Lt. Col. Vermont	10*	Adams, Maj. Donald E.	6.50	Kincheloe, Capt. Iven C., Jr.	5
Johnson, Col. James K.	10*	Gabreski, Col. Francis S.	6.50*	Latshaw, Capt. Robert T., Jr.	5
Moore, Capt. Lonnie R.	10	Jones, Lt. Col. George L.	6.50	Moore, Capt. Robert H.	5
Parr, Capt. Ralph S., Jr.	10	Marshall, Maj. Winton W.	6.50	Overton, Capt. Dolphin D., III	5
Foster, Capt. Cecil G.	9	Kasler, 1st Lt. James H.	6	Thyng, Col. Harrison R.	5*
		Love, Capt. Robert J.	6	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 D. (USAF)	6
Cunningham, Lt. Randy (USN)	5
Driscoll, Lt. William (USN)	5
Feinstein, Capt. Jeffrey S. (USAF)	5
Ritchie, Capt. Richard S. (USAF)	5

LEADING AIR SERVICE/ AAF/USAF ACES OF ALL WARS

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

SOME FAMOUS FIGHTER FIRSTS

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

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

AIR FORCE MAGAZINE'S

GUIDE TO USAF BASES AT HOME AND ABROAD

(Includes civilian airports and airfields of other military services that provide basing for USAF units and activities.)

Altus AFB, Okla. 73521; within Altus city limits. Phone (405) 482-8100; AUTOVON 855-1110. MAC base. 443d Military Airlift Wing; training for C-141 and C-5 crews; 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 3,313; civilians 627. Payroll $53.6 million. Housing: 163 officer; 637 NCO; 12 transient (4 VOQ, 4 VAQ, 4 transient). 30-bed hospital.

Andersen AFB, Guam 96334; 16.8 mi. N of Agana. Phone (671) 366-1110; AUTOVON 343-1110. SAC base. Hq. 3d Air Div., 43d Strategic Wing. 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 3,926; civilians 956. Payroll $59.5 million. Housing: shared officer and NCO 1,754; transient 206. Clinic, outpatient care only. 63-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, European theater, killed in aircraft accident May 3, 1943, in Iceland. Area 4,216 acres. Altitude 279 ft. Military 5,360; civilians 3,236. Payroll $167.8 million. Housing: 392 officer; 1,696 NCO; 273 transient (incl. 82 temp. living quarters for incoming personnel, 141 VOQ, 50 TAQ). 250-bed hospital.

Arnold AFS, Tenn. 37389; approx. 7 mi. SE of Manchester. Phone (615) 455-2611; AUTOVON 882-1520. 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 141; civilians 3,180. Payroll $87 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. Base is also site of 917th Tactical Fighter Gp. (AFRES), flying A-10s. In spring 1981 it became first USAF installation to receive the KC-10 Extender tanker aircraft. Base named for Lt. Eugene H. Barksdale, WW I airman killed in Aug. 1926, in crash near Wright Field, Ohio. Area 22,000 acres (20,000 acres reserved for recreation). Altitude 167 ft. Military 5,401; civilians 1,008. Payroll $103.3 million. Housing: 169 officer; 864 NCO; 29 transient. 65-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; 100th Air Refueling Wing; 1883d Communications Sqdn. (AFCC). Beale is the only USAF base having SR-71 and U-2 reconnaissance aircraft. Originally US Army's Camp Beale, became AF installation in Nov. 1948; became AFB in Dec. 1951. Named for Brig. Gen. E. F. Beale, Indian agent in California prior to Civil War. Area 22,944 acres. Altitude 113 ft. Military 4,170; civilians 560. Payroll $68.9 million. Housing: 395 officer; 1,342 NCO; 45 transient. 30-bed hospital.

Bergstrom AFB, Tex. 78743; 7 mi. SE of downtown Austin. Phone (512) 479-4100; AUTOVON 685-1110. TAC base. Hq. 12th Air Force; Hq. 10th Air Force; 67th Tactical Recon Wing (host) with RF-4C operations; 602d Tactical Air Control Wing; 924th Tactical Airlift Gp. (AFRES) with C-130B 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 3,865; civilians 741. Payroll $79.9 million. Housing: 92 officer; 612 NCO; 190 transient. 30-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 4,805 acres. Altitude 254 ft. Military 2,696; civilians 366. Payroll $52.1 million. Housing: 203 officer; 727 NCO; 46 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 Reserve Personnel Center Operating Location; Air Force Chief of Chaplains; US Air Force Office of History. Activated Oct. 1917; named for Col. Raynal C. Bolling, assistant chief of air service, killed in France during WW I. Area 604 acres. Altitude 16 ft. Military 1,562; civilians 1,157. Payroll $38 million. Housing: 296 officer; 1,100 NCO; 168 transient (including 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; 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 1,330 acres. Altitude 600 ft. Military 1,444; civilians 854. Payroll $50 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 3,780 acres. Altitude 4,295 ft. Military 3,866; civilians 409. Payroll $51.9 million. Housing: 149 officer; 863 NCO; 104 transient. 25-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 4,768; civilians 1,899. Payroll $62 million. Housing: 128 officer; 679 NCO. 140-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 crews. Also houses 84th Fighter Interceptor Sqdn. (TAC). 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 5,920; civilians 420. Payroll $88.5 million. Housing: 90 officer; 844 NCO; 384 transient (incl. 104 VAQ, 276 VOQ, and 4 transient quarters). 30-bed hospital.

Chanute AFB, Ill. 61868; 14 mi. N of Champaign. Phone (217) 495-1110; AUTOVON 862-1110. ATC base. Chanute Technical Training Center provides training in missile and aircraft maintenance, fire

fighting, and weather. 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 7,500; civilians 1,800. Payroll $102 million. Housing: 140 officer; 1,518 NCO; 8 transient. 55-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, 48th Fighter Interceptor Sqdn. (TAC); and Det. 7, 1361st Audiovisual Sqdn. Base activated June 1942; inactivated Feb. 1946, reactivated Aug. 1953. Area 3,772 acres. Altitude 45 ft. Military 7,081 (incl. AFRES); civilians 1,667. Payroll $81 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 4,606 acres. Altitude 214 ft. Military 2,792; civilians 522. Payroll $46 million. Housing: 228 officer; 592 NCO. 15-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; 390th Strategic Missile Wing (Titan II) (SAC). Also site of AFLC's Military Aircraft Storage and Disposition Center. Base activated in 1927; named for two local aviation accident victims—1st Lt. Samuel H. Davis, killed Dec. 28, 1921; and 2d Lt. Oscar Monthan, killed Mar. 27, 1924. Area 11,000 acres. Altitude 2,705 ft. Military 5,405; civilians 1,302. Payroll $92.1 million. Housing: 215 officer; 1,040 enlisted. 90-bed hospital.

Dover AFB, Del. 19901; 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 largest air cargo port on East Coast. Base activated Dec. 1941; inactivated 1946, reactivated Feb. 1951. Area 3,600 acres. Altitude 28 ft. Military 5,084; civilians 1,384. Payroll $88.6 million. Housing: 229 officer; 1,327 NCO; 297 transient. 30-bed hospital.

Duluth International Airport, Minn. 53814; 5 mi. NW of Duluth. Phone (218) 727-8211; AUTOVON 825-0011. TAC base. 23d NORAD Region; Hq. 23d Air Div. (TAC); SAGE Control Center (NORAD); 4787th Air Base Gp. (TAC); 148th Tactical Recon Gp. (ANG). Activated Mar. 1951. Area 1,139 acres. Altitude 1,429 ft. Military 1,036; civilians 287. Payroll $19 million. Housing: 70 officer; 361 military; 24 transient. Dispensary.

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). 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 4,913; civilians 442. Payroll $94.8 million. Housing: 150 officer; 849 NCO; 124 transient. 40-bed hospital.

Edwards AFB, Calif. 93523; 20 mi. E of Rosamond. Phone (805) 277-1110; AUTOVON 350-1110. AFSC base. AF Flight Test Center. USAF Test Pilot School trains pilots and flight-test engineers. NASA Dryden Flight Research Center is concerned with the Space Shuttle, lifting bodies,

ctive Air Force Installations in the US

and supersonic and transonic flight research. Other tenant units include US Army Aviation Engineering Flight Activity and USAF Rocket Propulsion Lab. Base activated Sept. 1933; named for Capt. Glen W. Edwards, killed June 5, 1948, in crash of YB-49 "Flying Wing" experimental bomber. Area 301,000 acres. Altitude 2,302 ft. Military 3,785; civilians 4,732. Payroll $177 million. Housing: 658 officer; 3,380 NCO; 125 transient. 30-bed hospital.

Eglin AFB, Fla. 32542; 2 mi. SE of Valparaiso; 7 mi. NE of Fort Walton Beach. Phone (904) 881-6668; AUTOVON 872-1110. AFSC base. AF Armament Div.; AF Armament Lab; 3246th Test Wing; 39th Aerospace Rescue and Recovery Wing; 33d Tactical Fighter Wing; Tac Air Warfare Center; 919th Special Operations Gp. (AFRES); Air Force Armament Museum. 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 8,865; civilians, 4,400. Payroll $227.1 million (includes AFRES). Housing: 322 officer; 2,014 NCO; 84 transient. 160-bed hospital.

Eielson AFB, Alaska 99702; 26 mi. SE of Fairbanks. Phone (907) 372-1181; AUTOVON (317) 377-1292. AAC base. 5010th Combat Support Gp. is host unit. Air defense, 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 2,596; civilians 318. Payroll $46.7 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. 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 5,675 acres. Altitude 3,600 ft. Military 5,891; civilians 564. Payroll $93.1 million. Housing: 414 officer; 1,482 NCO; 141 transient. 40-bed hospital.

Elmendorf AFB, Alaska 99506; bordering Anchorage. Phone (907) 752-1110; AUTOVON (317) 752-1110. AAC base. Hq. Alaskan Air Command; 21st Tactical Fighter Wing; NORAD Region Control Center; Rescue Coordination Center; 531st Aircraft Control and Warning Gp.; 18th Tactical Fighter Sqdn.; 43d Tactical Fighter 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 Combat Support Gp. (AAC) 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 6,209; civilians 1,464. Payroll $128.1 million. Housing: 356 officer; 1,839 NCO; 140 transient. 140-bed hospital.

England AFB, La. 71301; 5 mi. W of Alexandria. Phone (318) 448-2100; AUTOVON 683-1110. TAC base. 23d Tactical Fighter Wing. Converting to A-10 fighter operations from A-7D. 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 $53.2 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 Rescue and Weather Reconnaissance Wing (MAC); Det. 1, 4000th Aerospace Applications Gp. (SAC); and 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 5,021 acres. Altitude 2,462 ft. Military 4,000; civilians 1,025. Payroll $59.8 million for civilian and active-duty military and $14.0 million for ANG. Housing: 502 officer; 1,079 NCO; transient incl. 60 VOQ and 62 VAQ, no family quarters. 45-bed hospital.

Francis E. Warren AFB, Wyo. 82001; 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 7,600 acres, plus 200 Minuteman III missile sites distributed over more than 15,000 sq. mi. Altitude 6,124 ft. Military 3,687; civilians 426. Payroll $46.8 million. Housing: 211 officer; 620 NCO; 36 transient, 25-bed hospital.

George AFB, Calif. 92392; 6 mi. NW of Victorville. Phone (714) 269-1110; AUTOVON 353-1110. TAC base. Hq. 831st Air Div.; 35th and 37th TAC Fighter Wings; Home of TAC's "Wild Weasel" F-4G and F-4E sqdns.; F-4 transitional and upgrade training; German Air Force training in F-4. TAC 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. Military 4,865; civilians 448. Payroll $67.2 million. Housing: 229 officer; 1,212 NCO; 200 Senior NCO; transient 40 TLQs. 30-bed hospital.

Goodfellow AFB, Tex. 76908; 2 mi. SE of San Angelo. Phone (915) 653-3231; AUTOVON 477-2011. ATC base. 3480th Technical Training Wing; USAF Technical Training School. Base activated Jan. 1941; named for Lt. John J. Goodfellow, Jr., WW I fighter pilot killed in combat Sept. 17, 1918. Area 1,127 acres. Altitude 1,877 ft. Military 1,394; civilians 576. Payroll $20 million. Housing: 3 officer; 96 NCO; 86 transient (23 VAQs, 63 VOQs). Dispensary.

Grand Forks AFB, N. D. 58205; 16 mi. W of Grand Forks. Phone (701) 594-6011; AUTOVON 362-1110. SAC base. 319th Bomb Wing; 321st Strategic Missile Wing (Minuteman III). Base activated in 1956. Area 5,500 acres. Altitude 911 ft. Military 5,140; civilians 705. Payroll $67.2 million. Housing: 542 officer; 1,661 NCO; 71 transient. 30-bed hospital.

Griffiss AFB, N. Y. 13441; 1 mi. NE of Rome. Phone (315) 390-1110; 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 Northern Communications Area; 485th Communications and Installations Gp. (AFCC); and 49th Fighter-Interceptor Sqdn. (TAC). 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 3,871; civilians 2,870. Payroll $109.8 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 3,726; civilians 1,029. Payroll $42.1 million (SAC only). Housing: 276 officer; 1,852 NCO; 138 transient. Dispensary.

Gunter AFS, Ala. 36114; 4 mi. NE of Montgomery. Phone (205) 279-1110; AUTOVON 921-1110. ATC 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 364 acres. Altitude 166 ft. Military 1,141; civilians 812. Payroll included in Maxwell entry. Housing: 118 officer; 206 NCO; 105 transient.

Hancock Field, N. Y. 13225; 10 mi. NNE of Syracuse. Phone (315) 458-5500; AUTOVON 587-9110. TAC base. 4789th Air Base Gp., host unit, supports 21st NORAD Region; Hq. 21st Air Div. (TAC); 113th Tactical Control Flight (ANG); 174th Tactical Fighter Wing (ANG); 3513th USAF Recruiting Sqdn. Base activated Sept. 1942 as Syracuse Army Air Base, renamed Mar. 1952 for Clarence E. Hancock (1885–1949), prominent local citizen and member of US House of Representatives. Area 765 acres. Altitude 421 ft. Military 862; civilians 327. Payroll $15.3 million. Housing: 61 officer; 167 NCO; 17 transient.

Hanscom AFB, Mass. 01731; 17 mi. NW of Boston. Phone (617) 861-4441; AUTOVON 478-4441. AFSC base. Hq. Electronic Systems Div. (AFSC), manages development and acquisition of command control and communications 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 887 acres. Altitude 133 ft. Military 1,848; civilians 3,025. Payroll $118 million. Housing: 289 officer; 406 NCO; 16 transient. Dispensary.

Hickam AFB, Hawaii 96853; 6 mi. W of Honolulu. Phone (808) 422-0531 (Oahu military operator); AUTOVON 430-0111. PACAF base. Hq. Pacific Air Forces; 15th Air Base Wing, support organization for Air Force units in Hawaii and throughout the Pacific; 154th Tactical Fighter Gp. (ANG); Hq. Pacific Communications Area (AFCC); 1st Weather Wing (MAC); 834th Airlift Div. (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 2,731 acres. Altitude sea level. Military 5,000; civilians 2,000. Payroll $197.5 million (includes Hickam, Wheeler AFB, and Bellows AFS). Housing: 535 officer; 1,940 NCO. Clinic.

Hill AFB, Utah 84056; 7 mi. S of Ogden. Phone (801) 777-7221; AUTOVON 458-1110. AFLC base. Hq. Ogden Air Logistics Center. Furnishing logistics support for 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, F-16, and F-105 manager; air munitions; aircraft landing gears; wheels, brakes, tires, and tubes; photographic and aerospace training equipment; and COM-10. Also home of 388th Tactical Fighter Wing; 508th Tactical Fighter Gp. (AFRES); 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 7,000 acres. Altitude 4,788 ft. Military 5,390; civilians 13,873. Payroll $375 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 (T-38 fighter lead-in training); 4449th Mobility Support Sqdn. (Harvest Bare) and 82d Tactical Control Flight. AFSC conducts test and evaluation of aircraft and missile systems and operates the Central Inertial Guidance Test Facility, the High Speed Test Track Facility, and the Radar Target Scatter (RATSCAT) Site. Base activated in 1942; named for Col. George V. Holloman, guided-missile pioneer, killed in B-17 crash in Formosa, Mar. 19, 1946. Area 57,530 acres. Al-

titude 4,092 ft. Military 5,737; civilians 1,371. Payroll $82 million. Housing: 192 officer; 1,360 NCO; 250 transient. 30-bed hospital.

Homestead AFB, Fla. 33039; 5 mi. NNE of Homestead. Phone (305) 257-8011; AUTOVON 791-0111. TAC base. 31st Tactical Fighter Wing; F-4D fighter operations and training; site of ATC sea-survival school; 915th Tactical Fighter Gp. (AFRES) and aerospace rescue and recovery sqdn. Base activated Apr. 1955. Area 3,558 acres. Altitude 7 ft. Military 5,352; civilians 1,389. Payroll $85 million. Housing: 321 officer; 1,294 NCO; 203 transient. 80-bed hospital.

Hurlburt Field, Fla. 32544; 8 mi. W of Fort Walton Beach. Phone (904) 881-6668; AUTOVON 872-1110. TAC base, though part of the Eglin AFB (AFSC) reservation. Home of 1st Special Operations Wing, focal point of all USAF special operations; USAF Special Operations School; MC-130E (Combat Talon), AC-130H (Spectre Gunship), HH-53 (Super Jolly), and UH-1N (Huey Gunship) helicopter sqdns.; TAC's only special operations combat control team and special operations weather team; 4442d Tactical Control Gp., including USAF Air Ground Operations School, 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 3,534; civilians 360. Payroll $60 million. Housing: 74 officer; 306 NCO; 341 transient. Clinic only at Hurlburt, but 200-bed hospital at Eglin main base.

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.; Det. 1, 57th Fighter Weapons Wing; 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 160; civilians 48. (Payroll included in Nellis AFB entry.) Housing: 9 officer; 69 NCO; 30 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, personnel, and administrative courses); Keesler USAF Medical Center. Hosts MAC and AFRES weather recon units. TAC airborne command and control sqdn., AFCC installation gp., and 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 14,329; civilians 3,596. Payroll $194 million. Housing: 430 officer; 1,527 NCO; 68 transient. (350 VOQ 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 3,925 acres. Altitude 689 ft. Military 4,251; civilians 18,100. Payroll $410.9 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 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. 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 4,543; civilians 12,069. Payroll $415 million. Housing: 124 officer; 2,010 NCO; 380 transient (211 VOQ, 169 VAQ). Dispensary and 45-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; 46th Air Refueling Sqdn.; 87th Fighter-Interceptor Sqdn. (TAC); 2001st Communications Sqdn. (AFCC). Base activated in 1959; named for Kenneth I. Sawyer, who proposed site for county airport, died in 1944. Area 5,224 acres. Altitude 1,220 ft. Military 3,696; civilians 517. Payroll $61 million. Housing: 337 officer; 1,356 NCO; 40 BOQ units; 244 transient (incl. 20 fully furnished efficiency apartments and 200 trailer spaces in housing section). 50-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 6,828 acres, incl. 4,017 acres at Lackland Training Annex. Altitude 787 ft. Military 19,860; civilians 4,891. Payroll $202.3 million. Housing: 106 officer; 619 NCO; 1,257 transient. 1,000-bed hospital.

Langley AFB, Va. 23665, 3 mi. N of Hampton. Phone (804) 764-9990; AUTOVON 432-1110. TAC

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, for the most part, perform an air defense mission, are Joint Surveillance Systems (JSS), and house radar, SAGE, and/or AC&W units. Some stations are excess to USAF requirements and will be closed. 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. Commercial telephone numbers (AC) are given for stations not having access to AUTOVON.

Albrook AFS, APO Miami 34002 (TAC)	AV 313-28-1110
Almaden AFS, California 95042 (TAC)	AC (408) 268-3512
Bellows AFS, Hawaii 96795 (PACAF)	AC (808) 259-5428
Calumet AFS, Michigan 49913 (TAC)	AC (906) 337-4200
Camoria AFS, California 93428 (TAC)	AC (805) 927-4011
Campion AFS, APO Seattle 98703 (AAC)	AV 317-743-1200
Cape Canaveral AFS, Florida 32925 (AFSC)	AV 467-1110
Cape Charles AFS, Virginia 23310 (TAC)	AC (804) 331-2765
Cape Lisburne AFS, APO Seattle 98716 (AAC)	AV 317-725-1200
Cape Newenham AFS, APO Seattle 98745 (AAC)	AV 317-794-1200
Cape Romanzof AFS, APO Seattle 98706 (AAC)	AV 317-795-1200
Clear AFS, APO Seattle 98704 (SAC)	AV 317-522-3333
Cold Bay AFS, APO Seattle 98711 (AAC)	AV 317-565-7200
Concrete MEWS, North Dakota 58221 (SAC)	AV 330-3297
Cudjoe Key AFS, Florida 33042 (TAC)	AC (305) 745-3957
Dallas AFS, Oregon 97338 (TAC)	AC (503) 787-3336
Dauphin Island AFS, Alabama 36528 (TAC)	AC (205) 868-2972
Empire AFS, Michigan 49630 (TAC)	AC (616) 326-6211
Finland AFS, Minnesota 55603 (TAC)	AC (218) 353-7444
Finley AFS, North Dakota 59230 (TAC)	AV 362-6138
Fort Fisher AFS, North Carolina 28449 (TAC)	AC (919) 458-8251
Fort Lee AFS, Virginia 23801 (TAC)	AV 687-4008
Fort Yukon AFS, APO Seattle 98710 (AAC)	AV 317-732-1200
Fortuna AFS, North Dakota 58844 (SAC)	AC (701) 834-2251
Gentile AFS, Ohio 45401 (AFLC)	AV 850-5111
Gibbsboro AFS, New Jersey 08026 (TAC)	AC (609) 783-1449
Indian Mountain AFS, APO Seattle 98748 (AAC)	AV 317-722-1200
Jacksonville AFS, Florida 32212 (TAC)	AC (905) 777-9695
Klamath AFS, California 95548 (TAC)	AV 670-2011
Kotzebue AFS, APO Seattle 98709 (AAC)	AV 317-748-1200
Lake Charles AFS, Louisiana 70601 (TAC)	AV 683-5684
Lakeside AFS, Montana 59922 (TAC)	AC (406) 844-3351
Makah AFS, Washington 98357 (TAC)	AC (206) 645-2231
Mica Peak AFS, Washington 99023 (TAC)	AC (509) 247-2669
Mill Valley AFS, California 94941 (TAC)	AC (415) 388-0130
Montauk AFS, New York 11954 (TAC)	AC (516) 668-2321
Mt. Hebo AFS, Oregon 97122 (TAC)	AC (503) 392-3111
Mt. Laguna AFS, California 92048 (TAC)	AV 727-8301
Newark AFS, Ohio 43055 (AFLC)	AV 580-1110
North Bend AFS, Oregon 97459 (TAC)	AC (503) 756-4146
North Charleston AFS, South Carolina 29404 (TAC)	AC (919) 744-7481
North Truro AFS, Massachusetts 02652 (TAC)	AC (617) 487-1248
Oklahoma City AFS, Oklahoma 73145 (AFLC)	AV 735-9011
Point Arena AFS, California 95468 (TAC)	AC (707) 882-2165
Port Austin AFS, Michigan 48467 (TAC)	AC (517) 738-5111
Richmond AFS, Florida 33156 (TAC)	AV 791-8124
San Pedro Hill AFS, California 90274 (TAC)	AV 972-7061
Savannah AFS, Georgia 31402 (ANG)	AC (912) 352-5414
Sparrevohn AFS, APO Seattle 98746 (AAC)	AV 317-731-1200
Sunnyvale AFS, California 94088 (AFSC)	AV 359-3611
Tatalina AFS, APO Seattle 98747 (AAC)	AV 317-728-1200
Tin City AFS, APO Seattle 98715 (AAC)	AV 317-724-1200
Tonapah AFS, Nevada 89049 (AFSC)	AC (702) 643-9252
Watford City AFS, North Dakota 58831 (TAC)	AC (701) 482-5136

base. Host unit 1st Tactical Fighter Wing, F-15 fighter operations; Hq. Tactical Air Command; 5th Weather Wing (MAC); 2d Aircraft Delivery Gp. (TAC); 460th Reconnaissance Technical Sqdn. (TAC); 6th Airborne Command and Control Sqdn. (TAC); US Army TRADOC Flight Det.; 48th Fighter Interceptor Sqdn. (ADTAC). 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 7,950; civilians 2,427. Payroll $148.0 million. Housing: 384 officer; 1,259 NCO; 201 transient. 85-bed hospital and dispensary.

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 2,600; civilians 553. Payroll $43 million. Housing: 255 officer; 348 NCO; 39 transient. 15-bed hospital.

Laurence G. Hanscom AFB *(see Hanscom AFB).*

Little Rock AFB, Ark. 72076; 12 mi. NE of Little Rock. Phone (501) 988-3131; AUTOVON 731-1110. MAC base. 314th Tactical Airlift Wing; 308th Strategic Missile Wing; SAC Titan II ICBM support base; 189th Air Refueling Gp. (ANG); Det. 9, 1365th Audiovisual Sqdn. Base activated in 1955. Area 6,100 acres. Altitude 310 ft. Military 6,343; civilians 800. Payroll $89 million. Housing: 313 officer; 1,222 NCO; 380 transient (160 VAQ, 220 VOQ). 40-bed hospital.

Loring AFB, Me. 04751; 4 mi. W of Limestone. Phone (207) 999-1110; AUTOVON 920-1110. SAC base. 42d Bomb Wing. Base activated Feb. 25, 1953, as Limestone AFB; renamed for Maj. Charles 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 3,370; civilians 752. Payroll $54.5 million. Housing: 654 officer; 1,364 NCO; 12 transient; 4 VIP. 15-bed hospital.

Los Angeles AFS, Calif. 90009; in metropolitan Los Angeles area, city of El Segundo. Phone (213) 643-1000; AUTOVON 833-1110. AFSC station. Space Division of AFSC manages the development, launch, and on-orbit control of DoD's space programs. 23 tenant units. Station activated Dec. 14, 1960. Military 1,900; civilians 1,250. Payroll $60 million.

Lowry AFB, Colo. 80230; 6 mi. E of Denver. Phone (303) 370-1110; AUTOVON 926-1110. ATC base. Technical Training Center; Air Force Accounting and Finance Center; Air Reserve Personnel Center, and the 3320th Correction and Rehabilitation Sqdn. Lowry Technical Training Center conducts training in avionics, aerospace munitions, air intelligence, logistics, and audiovisual fields. Base activated Feb. 26, 1938; 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 8,841; civilians 5,011. Payroll $154 million. Housing: 94 officer; 772 NCO; 40 transient. Dispensary.

Luke AFB, Ariz. 85309; 20 mi. WNW of Phoenix. Phone (602) 935-7411; AUTOVON 853-1110. TAC base. 832d Air Div., 405th Tactical Training Wing; 58th Tactical Training Wing; Hq. 26th NORAD Region; Hq. 26th Air Div. (TAC); 302d Special Operations Sqdn. (AFRES). Luke, the largest fighter training base in the free world, conducts training of USAF aircrews in the F-4C and F-15, German students in the F-104G, 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 7,000; civilians 900. Payroll $140 million. Housing: 80 officer; 786 NCO; 40 transient. 105-bed hospital.

MacDill AFB, Fla. 33608; adjacent to Tampa. Phone (813) 830-1110; AUTOVON 968-1110. TAC base. Hq. US Readiness Command; 56th Tactical Fighter Wing conducts replacement training in the F-4D and the F-16. The wing is currently converting to the F-16 for its RTU mission. Base activated Apr. 15, 1941; named for Col. Leslie MacDill, killed in an aircraft accident Nov. 8, 1938, near Washington, D. C. Area 5,621 acres. Altitude 6 ft. Military 6,198; civilians 1,386. Payroll $115 million. Housing: 58 officer; 746 enlisted; 350 transient. 75-bed hospital.

Malmstrom AFB, Mont. 59402; 4 mi. E of Great Falls. Phone (406) 731-9990; AUTOVON 632-1110. SAC base. 341st Strategic Missile Wing; Hq. 24th Air Div. (TAC); SAGE Region Control Center (NORAD). 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 4,416; civilians 525. Payroll $64.4 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 Bomb Wing; 452d Air Refueling Wing (AFRES); 303d Aerospace Rescue and Recovery Sqdn. (AFRES). 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 4,057; civilians 1,370. Payroll $91.1 million. Housing: 103 officer; 608 NCO; 150 transient. 145-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, at Ellington Field, Tex. Area 5,800 acres. Altitude 96 ft. Military 4,800; civilians 1,950. Payroll $105 million. Housing: 407 officer; 864 NCO; 40 transient. 70-bed hospital.

Maxwell AFB, Ala. 36112; 1 mi. WNW of Montgomery. Phone (205) 293-1110; AUTOVON 875-1110. ATC base. Hq. Air University, professional education center for USAF; site of Air War College, Air Command and Staff College, Squadron Officer School, Leadership and Management Development Center, Academic Instructor and Foreign Officer School; Hq. Air Force ROTC; Hq. Civil Air Patrol-USAF; Community College of the Air Force; 908th Tac Airlift Gp. (AFRES). (The Senior NCO Academy and Extension Course Institute are at Gunter AFS.) Base activated 1918; named for 2d Lt. William C. Maxwell, killed in an air accident Aug. 12, 1920, in the Philippines. Area 2,556 acres. Altitude 169 ft. Military 2,785; civilians 1,577. Payroll $142.5 million. Housing: 275 officer; 249 NCO; 1,029 transient (971 VOQ and 58 VAQ). 85-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 5,268; civilians 1,361. Payroll $113.9 million. Housing: 111 officer; 782 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 System, 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 2,598 acres. Altitude 76 ft. Military 3,558; civilians 12,851. Payroll $343 million. Housing: 168 officer; 507 NCO; 21 transient. Dispensary.

McConnell AFB, Kan. 67221; 5 mi. SE of Wichita. Phone (316) 681-6100; AUTOVON 962-1110. 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 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 2,608 acres. Altitude 1,371 ft. Military 3,197; civilians 490. Payroll $56.6 million. Housing: 149 officer; 445 NCO; 133 transient. 20-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; and 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, holder of Medal of Honor, killed in action Jan. 7, 1945, in the Philippines. Area 3,552 acres. Altitude 133 ft. Military 5,321; civilians 2,037. Payroll $114.8 million. Housing: 442 officer; 1,312 NCO; 620 transient (186 VOQ, 244 VAQ, 160 transient family units, 30 transient). Dispensary and 163-bed hospital.

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 5,627; civilians 670. Payroll $76.3 million. Housing: 543 officers; 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 2,756; civilians 464. Payroll $45 million. Housing: 61 officers; 245 NCO; 51 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 defense-suppression operations. Base activated Apr. 1942. Area 6,639 acres. Altitude 3,000 ft. Military 4,105; civilians 650. Payroll $59 million. Housing: 346 officer; 1,292 NCO; 105 transient. 20-bed hospital.

Myrtle Beach AFB, S. C. 29577; S of 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 24 ft. Military 2,898; civilians 703. Payroll $44.9 million. Housing: 132 officer; 668 NCO; 65 trailer lots. 32-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-4D/E, F-5E, F-15, F-16, F-111, A-10, T-38, UH-1N operations; 57th Fighter Weapons Wing; 474th Tactical Fighter Wing; USAF Thunderbirds Air Demonstration Sqdn.; 4440th Tactical Fighter Training Gp. (Red Flag); 554th Operations Support Wing, range group; conducts initial and advanced tactical fighter training and realistic combat training for DoD; provides test and evaluation of air tactics and new equipment. Base activated July 1941; named for 1st Lt. William H. Nellis, WW II P-47 fighter pilot, killed Dec. 27, 1944, in Europe. Area 11,274 acres, with ranges totaling 3,012,770 acres. Altitude 2,171 ft. Military 9,096; civilians 1,287. Payroll $112 million. Housing: 163 officer; 1,319 NCO; 100 trailer spaces; 943 transient (incl. 581 VAQ, 336 VOQ, 26 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.); 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 2,407 acres. Altitude 1,156 ft. Military 5,396; civilians 2,798. Payroll $161 million. Housing: 56 officer; 208 NCO; 339 transient (incl. 289 transient, 40 TQ, 10 guest). 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 Center (MAC); 3d Weather Wing (MAC); and 3902d Air Base Wing. Base activated 1888 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 12,464; civilians 2,110 (incl. 468 contractor personnel). Payroll $220.1 million. Housing: 882 officer; 1,798 NCO; 60 transient, 65-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. 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 2,332 acres. Altitude 9 ft. Military 3,750; civilians 4,850. Payroll $109 million. Housing: 247 officer; 1,407 NCO. 30-bed hospital.

Pease AFB, N. H. 03801; 3 mi. W of Portsmouth. Phone (603) 436-0100; 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

USAF'S PRINCIPAL BASES OVERSEAS

Ankara AS, Turkey
APO New York 09254
AUTOVON 676-1110
TUSLOG Hq., USAFE

Aviano AB, Italy
APO New York 09293
AUTOVON 632-1110
Tactical group, USAFE

Bitburg AB, Germany
APO New York 09132
AUTOVON 455-1110
Tactical fighter base, USAFE

Camp New Amsterdam,
The Netherlands
APO New York 09292
Tactical fighter unit, USAFE
(Call Ramstein, AUTOVON 424-1110; ask for Camp New Amsterdam.)

Clark AB, Philippines
APO San Francisco 96274
AUTOVON 822-1201
Hq. 13th Air Force, PACAF

Hahn AB, Germany
APO New York 09109
AUTOVON 453-1110
Tactical fighter base, USAFE

Hellenikon AB, Greece
APO New York 09223
AUTOVON 662-1110
Support base, USAFE

Hessisch-Oldendorf AS, Germany
APO New York 09669
Support base, USAFE
(Call Sembach, AUTOVON 427-1110; ask for Hessisch-Oldendorf.)

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
Support base, USAFE

Iraklion AS, Crete, Greece
APO New York 09291
AUTOVON 668-1110
Support base, USAFE

Izmir, Turkey
APO New York 09224
AUTOVON 675-1110
Support base, USAFE

Kadena AB, Okinawa, Japan
APO San Francisco 96239
AUTOVON 630-1110
313th Air Division, PACAF
18th Tactical Fighter Wing, PACAF
Tactical fighter base, PACAF
Strategic operations, SAC

Keflavik Airport, 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
Tactical fighter base, PACAF

Kwang Ju AB, South Korea
APO San Francisco 96324
Combat support base, PACAF
(Call Korea, AUTOVON 262-1101; ask for Kwang Ju AB.)

Lajes Field, Azores
APO New York 09406
AUTOVON 895-3490
Airlift base, MAC

Lindsey AS, Germany
APO New York 09633
AUTOVON 472-1110
Support base, USAFE

Misawa AB, Japan
APO San Francisco 96519
AUTOVON 248-1101
6112th Air Base Wing, PACAF
Support base, PACAF

Osan AB, South Korea
APO San Francisco 96570
AUTOVON 271-1234
314th Air Division, PACAF
51st Composite Wing (Tactical), PACAF
Tactical fighter base, PACAF

RAF Alconbury, United Kingdom
APO New York 09238
AUTOVON 223-1110
Tactical reconnaissance base, USAFE

RAF Bentwaters, United Kingdom
APO New York 09755
AUTOVON 225-1110
Tactical fighter base, USAFE

RAF Chicksands, United Kingdom
APO New York 09193
AUTOVON 234-1110
Support base, USAFE

RAF Fairford, United Kingdom
APO New York 09125
AUTOVON 247-1110
KC-135 refueling support base, USAFE/SAC

RAF Lakenheath, United Kingdom
APO New York 09179
AUTOVON 226-1110
Tactical fighter base, USAFE

RAF Mildenhall, United Kingdom
APO New York 09127
AUTOVON 238-1110
Hq. 3d Air Force, USAFE
Tactical airlift base, USAFE
Rotational KC-135, SAC
Rotational C-130, MAC

RAF Upper Heyford, United Kingdom
APO New York 09194
AUTOVON 263-1110
Tactical fighter base, USAFE

RAF Woodbridge, United Kingdom
APO New York 09405
AUTOVON 225-1110
Tactical fighter base, USAFE

Ramstein AB, Germany
APO New York 09012
AUTOVON 424-1110
Hq. USAFE
Tactical fighter base, USAFE
Hq. European Communications Area, AFCC
7th Air Division, SAC
322d Airlift Division, MAC
2d Weather Wing, MAC

Rhein-Main AB, Germany
APO New York 09057
AUTOVON 462-1110
Tactical airlift base, MAC

San Vito AS, Italy
APO New York 09240
AUTOVON 633-1110
Support base, USAFE

Sembach AB, Germany
APO New York 09130
Hq. 17th Air Force, USAFE
Tactical air control base, USAFE

Sondrestrom AB, Greenland
APO New York 09121
Support base, SAC
(Call Malmstrom AFB, AUTOVON 632-6000; ask for Sondrestrom AB.)

Spangdahlem AB, Germany
APO New York 09123
AUTOVON 454-1110
Tactical fighter base, USAFE

Taegu AB, South Korea
APO San Francisco 96213
Combat support base, PACAF
(Call Korea, AUTOVON 262-1101; ask for Taegu AB.)

Tempelhof Airport, Berlin
APO New York 09611
AUTOVON 442-1110
Support base, USAFE

Thule AB, Greenland
APO New York 09023
AUTOVON 834-1211; ask for Thule.
Support base, SAC

Torrejon AB, Spain
APO New York 09283
AUTOVON 723-1110
Hq. 16th Air Force, USAFE
Tactical fighter base, USAFE

Yokota AB, Japan
APO San Francisco 96328
AUTOVON 248-1101
Hq. 5th Air Force, PACAF

Zaragoza AB, Spain
APO New York 09286
AUTOVON 724-1110
Tactical fighter training base, USAFE

Zweibrücken AB, Germany
APO New York 09860
AUTOVON 425-1110
Tactical reconnaissance base, USAFE

4,374 acres. Altitude 101 ft. Military 3,835; civilians 556. Payroll $58.9 million. Housing: 139 officer; 1,073 NCO; 129 transient. 70-bed hospital.

Peterson AFB, Colo. 80914; 7 mi. E of Colorado Springs. Phone (303) 591-7321; AUTOVON 692-7011. SAC base. Home of 46th Aerospace Defense Wing (SAC), which supports Hq. North American Air Defense Command/Aerospace Defense Command (NORAD/ADCOM) Combat Operations Center in Cheyenne Mountain; Aerospace Defense Center; the Air Force Academy; and Fort Carson, Colo. Base activated in 1941; 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 3,886; civilians 1,200. Payroll $92 million. Housing: 106 officer; 384 NCO; 40 transient. Dispensary.

Plattsburgh AFB, N. Y. 12903; adjacent to Plattsburgh, N. Y. Phone (518) 563-4500; AUTOVON 689-1110. 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. Second oldest active military installation in the US, established 1814; AFB since 1955. Area 3,305 acres. Altitude 235 ft. Military 3,766; civilians 632. Payroll $54.8 million. Housing: 242 officer; 1,397 NCO. 15-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 4,062; civilians 338. Payroll $55.9 million. Housing: 89 officer; 370 NCO; 216 transient. Dispensary.

Randolph AFB, Tex. 78148; 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 5,371; civilians 2,271. Payroll $151.1 million. Housing: 200 officer; 813 NCO; 13 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 3,597 acres. Altitude 3,338 ft. Military 2,656; civilians 580. Payroll $48 million. Housing: 113 officer; 294 NCO; 28 transient. 10-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 and Installations Gp. (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 8,809 acres. Altitude 294 ft. Military 4,007; civilians 15,000. Payroll $375.4 million. Housing: 245 officer; 1,151 NCO; 40 transient. 40-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. 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.); 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 6,473; civilians 3,791. Payroll $176 million. Housing: 407 officer; 1,469 NCO, plus 120 spaces for privately owned trailers; 283 transient. 180-bed hospital; 100-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 Bomb Wing (SAC); 2012th Communications Sqdn. (AFCC). Base activated June 12, 1941; named for Navy Lt. Seymour A. Johnson, native of Goldsboro, killed Mar. 4, 1941, in crash in Maryland. Area 4,281 acres. Altitude 109 ft. Military 4,982; civilians 905. Payroll $76.5 million. Housing: 310 officer; 1,380 NCO; 88 transient. 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 Recon. Wing, RF-4C recon. operations and training; 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 July 9, 1918, when his Bristol fighter was shot down during a reconnaissance mission. Area 3,269 acres; supports another 8,038 acres. Altitude 244 ft. Military 4,928; civilians 580. Payroll $79 million. Housing: 389 officer; 1,315 NCO; 16 transient. 45-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) 572-3000; AUTOVON (317) 572-3000. 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 547. Payroll $7.5 million. Housing: 70 transient. Dispensary.

Sheppard AFB, Tex. 76311; 4 mi. N of Wichita Falls. Phone (817) 851-6266; AUTOVON 736-1001. ATC base. Sheppard Technical Training Center provides resident courses in aircraft maintenance, civil engineering, communications, missile, comptroller, transportation, and instructor training. The 3785th Field Training Gp. provides specialized and advanced training at 70 field training detachments and 19 operating locations worldwide. The School of Health Care Sciences provides training in medicine, dentistry, nursing, biomedical sciences, and health services administration. 80th Flying Training Wing provides undergraduate pilot training for German and Royal Netherlands Air Forces as well as fixed-wing transition training for USAF helicopter pilots. 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 7,600; civilians 3,600. Payroll $170 million. Housing: 200 officer; 1,087 NCO. 315-bed hospital.

Tinker AFB, Okla. 73145; 8 mi. SE of Oklahoma City. Phone (405) 732-7321; AUTOVON 735-1110. AFLC base. Hq. Oklahoma City Air Logistics Center, furnishes logistic support for bombers, jet engines, instruments, and electronics; Hq. AFCC's Southern Communications Area; 3d Combat Communications Gp.; 552d Airborne Warning and Control Wing (TAC); 507th Tactical Fighter Gp. (AFRES). Base activated May 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 5,500; civilians 16,200. Payroll $409 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.); 307th Air Refueling Gp. (SAC); 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 6,170 acres. Altitude 62 ft. Military 9,936; civilians 2,376. Payroll $137.7 million. Housing: 341 officer; 1,826 NCO; 584 transient (incl. 40 transient living quarters, 204 VOQ, 188 VAQ, 83 Aerial Port quarters with cooking facilities, 69 Aerial Port quarters without cooking facilities). 280-bed hospital.

Tyndall AFB, Fla. 32403; 13 mi. E of Panama City. Phone (904) 283-1113; AUTOVON 970-1110. TAC base. Home of the Air Defense Weapons Center, a single DoD unit for centralization of operational and technical expertise on air defense. Conducts weapons-firing programs and evaluation for fighter-interceptor pilots; tests new air defense-related equipment and tactics. Tenants include Air Force Engineering and Services Center; 3625th Technical Training Sqdn. (ATC); 678th Air Defense Gp. (TAC); 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 4,100; civilians 1,300. Payroll $70 million. Housing: 142 officer; 929 NCO. Dispensary and 80-bed hospital.

US Air Force Academy, Colo. 80840; 10 mi. N of Colorado Springs. Phone (303) 472-1818; 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. (ATC). Area 18,000 acres. Altitude 7,280 ft. Military 2,437; civilians 1,777. Payroll $104.2 million. Housing: 622 officer; 621 enlisted; 18 transient. 70-bed hospital.

Vance AFB, Okla. 73701; 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 $37 million. Housing: 119 officer; 111 NCO; 1 transient. 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); 6595th Aerospace Test Wing. Conducts missile crew training and provides facilities and support for operational ICBM tests; research and development testing of USAF space and ballistic missile programs; and unmanned polar-orbiting space operations of USAF, NASA contractors, foreign allies, and others. Vandenberg is the only base that launches operational ballistic missiles in the SAC deterrent force and polar-orbiting satellites in the US space program; about 1,472 such launches have taken place from Vandenberg since Dec. 1958. Originally Army's Camp Cooke. Activated Oct. 1941. Base taken over by USAF 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 4,967; civilians 6,608. Payroll $178.2 million. Housing: 538 officer; 1,645 NCO; 20 transient. 45-bed hospital.

Warren AFB *(see Francis E. Warren AFB).*

Wheeler AFB, Hawaii 96854; near center of the island of Oahu, adjacent to Army's Schofield Barracks. Phone (808) 655-1112; AUTOVON 430-0111. PACAF base. 15th Air Base Sqdn. furnishes administrative and logistic support to the Hawaiian Air Defense Div. (326th Air Div.); Air Defense Control Center, Far East; tactical air support sqdn. Also supports US Army flying activities from Schofield Barracks. Base activated Feb. 1922; named for Maj. Sheldon H. Wheeler, who became CO of Luke Field, Hawaii, in 1919 and was killed there July 13, 1921, when his biplane crashed during aerial exhibition. Area 1,369 acres. Altitude 845 ft. Military 500; civilians 140. 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 3,168; civilians 430. Payroll $42.7 million. Housing: 209 officer; 783 NCO; 57 transient (incl. 19 VOQ, 4 guest houses, and 34 VAQ). 10-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 3,867 acres. Altitude 1,385 ft. Military 3,320; civilians 1,100. Payroll $54.5 million. Housing: 309 officer; 499 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); Foreign Technology Div. (AFSC); AF Institute of Technology; USAF Medical Center, Wright-Patterson; Air Force Museum; AF Acquisition Logistics Div.; AFLC International Logistics Center plus more than 70 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 7,725; civilians 15,700; contracted services employees 7,200. Payroll $550 million. Housing: 1,090 officer; 1,245 NCO; 40 transient. 310-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.; assigned to SAC Apr. 1, 1960. Area 5,200 acres. Altitude 634 ft. Military 3,152; civilians 399. Payroll $41.2 million. Housing: 290 officer; 1,065 NCO; 59 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 752-5215. 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 654; civilians 167. Payroll $7.7 million. 6-bed hospital.

Atlanta, Ga. (McCollum Airport, Kennesaw, Ga.) 30144; 27 mi. N of Atlanta. Phone (404) 422-2500; AUTOVON 925-2474. 129th Tactical Control Sqdn. and 129th Tactical Control Flight. 10 mi. from Dobbins AFB, Ga. Area 13 acres. Altitude 1,060 ft. Military 265; civilians 41. Payroll through Dobbins.

Atlantic City, N. J. (Federal Aviation Administration Technical Center) 08405; 10 mi. W of Atlantic City. Phone (609) 641-8200; AUTOVON 234-1980. 177th Fighter Interceptor Gp. (ANG). Area 119 acres. Altitude 76 ft. Military 835; civilians 279. Payroll $8.4 million.

Baltimore, Md. (Glenn L. Martin State Airport) 21220; 8 mi. E of Baltimore. 175th Tactical Fighter Gp. (ANG). Phone (301) 687-6270; AUTOVON 235-9210. 135th Tac Airlift Gp. (ANG). Phone (301) 687-6270; AUTOVON 235-9210. Area 750 acres. Altitude 89 ft. Military 1,650; civilians 314. Payroll $10.6 million.

Bangor, Me., International Airport 04401; 4 mi. NW of Bangor. Phone (207) 947-0571; AUTOVON 476-6210. 101st Air Refueling Wing (ANG). Area 1,094 acres. Altitude 192 ft. Military 943; civilians 236. Payroll $9.6 million. Dispensary.

Battle Creek ANG Base, Mich. 49016; located adjacent to W. K. Kellogg Airport. Phone (616) 963-1596; AUTOVON 889-3691. 110th Tactical Air Support Gp. (ANG). Area 89 acres. Altitude 941 ft. Military 728; civilians 148. Payroll $5.1 million.

Birmingham Municipal Airport, Ala. (Smith ANG Base) 35217. Phone (205) 591-8160; AUTOVON 694-2260. 117th Tactical Reconnaissance Wing (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 1,157; civilians 257. Payroll $10.2 million.

Boise Air Terminal, Idaho (Gowen Field) 83701; 6 mi. S of Boise. Phone (208) 385-5339; AUTOVON 941-5011. 124th Tactical Reconnaissance 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 910; civilians 230. Payroll $7.8 million. Limited transient facilities available during Army Guard camps.

Buckley ANG Base, Colo. 80011; 8 mi. E of Denver. Phone (303) 390-9011; AUTOVON 877-9011. 140th Tactical Fighter Wing (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 at Argonne, France, Sept. 27, 1918. Area 3,262 acres. Altitude 5,663 ft. Military 1,862; civilians 767. Payroll $14.6 million. Dispensary.

Burlington, Vt. (Burlington International Airport) 05401; 3 mi. E of Burlington. Phone (802) 658-0770; AUTOVON 689-4310. 158th Defense Systems Evaluation Gp. (ANG). Area 326 acres. Altitude 371 ft. Military 727; civilians 206. Payroll $7.1 million.

Charleston, W. Va. (Kanawha Airport) 25311; 4 mi. NE of Charleston. Phone (304) 342-6194; AUTOVON 366-9210. 130th Tactical Airlift Gp. (ANG). Area 218 acres. Altitude 981 ft. Military 833; civilians 180. Payroll $6.4 million. Dispensary, clinic.

Charlotte, N. C. (Douglas Municipal Airport) 28219. Phone (704) 399-6363; AUTOVON 583-9210. 145th Tactical Airlift Gp. (ANG). Area 49 acres. Altitude 749 ft. Military 984; civilians 183. Payroll $7.7 million. 4-bed dispensary.

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 700; civilians 183. Payroll $6.1 million.

Dallas Naval Air Station, Tex. (Hensley Field) 75211. Phone (214) 266-6111; AUTOVON 874-6111. 136th Tactical Airlift Wing (ANG), 181st Weather Flight, 531st USAF Band. Area 49 acres. Altitude 495 ft. Military 906; civilians 191. Payroll $7.7 million.

Des Moines Municipal Airport, Iowa 50321; in city of Des Moines. Phone (515) 285-7182; AUTOVON 939-8210. 132d Tactical Fighter Wing (ANG). Area 112.1 acres. Altitude 957 ft. Military 844; civilians 236. Payroll $7.4 million.

Dobbins AFB, Ga. 30060; 2 mi. S of Marietta; 16 mi. NW of Atlanta. Phone (404) 424-8811; AUTOVON 925-1110. AFRES base. Hq. 14th Air Force (AFRES); 94th Tactical Airlift Wing (AFRES); 116th Tactical Fighter Wing (ANG). Base activated in 1943; named for Capt. Charles Dobbins, WW II pilot killed in action near Sicily. Area 2,214 acres. Altitude 1,068 ft. Military 142; civilians 756; Reserve 1,523. Payroll $29.4 million. Housing: 3 officer; 6 NCO. Dispensary.

Duluth International Airport, Minn. 55811; 5 mi. NW of Duluth. Phone (218) 727-6886; AUTOVON 825-7210. 148th Tactical Reconnaissance Gp. (ANG). USAF base also located at airport. Area 152 acres. Altitude 1,429 ft. Military 863; civilians 230. Payroll $7.8 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 1,154; civilians 266. Payroll $9.3 million.

Forbes Field, Kan. 66620; 5 mi. S of Topeka. Phone (913) 862-1234; AUTOVON 720-4210. 190th Air Refueling Gp. (ANG). Area 486 acres. Altitude 1,079 ft. Military 680; civilians 261. Payroll $7.8 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 804; civilians 212. Payroll $6.9 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 Wing (ANG), 235th Air Traffic Control Flight, 163d Weather Flight. Area 87 acres. Altitude 800 ft. Military 890; civilians 248. Payroll $8.0 million.

Fresno Air Terminal, Calif. 93727; 5 mi. NE of Fresno. Phone (209) 252-4041; AUTOVON 949-9210. 26th NORAD Region and 26th Air Division

(TAC); 194th Fighter Interceptor Sqdn. (TAC); 144th Fighter Interceptor Wing (ANG). Area 139 acres. Altitude 332 ft. Military 919; civilians 292. Payroll $9.4 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. and 128th Tactical Control Flight (ANG). ANG: Area 65 acres. Military 916; civilians 228. Payroll $7.8 million. AFRES phone (414) 481-6400; AUTOVON 786-9110. 440th Tactical Airlift Wing (AFRES). AFRES: Area 99 acres. Military 5; civilians 179; Reserve 1,069. Payroll $11.4 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 27.9 acres. Altitude 640 ft. Military 787; civilians 156. Payroll $5.5 million. Dispensary.

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 844; civilians 297. Payroll $9.9 million. Dispensary.

Gulfport-Biloxi Regional Airport, Miss. 39501; within city limits of Gulfport. Phone (601) 863-8624; AUTOVON 363-8210. Training site; also host to 173d Civil Engineering Flight, 255th Combat Communications Sqdn., and the Army National Guard Transportation Repair Shop. An air-to-ground gunnery range is located 70 mi. due north of site. Area 211 acres. Altitude 28 ft. ANG military 328; civilians 18. Payroll $0.9 million (military pay only; civilians paid through Jackson). 2-bed dispensary.

Harrisburg-Olmstead International Airport, Pa. 17057. Phone (717) 944-0471; AUTOVON 454-9210. 193d Electronic Combat Gp. (ANG). ANG area 72 acres. Altitude 310 ft. Military 1,004; civilians 214. Payroll $10.7 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 865; civilians 267. Payroll $11.9 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 794; civilians 190. Payroll $7.3 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 959; civilians 289. Payroll $9.5 million. 5-bed dispensary.

Knoxville, Tenn. (McGhee Tyson Airport) 37901; 10 mi. SW of Knoxville. Phone (615) 573-0111; AUTOVON 588-8210. Host unit is 134th Air Refueling Gp. (ANG). Tenants: 228th Combat Communications Sqdn., 152d Band (ANG), ANG's I. G. Brown Professional Military Education Center. Area 287 acres. Altitude 980 ft. Military 1,147; civilians 301. Payroll $10.0 million. Dispensary.

Lincoln Municipal Airport, Neb. 68524; 3 mi. NW of Lincoln. Phone (402) 477-3904; AUTOVON 939-1700. 155th Tactical Reconnaissance Gp. (ANG). Also hosts Army National Guard and Army Reserve unit. Area 163 acres. Altitude 1,198 ft. Military 917; civilians 226. Payroll $7.4 million. Dispensary.

Louisville, Ky. (Standiford Field) 40213. Phone (502) 566-9400; AUTOVON 989-4400. 123d Tactical Reconnaissance Wing (ANG). Area 65 acres. Altitude 497 ft. Military 988; civilians 233. Payroll $7.9 million.

Mansfield Lahm Airport. Ohio 44901; 3 mi. N of Mansfield. Phone (419) 524-4621; AUTOVON 889-1520. 179th Tactical Airlift Gp. (ANG). Named for aviation pioneer Brig. Gen. Frank P. Lahm. Area 210 acres. Altitude 1,296 ft. Military 769; civilians 178. Payroll $5.9 million. Dispensary.

Martinsburg, W. Va. (Eastern West Va. 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 847; civilians 177. Payroll $6.0 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 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 972; civilians 238. Payroll $7.8 million. Dispensary.

Memphis International Airport, Tenn. 38118; 10 mi. S of Memphis. Phone (901) 363-1212; AUTOVON 966-8111. 164th Tactical Airlift Gp. (ANG). ANG occupies 227 acres. Altitude 332 ft. Military 796; civilians 164. Payroll $5.9 million. Clinic.

Meridian, Miss. (Key Field) 39301; within city limits. Phone (601) 693-5031; AUTOVON 363-9210. 186th Tactical Reconnaissance Gp. (ANG), 238th Combat Communications Flight, and 238th Air Traffic Control Flight. Area 74 acres. Altitude 297 ft. Military 1,065; civilians 248. Payroll $8.2 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 Wing (ANG). ANG: Area 126 acres. Military 941; civilians 230. Payroll $8.2 million. AFRES phone (612) 725-5011; AUTOVON 825-5100. 934th Tactical Airlift Gp. (AFRES). AFRES: Area 300 acres. Reservists 888; civilians 221. Payroll $8.5 million for ANG, $11 million for AFRES. Other units include 210th Electronic Installation Sqdn.; 237th Air Traffic Control Flight; 133d Field Training Flight; Det. 1, 1963d Communications Sqdn.; US Naval Reserve units; and Defense Investigative Service.

Moffett Naval Air Station, Calif. 94035; 2 mi. N of Mountain View. 129th Aerospace Rescue and Recovery Gp. (ANG). ANG phone (415) 966-4700; AUTOVON 462-4700. Area 12 acres. Altitude 34 ft. Military 800; civilians 196. Payroll $9.5 million.

Montgomery, Ala. (Dannelly Field) 36105; 7 mi. SW of Montgomery. Phone (205) 281-7770; AUTOVON 485-9210. 187th Tactical Reconnaissance Gp. (ANG). Hosts 232d Combat Communications Gp. Named for Ens. Clarence Dannelly, Navy pilot killed at Pensacola, Fla., during WW II. Area of base 42 acres. Altitude 221 ft. Military 1,009; civilians 270. Payroll $10.4 million. Dispensary.

Nashville Metropolitan Airport, Tenn. 37217. 6 mi. SE of Nashville. Phone (615) 361-4600; AUTOVON 446-6210. 118th Tactical Airlift Wing (ANG). Area 66 acres. Altitude 597 ft. Military 1,044; civilians 274. Payroll $9.3 million.

New Orleans Naval Air Station, La. (Alvin Callender Field) 70146; 15 mi. S of New Orleans. Area 3,245 acres. Altitude 3 ft. ANG and AFRES have separate phones and facilities. ANG phone (504) 394-2818; AUTOVON 363-3399. 159th Tactical Fighter Gp. (ANG). ANG: Military 771; civilians 231. Payroll $7.1 million. AFRES phone (504) 393-3399; AUTOVON 363-3399. 926th Tactical Fighter Gp. (AFRES). AFRES 585; civilians 95. Payroll $7.3 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 was shot down over France in 1918. 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. Military 3; civilians 327; Reservists 864. Payroll $17.5 million.

O'Hare International Airport, Ill. 60666; 22 mi. NW of Chicago's Loop. Phone (312) 694-3031; AUTOVON 930-1110. AFRES base. 928th Tactical Airlift Gp. (AFRES); 126th Air Refueling Wing (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. Military 5; civilians 1,853; Reservists 1,271; ANG 1,268. Payroll $20.5 million.

Oklahoma City, Okla. (Will Rogers World Airport) 73169; 7 mi. SW of Oklahoma City. Phone (405) 681-7551; AUTOVON 956-8210. 137th Tactical Airlift Wing (ANG). Area 71 acres. Altitude 1,290 ft. Military 1,127; civilians 218. Payroll $7.9 million.

Ontario International Airport, Ontario, Calif. 91761. Phone (714) 984-2705; AUTOVON 898-3870. 163d Tactical Air Support Gp. (ANG). Area 39 acres. Altitude 900 ft. Military 752; civilians 138. Payroll $6.3 million.

Otis ANG Base, Mass. 02542; 7 mi. NNE of Falmouth. Phone (617) 968-4667; AUTOVON 557-4667. 102d Fighter Interceptor Wing (ANG). 567th Band (ANG). 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, including ANG 4,000 acres. Altitude 132 ft. Military ANG 988; civilians 513. Payroll $14.6 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 3,217 acres. Altitude 689 ft. Military 34; no civilians. Payroll paid through Battle Creek; seasonal during field training. Housing: 86 officer; 40 NCO; 14 transient. 10-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 893; civilians 258. Payroll $8.7 million.

Pittsburgh ANG Base/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) 264-3380; AUTOVON 936-1760. 171st Air Refueling Wing and 112th Tactical Fighter Gp. (ANG). ANG: Area 90 acres. Military 1,398; civilians 372. Payroll $12.4 million. AFRES phone (412) 264-5000; AUTOVON 277-8000. 911th Tactical Airlift Gp. (host unit). AFRES: Area 165 acres. Military 21; civilians 180; Reservists 1,010. Payroll $10.4 million. Other units include 2046th Communications Installation Gp. (AFCC); USAF Liaison, Pa. CAP. Base activated 1943. 50 VOQ; 224 enlisted qtrs.

Portland International Airport, Portland, Ore. 97218. Phone (503) 288-5611; AUTOVON 891-1701. 142d Fighter Interceptor Gp. (ANG). Also host to 304th Aerospace Rescue and Recovery Sqdn. (AFRES), 83d Aerial Port Sqdn. (AFRES). Area 394 acres. Altitude 26 ft. Military 2,338; civilians 123. Payroll $15 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 882; civilians 185. Payroll $8.4 million.

Reno, Nev. (Cannon International Airport—May

ANG Base) 89502: 5 mi. SE of Reno. Phone (702) 323-1011; AUTOVON 830-8310. 152d Tactical Reconnaissance Gp. (ANG). Named for Maj. Gen. James A. May, state Adjutant General. Area 123 acres. Altitude 4,411 ft. Military 823; civilians 216. Payroll $7.2 million. Dispensary.

Richards-Gebaur AFB, Mo. 64030: 17 mi. S of Kansas City. Phone (816) 348-2000: AUTOVON 465-1110: AFRES base. 442d Tactical Airlift Wing (AFRES): 1879th Communications Sqdn. (AFCC): Det. 12, 17th Weather Wing (MAC). 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, killed Aug. 29, 1952, over North Korea during his 99th mission. Area 2,418 acres. Altitude 1,090 ft. Military 323; Reservists 1,444; AFRES civilians 31. Payroll for civilians and active-duty military $6.2 million; $5.2 million for AFRES personnel. Housing: 27 officer; 217 NCO; 152 transient.

Richmond, Va. (Byrd Field 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 1,009; civilians 250. Payroll $8.1 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. SAC forces are being withdrawn through Oct. 1982. 121st Tactical Fighter Wing (ANG); 906th and 907th Tactical Airlift Gps. (AFRES):160th Air Refueling Gp. (ANG). Base activated 1942. Formerly Lockbourne AFB. Renamed May 18, 1974, in honor of Capt. Edward V. Rickenbacker, America's leading WW I ace and Medal of Honor recipient, died July 23, 1973. Area 4,100 acres. Approximately 2,000 acres to be declared excess and turned over to General Services Administration. Some 1,500 acres shared by military and civilian concerns. Altitude 744 ft. Reserve and ANG military 3,350; active-duty USAF 100; civilians 5,050. ANG payroll $13.9 million. On-base Capehart housing to be retained as DoD family housing.

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 following ANG units: 109th Tactical Control Flight, 106th Tactical Control Flight, 130th Electronic Installation Sqdn., 299th Communications Sqdn. Area 75 acres. Altitude 4,220 ft. Military 1,222; civilians 308. Payroll $9.6 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 959; civilians 207. Payroll $9.2 million. Dispensary.

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 231 acres. Altitude 50 ft. Military 632; civilians 208. Payroll $9.0 million. Housing: 156 officer; 100 NCO. 3-bed dispensary.

Schenectady County Airport, N. Y. 12301; 2 mi N of Schenectady. Phone (518) 372-5621; AUTOVON 974-9221. 109th Tactical Airlift Gp. (ANG). Area 106 acres. Altitude 378 ft. Military 765; civilians 182. Payroll $6.4 million. Dispensary.

Selfridge ANG Base, Mich. 48045; 3 mi. NE of Mount Clemens. Phone (313) 466-4011; AUTOVON 273-0111. 127th Tactical Fighter Wing (ANG); 191st Fighter Interceptor Gp. (ANG); 403d Rescue and Weather Reconnaissance Wing (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, and transferred to Mich. 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 3,629 acres. Altitude 583 ft. Military ANG 1,528; civilians ANG 925. Payroll $24.0 million. Housing: 12 transient. 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 731; civilians 201. Payroll $6.9 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 and National President of AFA, founder of the South Dakota ANG. Area 145 acres. Altitude 1,428 ft. Military 767; civilians 209. Payroll $6.7 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 940; civilians 247. Payroll $8.2 million. Dispensary.

Springfield Municipal Airport, Ohio 45501; 5 mi. S of Springfield. Phone (513) 323-8653; AUTOVON 346-2210. 178th Tactical Fighter Gp. (ANG). Area 113 acres. Altitude 1,052 ft. Military 1,073 ANG; civilians 240. Payroll $8.8 million. 6-bed dispensary.

St. Joseph, Mo. (Rosecrans Memorial Airport) 64503; 4 mi. W of St. Joseph. Phone (816) 364-2941; AUTOVON 720-9210. 139th Tactical Airlift Gp. (ANG). Area 298 acres. Altitude 724 ft. Military 670; civilians 175. Payroll $6.1 million.

St. Louis International Airport, Mo. (Lambert Field) 63145. Phone (314) 263-6356; AUTOVON 693-6356. 131st Tactical Fighter Wing (ANG), 139th Combat Communications Flight, 241st Air Traffic Control Flight, 110th Weather Flight, 571st USAF Band. Area 50 acres. Altitude 589 ft. Military 1,201; civilians 294. Payroll $12.0 million.

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 739; civilians 184. Payroll $6.0 million.

Syracuse, N. Y. (Hancock Field) 13211; 5 mi. NE of Syracuse. Phone (315) 458-5500; AUTOVON 587-9110. 174th Tactical Fighter Wing (ANG). Tenants are 108th Tactical Control Flt. (ANG), and base operations for Hancock AFB (NORAD site on remote part of Syracuse Hancock International Airport). Area 443 acres. Altitude 421 ft. Military 910; civilians 232. Payroll $7.1 million. Dispensary.

Terre Haute, Ind. (Hulman Field) 47803; 5 mi. E of Terre Haute. Phone (812) 877-2551; AUTOVON 634-1581. 181st Tactical Fighter Gp. (ANG). Area 279 acres. Altitude 585 ft. Military 835; civilians 218. Payroll $7.4 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); hosts 555th USAF Band. Area 79 acres. Altitude 684 ft. Military 886; civilians 203. Payroll $8.0 million. 4-bed clinic.

Truax Field, (Dane Co. Regional Airport), Madison, Wis. 53704; 2 mi. N of Madison. Phone (608) 241-6200; AUTOVON 273-8210. 128th Tactical Air Support Wing (ANG). Activated June 1942, as AAF base, taken over by Wis. 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 834; civilians 163. Payroll $6.4 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 1,057; civilians 402. Payroll $12.3 million.

Tulsa International Airport, Okla. 74115. Phone (918) 836-0381; AUTOVON 956-5297. 138th Tactical Fighter Gp. (ANG), 125th Weather Flight (ANG). Area 78 acres. Altitude 676 ft. Military 753; civilians 195. Payroll $6.4 million.

Van Nuys ANG Base, Calif. (Van Nuys Airport) 91409. Phone (213) 781-5980; AUTOVON 873-6310. 146th Tactical Airlift Wing (ANG), 147th Combat Communications Sqdn. (Contingency), 195th Weather Flight, 562d USAF Band. Area 62 acres. Altitude 799 ft. Military 1,442; civilians 306. Payroll $11.6 million.

Volk Field ANG Base, Wis. 54618; 90 mi. NW of Madison. Phone (608) 427-3341; AUTOVON 884-3480. ANG Permanent Field Training Site, including air-to-air and air-to-ground gunnery ranges, to provide training for ANG flying units. Named for Lt. Jerome A. Volk, first Wisconsin ANG pilot killed in Korean War. Base area 7,629 acres. Altitude 915 ft. Military 41; no civilians. Payroll $0.1 million (military pay only).

Westfield, Mass. (Barnes Municipal Airport) 01085; 3 mi. N of Westfield. Phone (413) 562-3691; AUTOVON 893-1470. 104th Tactical Fighter Gp. (ANG). Area 133 acres. Altitude 270 ft. Military 838; civilians 193. Payroll $7.9 million.

Westover AFB, Mass. 01022; 5 mi. NE of Chicopee Falls. Phone (413) 557-1110; AUTOVON 589-1110. AFRES base. 439th Tactical Airlift Wing (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 1,952; civilians (AFRES and tenant units) 447. Payroll $19.7 million. Housing: 313 family quarters; 432 dormitory rooms; 25 VOQ; 174 BOQ.

White Plains, N. Y. (Westchester County Airport) 10604; 8 mi. NE of White Plains. Phone (914) 946-9511; AUTOVON 456-9210. 105th Tactical Air Support Gp. (ANG). Area 692 acres; ANG base 27 acres. Altitude 439 ft. Military 786; civilians 151. Payroll $7.6 million. Dispensary.

Willow Grove NAS (Air Reserve Facility), Pa. 19090; 14 mi. N of Philadelphia. ANG and AFRES have separate phones and facilities. Altitude 356 ft. ANG phone (215) 441-1500; AUTOVON 991-1500. 111th Tactical Air Support Gp. (ANG). ANG: Area 1,000 acres. Military 676; civilians 132. Payroll $5.4 million. AFRES phone (215) 443-1062; AUTOVON 991-1062. 913th Tactical Airlift Gp. (AFRES). AFRES: Area 162 acres. Civilians 112; Reservists 705. Payroll $7.6 million. Other units who use this facility include Army, Navy, and Marine Corps Reserve; 1998th Communications Sqdn. (AFCC); Defense Contract Administration Services Region, Philadelphia; 92d Aerial Port Sqdn. (MAC) as offbase tenant. Base activated Aug. 1958. Navy transient qtrs. available to Navy personnel only.

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 198th Aviation Company. Area 57 acres. Altitude 80 ft. Military 813; civilians 176. Payroll $6.2 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 837; civilians 191. Payroll $7.6 million.

Youngstown Municipal Airport, Ohio 44473; 16 mi. N of Youngstown. Phone (216) 856-1645; AUTOVON 346-9211. AFRES base. 910th Tactical Fighter Gp. (AFRES); 757th Tactical Fighter Sqdn. (AFRES). Base activated 1952. Area 226 acres. Altitude 1,784 ft. Reservists 736; civilians 221. Payroll $9.4 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 development and acquisition of aeronautical systems and related equipment. ASD comprises more than 7,000 officers, airmen, and civilians working in development programs and in conjunction with AFSC laboratory scientists and engineers.

Systems in development and production range from manned bombers, fighters, transports, trainers, and electronic countermeasures aircraft to such unmanned systems as the air-launched cruise missile and tactical air-to-ground missiles. Related equipment in development includes a night-attack system, life-support gear, flight simulators, and reconnaissance and electronic warfare subsystems. Aircraft programs under way include studies aimed at development of a strategic manned bomber, the CX transport as part of the worldwide Rapid Deployment Force, a Next Generation Trainer to replace the aging T-37, a Companion Trainer Aircraft for the economical training of SAC bomber crews, production of the EF-111A tactical jamming system, reengining and other improvements of the KC-135 aerial tanker, updating the B-52 bomber fleet with new offensive avionics for the cruise-missile carrier role, and rewinging the C-5 fleet to extend its service life. Missile programs include follow-on test and evaluation, production, and deployment of the air-launched cruise missile, test and production of the tactical Imaging Infrared Maverick missile, and Advanced Cruise Missile Technology studies.

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 44,000 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 countermeasure 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 −65 to +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).

Electronic Systems Division (ESD), Hanscom AFB, Mass.—ESD is responsible for development, acquisition, and delivery of electronic systems and equipment for the command control and communications functions 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 ground and aircraft use; optical and electromagnetic sensors to warn of solar-induced disruptions of the atmosphere; 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 Air Force and NATO; and the E-4 Airborne Command Post for the Strategic Air Command and the National Command Authorities. ESD also works directly with the major commands to plan for evolutionary command control and communications improvements.

Space Division (SD), Los Angeles AFS, Calif.—SD provides and manages the majority of the nation's military space systems. SD's responsibilities include:

- Providing and maintaining space-based communications, meteorological, navigation, and surveillance systems in support of combat forces on the ground, at sea, and in the atmosphere.
- Developing spacecraft, launch vehicles, and ground-terminal equipment to maintain and improve military space capabilities.
- Launching and controlling on-orbit satellites for DoD and other government agencies.
- Developing space defense and survivability technology to ensure protection of the nation's space assets.
- Managing DoD activities in the national Space Transportation System (Space Shuttle) being developed by NASA.
- 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, and the Manned Space Flight Support Group, major field elements of SD, described below.

Ballistic Missile Office (BMO), Norton AFB, Calif.—BMO manages the research, design, development, and acquisition of DoD ballistic missile systems. BMO's mission is to plan, implement, and manage programs to acquire ballistic missile systems and subsystems, support equipment, and related hardware. In addition, BMO provides for the alteration of missile sites and launch facilities and acts as executive agent for designated Air Force, DoD, and international missile programs.

BMO is currently managing full-scale engineering development of the MX missile system, the new land-based mobile intercontinental ballistic missile scheduled to be deployed in mid-1986.

BMO also currently provides for the Advanced Ballistic Reentry Systems triservice mission requirements.

Test Organizations

Space and Missile Test Organization (SAMTO), Vandenberg 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.

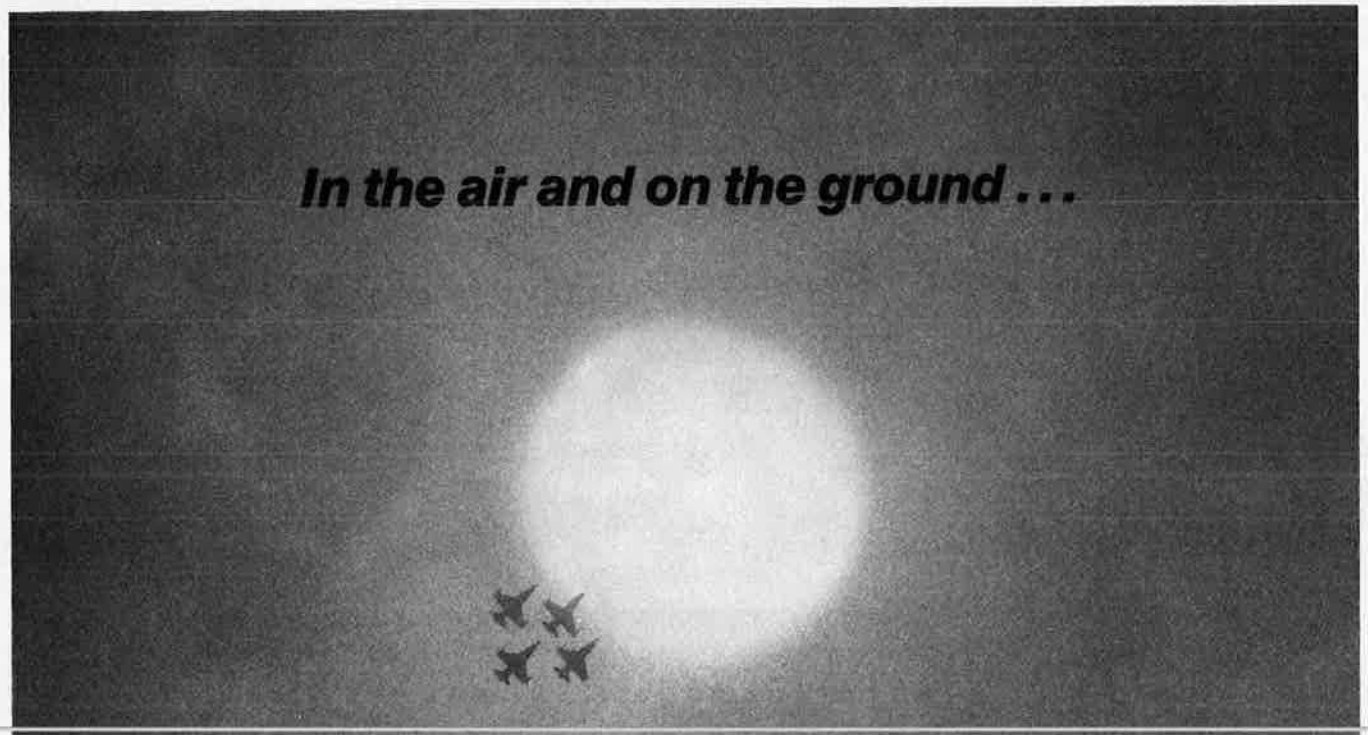
Western Space and Missile Center (WSMC), Vandenberg AFB, Calif.—The Center is responsible for conducting launch and launch-support activities for space and missile research and development programs of the Air Force and user agencies. Stretching halfway around the world from the California coast to the Indian Ocean, the Western Test Range is operated in support of both ballistic and space test operations. The range also is used for aeronautical tests, employing the same sensors and data-gathering equipment used for ballistic and space booster flights.

Eastern Space and Missile Center (ESMC), Patrick AFB, Fla.—The Center is responsible for conducting launch and launch support activities for the Air Force and user agencies. 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, Grand Turk, Antigua, and the 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 control 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 tests of manned and unmanned aircraft and aerospace research vehicles. Included in the evaluation are flying qualities and subsystem performance, reliability, maintainability, and functional capability under climatic extremes. The Center not only supports Air Force test programs but also DoD and other government agency, foreign, and



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contractor programs. Developmental testing of advanced and special mission parachutes is also conducted. AFFTC is responsible for operating the USAF Test Pilot School. Edwards AFB will serve as the landing site for the first series of Space Shuttle orbital flights and as an alternate site for subsequent flights.

Projects currently under evaluation include the F-15 and F-16 fighters, A-10 close support aircraft, the air-launched cruise missile, and the B-1.

AFFTC has management responsibility for the Utah Test and Training Range. Located in northwestern Utah, the range has 1,700,000 acres of land. Use of the range covers many development test and evaluation programs, including cruise missiles and remotely piloted vehicles. The Tactical Air Command and Strategic Air Command also conduct operations test and evaluation training programs.

Arnold Engineering Development Center (AEDC), Arnold AFS, Tenn.—AEDC has the largest complex of advanced aerospace flight simulation test facilities in the Western world. The Center operates more than thirty test units—including wind tunnels, altitude test cells, space chambers, and aeroballistics ranges—in which flight conditions can be simulated from sea level to altitudes of 1,000 miles, and from subsonic speeds to more than 20,000 mph.

AEDC's mission is to assist in ensuring that aircraft, missiles, spacecraft, jet and rocket propulsion systems, and other aerospace hardware meet specified requirements the first time launched or flown. Problems encountered with operational systems also are investigated.

Tests are conducted for the Air Force, Army, Navy, NASA, other federal agencies, and aerospace industry contractors. The development of essentially every major US aerospace program for the past quarter century has been supported by AEDC test work.

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

Director of Laboratories (DL), Andrews AFB, Md.—The Director of Laboratories provides policy, planning, and technical direction to programs of the command's research and development laboratories, and monitors their operations.

Laboratories under DL and their respective functional areas are:

• **Air Force Weapons Laboratory (AFWL),** Kirtland AFB, N. M.—AFWL conducts research and development programs in weapon effects and safety, laser technology, nuclear survivability/vulnerability, and advanced weapons concepts.

• **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 Human Resources Laboratory (AFHRL),** Brooks AFB, Tex.—AFHRL manages and conducts research and exploratory and advanced development programs for personnel management and training. Three of AFHRL's operational divisions are also located at Brooks AFB: Personnel Research Division, Occupational and Manpower Research Division, and Computational Sciences Division. The other AFHRL divisions are the Advanced Systems Division at Wright-Patterson AFB, Ohio; the Flying Training Division at Williams AFB, Ariz.; and the Technical Training Division at Lowry AFB, Colo.

• **Air Force Geophysics Laboratory (AFGL),** Hanscom AFB, Mass.—AFGL is the center for research and exploratory 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.

• **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 and the European Office of Aerospace Research and Development.

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.

• **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. AFWAL was established to combine common laboratory overhead, management, and support functions.

Flight Dynamics Laboratory is concerned with the development of flight-vehicle technology. Specific technical areas include structural design and durability, vehicle dynamics, aeroacoustics, vehicle equipment, mechanical subsystems, environmental control, crew escape and recovery, survivability and vulnerability, flight control, crew station design, flight simulation, performance analysis, aerodynamics, configuration synthesis, and technology integration.

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; and computer-aided manufacturing.

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.

Special Organizational Considerations

Several additional AFSC organizations contribute to the command's technological base and, while not directly responsible to the Director of Systems Command Laboratories, they do receive his technical direction. Some are discussed below; others have been discussed in the "Special AFSC Organizations" Section.

• **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.

• **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 bombs, dispensers, fuzes, guns, and ammunition. AFATL also provides consulting services in aircraft munition compatibility and analysis, and prediction of weapon effects. AFATL is organizationally assigned to the Armament Division at Eglin AFB, Fla.

• **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 in 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. The AFCMD evaluates contractor performance and manages the administration of contracts executed by Air Force, Army, Navy, Defense Supply Agency, NASA, and other government purchasing agencies.

Aerospace Medical Division (AMD), Brooks AFB, Tex.—AMD is charged with management and conduct of research and development in aerospace biotechnology which support 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.

• **Wilford Hall USAF Medical Center (WHMC),** Lackland AFB, Tex.—This 1,000-bed medical center is one of six in the Air Force and one of the largest in the Department of Defense. In addition to its primary mission of patient care, in clinical specialties, it provides more than fifty-five percent of all postgraduate medical training in the Air Force. 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. As a worldwide referral center, Wilford Hall offers such

sophisticated procedures as open-heart surgery, kidney and corneal transplants, cancer therapy, and reconstruction of various parts of the body. Its care unit for newborn infants has one of the lowest infant mortality rates in the world. A computerized Tomographic Scanner, the latest in diagnostic X-ray equipment, is located here.

• **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 define the limits of human tolerance and the degradation of human performance under the 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 a twenty-four-hour worldwide consultation service.

• **USAF Occupational and Environmental Health Laboratory (OEHL),** Brooks AFB, Tex.—OEHL provides consultation and specialized laboratory services to support requirements of occupational, radiological, environmental health, and environmental quality programs. ■

GUIDE TO NASA'S RESEARCH CENTERS

The National Aeronautics and Space Administration (NASA) operates a number of research, development, test, and evaluation (RDT&E) facilities 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.—Ames conducts such laboratory and flight research as atmospheric reentry, fundamental physics, solar physics and planetary environments, materials, chemistry, life sciences, guidance and control, aircraft supersonic flight, aircraft operational problems, and V/STOL. It manages such spaceflight programs as Pioneer. Named for Dr. Joseph S. Ames (1864–1943), Chairman of the National Advisory Committee for Aeronautics (NACA) from 1927 to 1939.

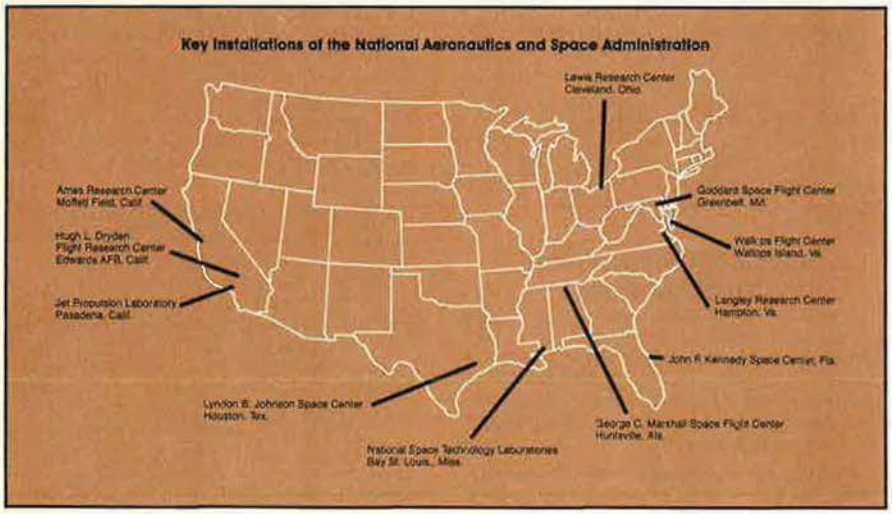
Hugh L. Dryden Flight Research Center, Edwards AFB, Calif.—Dryden Flight Research Center is concerned with manned flight within and outside the atmosphere, including low-speed, supersonic, hypersonic, and reentry flight, and aircraft operations. Flight testing includes HiMAT (Highly Maneuverable Aircraft Technology), RPRVs (Remotely Piloted Research Vehicles), pivot-wing subsonic aircraft, digital fly-by-wire flight control systems, and wake vortex alleviation methods. The approach and landing tests of the Space Shuttle Orbiter were held here. Dryden will serve as a Shuttle landing site for the first four orbital flights and as a contingency landing site afterwards. 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.—Goddard Space Flight Center is responsible for a broad variety of unmanned earth-orbiting satellites and sounding-rocket projects. Among its projects are Orbiting Observatories, Explorers, weather satellites, and Landsat. Goddard is also the nerve center for the worldwide tracking and communications network for both manned and unmanned satellites, home of the Space Science Data Center, and manager of the Delta launch vehicle. Named for Dr. Robert H. Goddard (1882–1945), "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 laboratory's primary role is investigation of the planets. It manages the Voyager and Galileo programs. JPL designed and operates the Deep Space Network, which tracks, communicates with, and commands spacecraft on lunar, interplanetary, and planetary missions.

John F. Kennedy Space Center, Fla.—The Center makes preflight tests and prepares and launches manned and unmanned space vehicles for NASA. 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 in California.

Langley Research Center, Hampton, Va.—Oldest of the NASA centers, Langley provides technology for manned and unmanned exploration of space and for improvement and extension of performance, utility, and safety of transport, military, and general aviation aircraft. Langley devotes more than half its efforts to aeronautics. The Center also managed the Viking project that orbited and landed spacecraft on Mars in 1976, and the Scout launch vehicle program. 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 Center has major responsibilities for Space Shuttle development, testing, and fabrication, including the main engine and solid rocket boosters. Other major projects are: Spacelab, Space Telescope, High Energy Astronomy Observatories, solar electric propulsion, and space processing. It manages the Michoud Assembly Facility in New Orleans. Named for the late General of the Army George C. Marshall, recipient of the Nobel Peace Prize, who died in 1959.

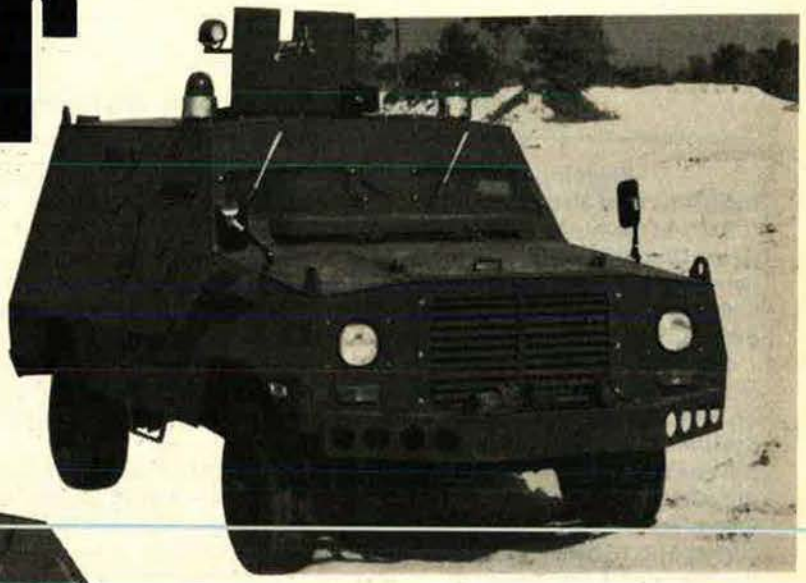
Wallops Flight Center, Wallops Island, Va.—Wallops is one of the oldest and busiest ranges in the world. Some 300 experiments are sent aloft each year on vehicles that vary in size from small sounding rockets to the four-stage Scout with orbital capability. A sizable effort is devoted to aeronautical research and development.

Lewis Research Center, Cleveland, Ohio—Aircraft and rocket propulsion and energy systems for space and on earth are among the major programs of Lewis. These take the Center into such studies as metallurgy, fuels and lubricants, magnetohydrodynamics, and ion propulsion. Lewis has technical management of the Atlas-Centaur and Titan-Centaur launch vehicles and Agena rocket stage. It is the main NASA center engaged in energy activities for the Department of Energy. Named for Dr. George W. Lewis (1882–1948), NACA Director of Aeronautical Research from 1924–47.

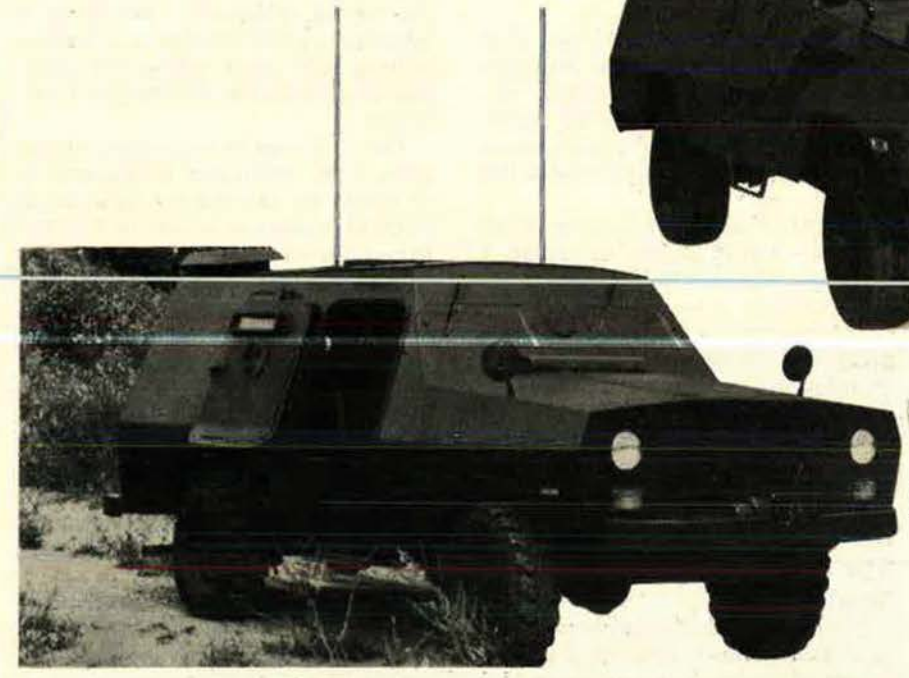
Lyndon B. Johnson Space Center, Houston, Tex.—The Center designs, tests, and develops manned spacecraft and selects and trains astronauts. It directs the Space Shuttle program. Mission Control for manned spaceflight is located at the Center. Named for the late President Johnson, during whose Administration the US manned space program gained its greatest impetus.

National Space Technology Laboratories, Bay St. Louis, Miss.—This complex conducts developmental tests of Space Shuttle main engines and environmental and related research. ■

COMMANDO Ranger

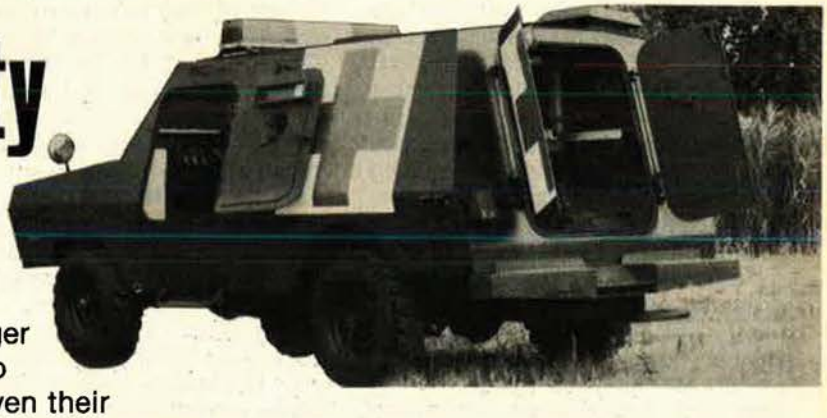


Security Vehicle



Command Communications

Medical Transport



Proven Reliability and Versatility

Specially equipped Commando Ranger armored vehicles, designed and built to U.S. Air Force specifications, have proven their reliability as security vehicles to many missile sites and air bases. Highly versatile and providing complete protection for occupants, the Ranger vehicle can also be employed as a command communications vehicle or as a medical transport.

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CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., April 2

Inflation and Procurement

Several members of the Armed Services Committees are voicing concern over the inflation assumption used by the new Administration in determining DoD spending for FY '82.

Rep. Samuel Stratton (D-N. Y.), chairman of the House subcommittee on Procurement and Military Nuclear Systems, recently criticized the 8.7 percent inflation factor for DoD procurement as "unrealistic." The amended inflation rate is a full percentage point below that projected by the previous Administration.

Defense Secretary Weinberger states consistently that the inflation assumption is consonant with the President's economic recovery expectations. At the same time, he also assures Congress that should the 8.7 percent prove too low, the Administration will request a Supplemental, rather than let inflation erode the proposed defense increases.

USAF Proceeds on MRASM

The Medium-Range Air-to-Surface Missile (MRASM), for which Congress authorized R&D funds last year, provided it was a joint Navy/Air Force venture, is now being pursued by the Air Force only. The Navy has dropped MRASM in favor of another on-going program, the Harpoon, an air-launched antiship missile.

The Air Force is requesting $49.1 million in FY '82 for the MRASM R&D program. Originally, no funds were allotted the Air Force in FY '81, but the Reagan Supplemental earmarks $14 million for the USAF program. The Navy was appropriated $23 million this fiscal year for MRASM; it now wants $14 million of that amount switched to its Harpoon program, if Congress agrees.

Navy's dropout from the joint venture was criticized by Rep. William Dickinson (R-Ala.), ranking minority member of the House R&D subcommittee, who asked what USAF intentions were concerning the continuation of the program. Air Force officials responded that MRASM is under way, and the Air Force is willing to proceed with the program either unilaterally or jointly with the Navy.

TAC Priorities

Lt. Gen. Thomas McMullen, Vice Commander of the Tactical Air Command (TAC), outlined tactical airpower needs for a House R&D panel.

The TAC spokesman emphasized three programs that must receive top priority:

- PLSS (Precision Location Strike System)—holds Soviet air defense weapon systems at risk.
- LANTIRN (Low-Altitude Navigation Targeting Infrared for Night) program—gives the F-16 force around-the-clock operating capability.
- SEEK TALK antijam program—allows communication during air combat by providing a jam-proof radio.

RDF Command Structure Scrutinized

Both House and Senate Armed Services Committees called on the Joint Chiefs of Staff to clarify the issue of command and control of the Rapid Deployment Force (RDF). Sen. William Cohen (R-Me.), chairman of the Sea Power and Force Projection subcommittee, said the "unsatisfactory nature of the present lines of command authority governing the RDF" and the unanswered question of where to put the command must be resolved before authorizing billions of dollars for the program.

Currently, the RDF is under the Readiness Command at MacDill AFB, Fla., but Marine Corps Lt. Gen. P. X. Kelley, RDF Commander, states that a new unified command for the Persian Gulf is the "optimal solution" for establishment of "clear and clean lines of command authority."

JCS Chairman USAF Gen. David Jones rebuffed this idea, emphasizing that the RDF is not only for Persian Gulf contingencies, and one-service domination of the force would be a "major step backwards," since each service provides unique capabilities essential for force flexibility to respond to any scenario worldwide.

Deputy Secretary of Defense Frank Carlucci informed Congress that six alternatives to the current structure are being reviewed, including a separate unified command as well as putting RDF under either the European Command or the Pacific Command.

The JCS tried to steer questioning away from command arrangements to focus on the more fundamental issue of resources to enable the RDF to be a viable deterrent. Adm. Thomas Hayward, Chief of Naval Operations, said, "The real issue . . . is what kind of forces should we have and should we be building or not building toward those forces, rather than the issue of command. . . ."

The Joint Chiefs differ in their personal views on the command structure. Hence, a decision is pending with the Secretary of Defense on the final resting place for the RDF Command.

Support for Multiyear Contracts

Stating that "multiyear procurements offer . . . an opportunity to reduce weapon system and equipment costs," Gen. Lew Allen, Jr., USAF Chief of Staff, criticized current legislative restrictions preventing the use of multiyear contracts for major acquisitions.

Appearing before a House panel on defense procurement, General Allen lent his support to pending legislation that would yield substantial savings through wider use of multiyear contracting under less restrictive conditions. If enacted, the bill would eliminate the need for annual congressional approval for various acquisition programs.

The Air Force currently uses multiyear funding for certain programs, *e.g.*, electronics equipment and 30-mm ammunition.

General Allen said the concept would have to be applied selectively, but the Air Force is reviewing certain stable programs where major savings could be achieved. Potential candidate programs include the KC-135 reengining, the F-16, and the air-launched cruise missile. ■

With the strategy of mutual assured destruction now bankrupt and US ICBMs vulnerable to a Soviet first strike, the only logical course seems to be to press on with the huge MX construction program. Unless, of course, we consider . . .

Another Possibility: Ballistic Missile Defense

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

THE burning defense issue now before the Secretary of Defense is how and where to base the MX. Like a lot of us for whom ICBMs are simply impersonal if essential doomsday devices, Mr. Weinberger doubtless wishes he could put the MX on the moon and out of mind, leaving him free to go on to more agreeable problems. There will be no such luck. The report of his MX basing advisory group is due in time for a decision around July 1. Whatever the answer, it will be disputed by a considerable segment of the population.

The Soviets have made the MX necessary, if we are to keep up our end in this seemingly perpetual confrontation. However unreal and illogical the idea of all-out nuclear war, it is something we must be prepared for if we are to have any chance of preventing it. For if we look sufficiently well prepared, clearly able to sustain a first strike and hit back with devastating accuracy, then these many-headed nuclear monsters may end up like their ancestors, the guns of the United States Coast Artillery, which never fired a shot in anger.

Now that the McNamara strategy—if it could be called that—of mutual assured destruction, or MAD, is out of style, there is general agreement that we need missiles that can, with precision, knock out hard military targets. This sort of strategy requires highly accurate weapons, and it also presupposes sure and instant communications. So far, at least, land-based missiles have a clear advantage over submarine-launched ballistic missiles in both of these categories. Where the submarine shines is in its relative invulnerability.

Although there are still some who doubt it, the conventional wisdom today has our Minuteman ICBMs vulnerable to a Soviet first strike. If they were knocked out, our retaliation would presumably have to take the form of city-busting. Simply possessing that capacity for revenge gets us back to the old mutual assured destruction concept. Since the poverty and incredibility of that concept are now well established, and since submarines still have a long way to go before they can be as accurate and responsive as land basing, Mr. Weinberger, it seems, will have to choose between the enormous and politically unpopular construction project in Utah and Nevada or swallow some misgivings and put the things to sea.

Maybe it is grasping at straws, but there does seem a third possibility — ballistic missile defense. Our last ABM effort, Safeguard, was a modest one, which went on the scrap heap almost as soon as it became operational. Under the ABM treaty, each side, the Soviets and ourselves, is limited to 100 ABMs and two sites. That treaty, incidentally, comes up for review next year.

Secretary of Defense Caspar Weinberger: The burning defense issue now before him is how and where to base MX.

Research on ABMs, however, was not banned under the treaty. The Soviets, according to publicly available evidence, have gone ahead on experiments in the exotic world of lasers and charged-particle beams. Ballistic missile defense of cities and other large areas poses very great problems, probably insuperable ones, if I understand what I have heard. But point defense of missile sites is something that may be well within the grasp of ABM technology, especially if the charged-particle beam proves a manageable weapon.

When the ABM treaty was signed in 1972, it was considered to be a stabilizing move. If neither side protected itself very much, went the reasoning, then each would be too vulnerable to risk attacking the other. Besides, in 1972, Soviet missiles were too inaccurate to take out our Minutemen, and everyone knew we would never launch a preemptive strike.

Now we are in a different era, with Soviet SS-18s threatening our land-based force. There was little enthusiasm, and precious little money, in the Carter Administration for ABM research. Perhaps that was the right decision, but not according to some sensible and knowledgeable people.

If a practical antiballistic missile defense is something that could come out of an accelerated, which is to say, heavily funded, research program, it could certainly solve a lot of problems, not to mention the tranquility it would bring to the 20,000 square miles of desert presently being eyed as the home of the MX. ■

May 23 at The Broadmoor, Colorado Springs, Colorado

THE TWENTY-SECOND ANNUAL OUTSTANDING SQUADRON DINNER

Saluting the 1981 Outstanding Squadron at the United States Air Force Academy
Cosponsored by the Air Force Association and its Colorado Springs 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

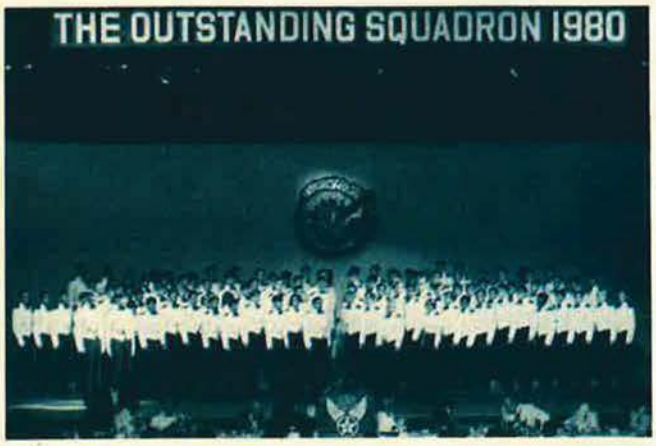
Cost: $45 single, $80 per couple

Hotel reservations may be made direct with: The Broadmoor, Colorado Springs, Colorado 80901, telephone (303) 634-7711. Singles $85-$110, Doubles $90-$115, or the Four Seasons Motor Inn, 2886 S. Circle Drive, Colorado Springs, Colorado 80906, telephone (303) 576-5900. Singles $40, Doubles $50, or the Antlers Plaza (under Broadmoor management, and providing regular shuttle to and from The Broadmoor) for $47 Single, $55 Twin. Be sure to mention AFA when writing or calling for reservations.

Golf and tennis tournaments will be conducted at The Broadmoor on Friday, May 23. 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



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_____ Singles @ $45 $_____

_____ Couples @ $80 $_____

Enclosed is my check for $_____

☐ Please send information on the golf and tennis tournaments.

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THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Benefits "Shopping List" Grows

Increased travel money, a subsistence allowance for staff sergeants and above, a fifty percent boost in hazardous-duty pay, greater household goods shipping weights, another flight pay raise, and funded special leave—these are a few of the new benefits USAF wants this year.

The full list contains a score of different compensation improvements. They are in addition to the two across-the-board pay raises the Administration proposes and Defense Secretary Weinberger's proposal to exempt the first $20,000 of military pay from federal taxes. Secretary Weinberger is also asking Congress for an extra $1.04 billion for "Quality of Life" improvements in family housing, barracks, commissaries, and dependent schools *(see also "Aerospace World," p. 30).*

The pay raises would elevate pay 5.3 percent July 1 and 9.1 percent October 1. These raises constitute USAF's "top priority" in the renewed compensation drive, but USAF is also bearing down hard on Congress to approve the following:

As part of the FY '81 supplemental appropriation, effective July 1, 1981: (1) funding for the aviator continuation bonus (up to four months' basic pay) authorized last fall; and (2) higher mileage/per diem rates of sixteen cents per mile/$50 per day (originally scheduled to be delayed until October 1).

As part of the FY '82 budget not requiring special legislation: (1) BAS for all E-5s and above; (2) increased weight allowances for single careerists serving long tours; and (3) bachelor COLA overseas.

Other FY '82 initiatives not requiring new legislation: (1) further increased PCS mileage to 18.5 cents a mile; (2) Stateside junior enlisted travel (JET), including dependent travel, 1,500 pounds of household goods and with-dependent dislocation allowance; (3) up to 2,500-pound increases in HHG allowance for others and removal of the 13,500-pound ceiling; and (4) dependent travel entitlements.

FY '82 initiatives requiring specific legislation: (1) CONUS temporary lodging allowance of four days at $37.50 per day for the member and $25 per day for each dependent; (2) twenty-five percent boost in flight pay (in addition to last fall's raise); (3) CHAMPUS dental care for families and space available care for families and retirees in military facilities; (4) a six-day house-hunting trip with payment of $50 per day for the member and $37.50 per day for the spouse; (5) a $15,000 scientist-engineer officer accession bonus plus a continuation bonus of up to $3,000 a year; (6) a fifty percent raise in hazardous-duty pay; (7) extension of hazardous-duty pay to more jobs, *e.g.,* Titan II fuel handlers and firefighters; (8) recruiter pay of $125–$250 a month; (9) government life insurance of $40,000; and (10) funded environmental, morale, and emergency leave.

USAF personnel officials Lt. Gen. Andrew P. Iosue and Maj. Gen. William R. Usher have built a strong case for the improvements before the Armed Services and Appropriations Committees. They are the keys to replacing "the mid-career and senior personnel losses already incurred," and they are necessary "to restore healthy readiness levels," General Usher said.

Missing from the official USAF and DoD shopping lists is a new GI Bill. General Iosue and leaders of the other services have testified in support of a new GI measure designed to attract high-quality recruits and provide retention incentives. But the Administration wants to study a one-year educational incentive test now going on before backing a new GI Bill. The congressional Veterans Affairs Committees, however, have indicated they may not wait, and have begun hearings.

PHS Facilities Face New Budget-Trimming Threat

The Public Health Service's eight hospitals and twenty-seven outpatient clinics, which provide patient care for thousands of military personnel and dependents, are targeted for elimination under the Administration's budget trimming plans.

Last year alone, the PHS facilities provided 8,235 inpatient days of care to DoD active-duty members, 34,605 days to retired personnel, and 40,279 days to military dependents. The outpatient work load was far higher: 50,528 visits by active-duty members, 220,428 visits for retired members, and 392,101 visits for DoD dependents.

PHS officials point out that because more than ninety percent of its patients are dependents and retirees, closing down PHS facilities would find huge numbers of people being forced into using CHAMPUS for their care at considerable expense to the government.

The Office of Management and Budget says $110 million could be saved next year by closing the PHS facilities, but PHS officials claim the closings would create nearly $200 million in new costs for personnel expenses, increased CHAMPUS costs, and continuing care in other facilities for people now accommodated in PHS facilities.

Previous administrations have tried and failed to close the PHS facilities, but the latest effort seems more likely to succeed. The PHS, which offers a full range of medical services, has hospitals in Boston, New York, Baltimore, Norfolk, New Orleans, Houston, San Francisco, and Seattle. The clinics are located in major cities along the ocean coasts and major rivers of the CONUS, in San Juan, and Honolulu. PHS officials say that in many of the areas their facilities are the only ones available to retirees.

Military Strength on Rise

After years of steadily declining military personnel strength, the services are slowly increasing the size of their active and civilian employee forces. The Reserve Forces, on a gradual increase for several years, are slated to expand further in the years ahead. Meanwhile, most other federal agencies are facing severe manpower reductions under the Administration's budget cutting.

THE BULLETIN BOARD

The main threat to the Pentagon's expansion plans is the declining youth population, reducing sharply the number becoming eighteen each year. To cope with this decline, the Defense Department hopes to boost its recruiting budget to $960 million in FY '82, compared to $812 million this year. As usual, the Army is earmarked for about half the recruiting outlay. USAF's share of the FY '82 money is $109 million.

Active-duty USAF strength, now about 558,000, will rise to 570,000 under the FY '82 budget. As the following chart shows, the Army and Navy also plan personnel increases:

Active Military by Service
(Thousands)

	FY '76	FY '80	FY '81	FY '82
Army	779	777	775	786
Navy	525	527	537	550
Marine Corps	192	188	188	188
Air Force	585	558	565	570
Totals	2,081	2,050	2,065	2,094

The USAF civilian employee increase, from 240,400 to 244,000, is the first in ten years and represents plans to move some uniformed personnel out of civilian-type positions.

The budget boosts the Air National Guard and Air Force Reserve strength to all-time highs—to 99,200 for the ANG and to 65,748 for AFRES. The combined current drill-pay Guardsmen and Reservists, with their 1,900 aircraft and 144 flying squadrons, comprise a force larger than all but four of the world's regular air forces, according to Acting Assistant Defense Secretary (Manpower, Reserve Affairs, and Logistics) Robert A. Stone.

Secretary Stone told Congress that many of the participants have "more experience and training" than active-duty Air Force members.

To help attain the higher manpower goals, the Pentagon is asking Congress for authority to pay active-duty enlistment bonuses of up to $10,000. Other new benefits the Air Force wants are listed elsewhere in this column.

Three incentives for the ANG and AFRES members are available only this fiscal year, but Defense wants the lawmakers to extend them indefinitely. They are: (1) authority for a bonus for volunteers who join a Selected Reserve unit for the remainder of their military obligation; (2) a reenlistment bonus for reenlistees in the Individual Ready Reserve or Inactive National Guard; and (3) forgiveness of student loans for enlisted service in the Selected Reserve.

VSBAP Expands Just a Bit

Five years ago, the Air Force, amid some fanfare, established the Voluntary Stabilized Base Assignment Program (VSBAP). It allows airmen volunteers to serve five-year tours at four unpopular SAC bases—Loring, K. I. Sawyer, Minot, and Grand Forks, all extremely frosty locations. The attraction is the guaranteed longer-than-usual tour and the reduction of transfer turbulence. For the Air Force it means slightly less travel outlays and increased mission continuity.

The Air Force advises that while only 3,491 persons, or 23.3 percent, of the population at the four sites are participating in VSBAP, the average residency has "greatly increased" and assignment turbulence has been reduced. Thus, Hq. USAF states, "The program is considered very successful."

But no major expansion is in the cards; if great numbers of personnel were offered lengthy tours at more popular locations, severe assignment problems would arise. So Air Force is limiting VSBAP expansion to Los Angeles AFS, Calif., disliked by many airmen because of the high living costs. The program will be tested there for two years. However, the guaranteed tour there is four years and, should the project be discontinued, those assigned will get to serve it out. CBPOs have details on the program.

Yesteryear's Outstanding Airmen . . . Where Are They?

At least three of them, all USAF retired chief master sergeants, followed the sun to the southwest. Contacted by AIR FORCE Magazine twenty-three years after being named an Outstanding Airman in 1958, CMSgt. Douglas P. Easterly of Albuquerque, N. M., reports that he is busy selling insurance, fishing, and touring in his recreation vehicle. His last active-duty tour was at Elmendorf AFB, Alaska, where he earned his insurance license, thus launching his second career. Now sixty-four, he plans to hang it up soon.

CMSgt. Frank J. Barnet, of Scottsdale, Ariz., a 1959 Outstanding Airman, served more than thirty years, the first fourteen in the Army. He retired in 1973. He was Senior Enlisted Advisor to the commander of Lackland AFB, Tex., and held the same position to the commander of Rhein-Main AB, Germany, earlier. Mrs. Barnet happily recalls the AFA Convention in 1959 when the Outstanding Airmen and their wives were AFA's guests at the Fountainbleau Hotel in Miami Beach, Fla.

CMSgt. Perry C. Bishop, also a thirty-year man and a 1959 Outstanding Airman, is fully retired; he suffered an accident a few years ago that left him unable to walk. His Air Force service took him to Vietnam, Thailand, Alaska, Okinawa twice, and elsewhere in the Pacific. He served as a radio operator, later as a B-29 flight engineer, then in various communications jobs, and finally as a first sergeant and a sergeant major. He is proud of his military-oriented family: two of his sons are in the Navy, one a lieutenant commander and the other a chief petty officer; his daughter is married to an Air Force major; and a third son completed a hitch in the Air Force.

Continuation Boards Dropped

The Air Force has continued on active duty 955 veteran Reserve officers since 1978 when the "continuation" boards were established. Now, it's starting to cut back, and the annual board action is being discontinued, although a few extensions past the twenty-year service point will be made on an individual basis.

The previously continued officers agreed to serve two additional years at a time when shortages were acute due to excessive separations. But retention generally is on the upswing, and the Air Force, under the DOPMA legislation, is moving toward an all-Regular officer career force; eventually officers approaching retirement eligibility will be primarily regulars.

It was in the late 1950s that Air Force began forcibly retiring active-duty non-Regulars as they hit the twenty-year service mark. This created a furor throughout the service and brought angry protests from Reserve organizations. But USAF, faced with huge overages of field graders with around that service, held that virtually all such billets would be filled by Regulars.

SPEAKING OF PEOPLE

A Salary System for Service Members?

By Ed Gates, CONTRIBUTING EDITOR

While military compensation, with pay raises and new benefits in the offing *(see "The Bulletin Board," p. 195)*, is again prominent in service news coverage, it might be timely to look at the composition of the pay system. Is it generally understood? Is it time to replace the antiquated pay and allowance arrangement, the only one US service members have ever known, with a salary system like those used by the Australian, Canadian, and British forces? Do their programs contain special wrinkles the US might adopt to advantage?

These matters are addressed in a new report by the General Accounting Office. It follows by five years a GAO study urging a salary plan on the grounds that military pay, as a lump sum, would be more visible, more likely to keep good people in uniform. The study got no place.

But the single salary and the demand for greater visibility ideas remain alive. Indeed, under orders from Congress, USAF has prepared a "total benefits" statement, spelling out in detail every pay, allowance, and benefit, direct and indirect. It even examines the value of military job security and leave and holidays. Distribution of this visibility statement is scheduled to begin in the fall *(see related item, p. 30)*.

The GAO is the watchdog of federal spending and the investigative arm of Congress. Its new report compares the military pay set-ups of the aforementioned nations plus France and West Germany with the US system. The latter two use pay and allowance systems similar to ours.

The new report concludes that several parts of these foreign systems "offer promise" for use by the US, salary being one of them. The GAO also urges the Pentagon to consider:

1. Establishing an "X factor" to compensate for the disadvantages and rigors of military service, as the Australians and British do. The former receive $1,295 in X factor money as part of their salaries.

2. Linking military pay systems to the civilian economy. The Canadians, the GAO explains, do this by tying military pay to that of Canadian public service employees, which in turn has been matched to different jobs of Canadian private sector employees. The British and Australian programs also use different pay tracks for different skill groupings. And their systems link private-sector salaries and military pay where the work requires similar skills, experience, and responsibilities.

3. Special rates for longer enlistments. France and the UK pay more for longer enlistments; the latter, in fact, signs some newcomers to ten-year enlistment pacts. Because the US forces are not getting long-term service from enough people, "it is possible that an evaluation of the United Kingdom and French programs would indicate possible corrective measures," the report says.

The GAO also urged DoD to look at the other countries' special pays tied to specific duties and occupations and find out how effective they might be here. Actually, while they vary widely by country, overall they do not appear as favorable as those in the US pay system.

But there is no doubt that the US military's pay and allowance rates (October 1980 figures) lag behind those of Australia, Canada, and the UK, all of which have volunteer services. France at some grade levels also trails this country's, but is ahead in others. At the E-5, or journeyman enlisted level, for example, the purchasing power range for the French is a surprisingly high $11,119 to $21,644, compared to ours of $11,689 to $16,026.

Perhaps the most extreme difference in the E-5 comparisons is between the US and the UK. The E-5 equivalent in that economically troubled nation is a purchasing power worth $22,176, far above the $11,689 to $16,026 range here.

The US also trails the other three English-speaking countries in officer compensation. At the O-4 level, for instance, the purchasing power range is Australia $29,373 to $33,057, Canada $29,407 to $33,025, and the UK $33,046 to $39,603, compared to a $22,784 to $35,565 spread here. France's O-4 rates are virtually the same as ours, while West Germany's are far behind at $13,705 to $24,275.

The US forces fare better on certain important extras. It is the only one of the six nations that does not tax quarters and subsistence allowances. Australia and West Germany have no exchanges and commissaries while the Australians, Canadians, and French contribute to their retirement. Australia and West Germany do not provide retiree medical care.

US recruits received $9,302 in 1980, second only to Australia's rookies whose salaries averaged $9,872. However, the US E-1 only saw the basic pay part, or $6,016. The remaining $3,286 he received in kind and tax advantage, and it is not visible. "This lack of visibility may have a significant impact on recruitment," the GAO declared. This report, it would seem, contains some worthwhile ideas deserving high-level attention. ■

The continuation program cited above is not to be confused with the continuation boards that consider promotion-failed officers for extended active duty. The later activity is spelled out in DOPMA.

VA Putting the Bite on Debtors

More than 66,000 federal workers owe Uncle Sam $37 million in overpaid VA benefits and defaulted education and home loans, and VA is asking the agencies they work for to get after them to pay up. The VA has already nailed its own employees who owe Uncle Sam money.

But the big money—a whopping $532 million worth—owed by the general public for overpaid VA benefits is harder to collect. A VA spokesman says the agency is trying, but it's slow going. Only recently, he says, the names of some 90,000 deadbeats not working for the government were referred to the Justice Department for collection attempts. If all 90,000 were nailed, and this obviously won't happen, $104 million would be recovered, he said.

One problem with getting a firm handle on collections, he said, is that the Carter Administration wrote off many debts as uncollectible. Now,

some of these have been reinstated, and attempts will again be made to collect.

The Veterans Administration wants to use private collection agencies to help, but permission for this is still pending, the spokesman said.

The VA said that it would "work with" the 66,000 federal employees who dispute the size of their debt or need to establish a repayment plan, but it urged the agencies to pressure debtors who fail to pay up. The VA maintains periodic computer checks to keep its own employee slate clean.

AFA Honors Engineer-Author

Harry R. Marien, an Air Force civilian engineer at Tyndall AFB, Fla., has won the Maj. Gen. A. M. Minton Best Author Award for 1980 for his article, "To Save a Million Dollars," which appeared in the February 1980 issue of the *Air Force Engineering and Services Quarterly.*

General Minton, the seventh Director of Air Force Civil Engineering, believed engineers should be able to communicate to laymen, in writing, an understanding of what they do. The AFA-sponsored award, presented for the past twenty-one years, recognizes this.

The runner-up article in this year's competition was "The Heat From Within the Earth," coauthored by Capts. Richard Steede and Don M. Bradford. There was a tie for third place between Lt. Col. Thomas Bozarth for "MX Weapon System" and Lt. Col. Max Day for his article "Alert to the Task."

AFA's Executive Director Russ Dougherty presented their plaques to the winners during a presentation luncheon at the Bolling AFB Officers Club.

THE BULLETIN BOARD

Airlines Extend Furlough Discounts

Ten major airlines have extended the fifty percent military discount on air fares past the March 31 expiration date. The positive responses followed an appeal by the Association of the United States Army, which stressed the importance of the reduced fares to members of all the military services.

The airlines responding positively to the extension appeal were Eastern, Delta, USAir, Braniff, United, Republic, Piedmont, Frontier, Western, and Texas International.

None of the responses indicated how long the extended fare reductions would last.

Gerrity Winners at Hq. AFLC

In an unusual spin of the assignment wheel, four officers in key posts within the same organization at Air Force Logistics Command headquarters, Wright-Patterson AFB, Ohio, are among the seven winners of AFA's annual Thomas P. Gerrity Award. AFA confers that honor at its national convention to recognize "the most outstanding contribution in the field of systems and logistics."

AFLC honorees and the year they won the award are Maj. Gen. Jack W. Waters, DCS for Logistics Operations, 1974; Brig. Gen. William P. Bowden, Assistant DCS for Logistics Operations, 1980; Col. James K. Lowman, Director of Distributions, 1978; and Lt. Col. Richard E. Ford, Deputy Chief, Investment Materiel Division, 1977.

The Gerrity Award, honoring the late Commander of AFLC, is one of the seven AFA national aerospace awards presented annually to individuals and organizations. The honors recognize outstanding contributions that further development of various fields of aerospace power.

Short Bursts

Each service member will soon receive a **"Personal Statement of Military Compensation."** It's a lengthy, involved, three-page single-spaced recitation of his or her pay and benefits. The House Appropriations Committee late last year directed USAF to prepare such a paper for everyone in the DoD establishment, saying it must cover "the entire range of compensation." Thus, the Air Force had no choice but to produce this monster that is of questionable value and imposes a huge burden on the service finance centers. The Air Force sent a draft of the statement to Congress recently and, if the lawmakers don't object, each member will receive a personalized copy. The draft covers an unnamed staff sergeant whose annual direct pay (as of October 31, 1981) comes to $18,096 and whose indirect compensation (medical care, Social Security equity, etc.) is $2,246. Additional considerations, including the value of "job security," "leave and holidays," and eight others are spelled out so that each person can insert his own estimate. It's the lawmakers' way of making military pay "visible."

From the Veterans Administration comes word that the agency is being **swamped with requests for the "dividend" on old NSLI policies.** There is no such dividend, the VA has been saying for years, but the rumors won't quit; in fact they multiply, for no apparent reason. The VA insurance office in Philadelphia alone is currently receiving more than 1,200 requests daily for the phantom dividend.

Enactment of DOPMA clears the way for reform of the laws governing **management of Reserve officers.** A task force has been formed in DoD to do this. It plans to submit a legislative proposal on the new Reserve Officer Personnel Management Act—ROPMA—to Congress late this year.

Our item in the February "Bulletin Board" explaining that Reservists

AFA Executive Director Russ Dougherty presents the Maj. Gen. A. M. Minton Best Author Award to Harry R. Marien, right, for his article, "To Save a Million Dollars." Mr. Marien is an engineer at Tyndall AFB, Fla. (See item.)

with **questions about the Survivor Benefits Plan** could call an 800 number at the Air Reserve Personnel Center swamped the Center's switchboard. The public affairs officer there, Lt. Col. Barry C. Trader, asks that SBP callers have their facts current and in hand before calling. It will speed up lengthy question-and-answer conversations.

The twice-a-year cost-of-living **indexing of federal and military retirement pay** is in jeopardy again. The Reagan Administration wants it cut to once annually, and the Senate Budget Committee has agreed. Other approvals are required in Congress, however.

Will **"contracting out" of military functions to private firms** create mobilization problems? There was heated debate on this at a recent House Armed Services Committee hearing. Army officials foresee serious problems if, for example, contractor employees go on strike during an emergency. Air Force witnesses disagreed, saying they didn't think contracting out posed a threat to mobilization capability.

Senior Staff Changes

PROMOTIONS: To be **Lieutenant General:** Lynwood E. **Clark.**

To be **AFRES Major General:** James J. **Feeney.**

To be **ANG Brigadier General:** Wess P. **Chambers.**

RETIREMENTS: M/G Billy J. **Ellis;** M/G Charles C. **Irions;** B/G William E. **Lindeman;** B/G Norris W. **Overton;** M/G Edwin W. **Robertson** II; L/G Evan W. **Rosencrans.**

CHANGES: M/G (L/G selectee) Lynwood E. Clark, from Cmdr., San Antonio ALC, AFLC, Kelly AFB, Tex., to Cmdr., Hq. AAC, Elmendorf AFB, Alaska, replacing L/G Winfield W. Scott, Jr. . . . **B/G Pintard M. Dyer III,** from C/S, Fifteenth Air Force, SAC, March AFB, Calif., to Cmdr., 12th AD, SAC, Dyess AFB, Tex., replacing B/G Dennis B. Sullivan . . . **L/G Lincoln D. Faurer,** from Dep. Chmn., NATO Mil. Comm., Brussels, Belgium, to Dir., NSA; and Chief, Central Security Service, Washington, D. C. . . . **B/G Sloan R. Gill,** from Dep. to Chief, AFRES, Hq. USAF, Washington, D. C., to Cmdr., Fourth Air Force, AFRES, McClellan AFB, Calif., replacing Maj. Gen. Sidney S. Novaresi.

B/G Richard D. Murray, from Dep. Dir. of Budget, USAF Comptroller, Hq. USAF, Washington, D. C., to Dep. Cmdr., Army and Air Force Exchange Service, Dallas, Tex., replacing retired B/G Norris W. Overton . . . **L/G Winfield W. Scott, Jr.,** from Cmdr., Hq. AAC, Elmendorf AFB, Alaska, to Dep. Cmdr., US Forces Korea; Dep. CINC, UN Command Korea; and C/S, Combined Forces Command, Seoul, Korea, replacing retired L/G Evan W. Rosencrans . . . **B/G Alan G. Sharp,** from Cmdr., 514th MAW (Assoc.), AFRES, McGuire AFB, N. J., to Cmdr., 94th TAW, AFRES, Dobbins AFB, Ga., replacing retired B/G Billy M. Knowles . . . **B/G Dennis B. Sullivan,** from Cmdr., 12th AD, SAC, Dyess AFB, Tex., to Command Dir., NORAD Combat Ops. Ctr., J-3, ADCOM, Cheyenne Mountain Complex, Colo. . . . **B/G James C. Wahleithner,** from Cmdr., 349th MAW (Assoc.), AFRES, Travis AFB, Calif., to Dep. to Chief, AFRES, Hq. USAF, replacing B/G Sloan R. Gill. ■

AFA NEWS

Chapter and State Photo Gallery

By Dave C. Noerr, AFA AFFAIRS EDITOR

Arc Light Chapter officers and board members met at Andersen AFB, Guam, recently with Maj. Gen. Stanley C. Beck, Commander of SAC's 3d Air Division at the base, to welcome General Beck to Guam and to discuss plans and programs of the Arc Light Chapter. General Beck is a strong supporter of AFA and immediately submitted his request for affiliation with the Guam Chapter. Pictured with General Beck at the meeting are (from left to right): Lee Webber, Chapter Secretary; Drew Kaye, Vice President; Arc Light Chapter President Joe Gyulavics; General Beck; and board members Bud Theisen and Cy Simon.

Maj. Gen. Jay T. Edwards, Commander of the Oklahoma City Air Logistics Center at Tinker AFB, Okla., was the featured speaker at the recent Awards Banquet of the Capt. Eddie Rickenbacker Memorial Chapter, Columbus, Ohio. The Awards Banquet honored the Ohio ANG's 121st Tactical Fighter Wing and 160th Air Refueling Group, and the 302d Tactical Airlift Wing (AFRES). Those present at the banquet included (from left to right): Chapter President Richard Hoerle; Francis Spalding, Ohio State AFA President; Robert J. Puglisi, Great Lakes Region Vice President; General Edwards; and Chapter Communications Committee Chairman David White.

Louis F. "Bud" Heilig, right, Vice President and General Manager of the Aeronutronic Division of Ford Aerospace & Communications Corp., was presented recently with the Annual Service Award plaque for 1980 by Ray Villareal, President of California's Orange County/General Curtis E. LeMay Chapter. The special Chapter award was given to Mr. Heilig in recognition of his outstanding commitment to and support of the Orange County/General Curtis E. LeMay Chapter and the goals of the Air Force Association.

The University of Oklahoma beat out Oklahoma State University in the second annual Off-Base Membership Drive sponsored by AFA's Central Oklahoma Chapter. The AFROTC detachments at the schools compete for the highest percentage of AFROTC cadets affiliating with AFA during the drive. Ron Wallis, left, Chapter Vice President for Off-Base Membership, presented University of Oklahoma's AFROTC detachment commander Col. James Kelm, center, and Angel Flight Cadet Carol Countryman, second from left, with the award plaque. Chapter President Rex Ball, right, also presented OU's Angel Flight Commander Elaine Evans a check for $100 for winning the drive. The score between the two schools' AFROTC detachments in the competition now stands at one win apiece.

CALENDAR OF EVENTS

May 8–10, **Tennessee State AFA Convention,** Tullahoma . . . May 15, **Arizona State AFA Convention,** Tucson . . . May 15–18, **Florida State AFA Convention,** Miami . . . May 16, **Kansas State AFA Convention,** Wichita . . . May 23, **AFA Nominating Committee and Board of Directors Meeting,** The Broadmoor, Colorado Springs, Colo. . . . May 23, **Twenty-second Annual Outstanding Squadron Dinner,** The Broadmoor's International Center, Colorado Springs, Colo. . . . May 23, **Connecticut State AFA Convention,** Windsor Locks . . . May 29–31, **Washington State AFA Convention,** Spokane . . . June 5–7, **Oregon State AFA Convention,** Portland . . . June 12–13, **Alabama State AFA Convention,** Mobile . . . June 12–14, **Illinois State AFA Convention,** Belleville . . . June 19–21, **New York State AFA Convention,** Niagara Falls . . . June 20, **Massachusetts State AFA Convention,** Bedford . . . June 26–27, **South Carolina State AFA Convention,** Charleston . . . June 26–28, **New Jersey State AFA Convention,** Cape May . . . June 26–28, **Texas State AFA Convention,** San Antonio . . . July 10–12, **Michigan State AFA Convention,** Detroit . . . July 17–18, **Ohio State AFA Convention,** Youngstown . . . July 17–19, **Pennsylvania State AFA Convention,** Hershey . . . August 13–15, **California State AFA Convention,** Lompoc . . . August 14–16, **Missouri State AFA Convention,** Springfield . . . August 21–22, **Colorado State AFA Convention,** Colorado Springs . . . September 14–17, **AFA National Convention,** Washington, D. C. . . . October 2–3, **Arkansas State AFA Convention,** Fayetteville.

AFA's Middle Georgia Chapter recently presented its annual A. J. Beck Scholarship Award to SSgt. Michael T. Chipley of the 2853d Civil Engineering Squadron at Robins AFB, Ga. The award, named in honor of Maj. Gen. A. J. Beck, past Commander of Warner Robins Air Logistics Center and founder of the Robins Resident Center, is based on academic achievement and financial considerations. Sergeant Chipley received the $200 award from newly elected Middle Georgia Chapter Treasurer Louis Friedel, right. Looking on at the presentation are other newly elected Chapter officers (from left): Bobby E. Bates, President; Wilbur H. Keck, first Vice President; and Janet M. Ferand, Secretary. (USAF photo by SSgt. Donald McMichael)

Tactical Air Command Surgeon Brig. Gen. Richard Hansen was the principal speaker at the Indiana State AFA annual Pearl Harbor Observance held last December at the Fort Benjamin Harrison Officers Club. Among those attending the Observance were (sitting from right to left along wall): Indiana State AFA President Donald E. Bradford; Chris Dally, Indiana State AFA Secretary; Dr. Ron Blankenbaker, Indiana State Health Commissioner; Lt. Col. Jerry Knotts, USAF; and Dr. Thomas Middleton, President of the Southern Indiana Chapter. In the foreground at left is Central Indiana Chapter Past President Tom Correll.

During the February dinner meeting of the General H. H. Arnold Chapter, Tenn., Col. Conrad Forsythe, Jr., Chief of the Space Launch and Control Division, Hq. USAF, spoke on "The Defense Department's Role in the National Space Transportation System." Also attending the Chapter-sponsored Shuttle program briefing held at the Arnold Engineering Development Center were (from left): South Central Region Vice President Tom Bigger; Brig. Gen. Michael H. Alexander, AEDC Commander; Colonel Forsythe; and Arnold Chapter President Lee V. Gossick.

A Charter Presentation Dinner was held last December for the newly formed Southern Maine Chapter. At the meeting, AFA National Director R. L. Devoucoux, left, presented the Charter to Chapter President Paul Edgar, second from left. Others attending the Charter Presentation Dinner included (from right): Joe Falcone, New England Region Vice President; Chapter Secretary-Treasurer Marylin Maneely; and Robert Bailey, Chapter Vice President.

AFA NEWS PHOTO GALLERY

AFA National President Vic Kregel was the guest speaker at a recent meeting of the Hawaii Chapter held in Honolulu. Also attending the Hawaii Chapter meeting were (from left): Gen. Gabriel P. Disosway, USAF (Ret.), a former TAC Commander; Maj. Gen. I. P. Graham, Deputy Chief of Staff for Plans at Hq., Pacific Air Forces; Mr. Kregel; and Hawaii Chapter President Bill Taylor.

The recently formed Dacotah Chapter elected their 1980–81 officers at a recent meeting held in Sioux Falls, S. D. They are (from left): Dan Hacking, Councilman; Marv Randall, Vice President; Phil Killey, President; Roger Timmer, Secretary; Jim Eisenmenger, Treasurer; and Toby Fladmark, Councilman.

At a recent dinner meeting of the Tennessee Ernie Ford Chapter, San Mateo, Calif., Lt. Gen. Eugene F. Tighe, Jr., USAF (right), Director of the Defense Intelligence Agency, spoke on "The World of the 1980s: Intelligence Viewpoints." With General Tighe is Capt. Leo T. Profilet, USN (Ret.), who received a Speaker's Award at the meeting at Cupertino along with General Tighe. Captain Profilet spent five and one-half years as a POW in the "Hanoi Hilton."

At a recent meeting of the Gus Grissom Chapter, Lafayette, Ind., Eastern Air Lines captain and Chapter member Ned Derhammer gave a presentation to the Chapter. Those at the meeting included (from left to right): Captain Derhammer; Chapter Membership Chairman Milt Kalapach; Eino Aaltonen, aviation technology professor at Purdue University; Don James, Chapter President; and Chapter member Harold Owens.

Langley, Va., Chapter President Rocky Jones recently presented a certificate honoring A1C Cheryl L. Free as the Airman of the Quarter for Langley AFB. Airman Free was chosen for her outstanding performance and specific achievements as the airman in charge of the base chaplain's administrative office. President Jones also presented Airman Free a one-year honorary membership in AFA. (USAF photo by SrA. Don Lee)

On a recent visit to the Jerry L. Pettis Memorial Hospital in Loma Linda, Calif., entertainer Bob Hope paid salute to the hospitalized veterans there and presented a check for $2,500 to acting hospital director Paul R. Stanford, Jr., second from right, for use in patient care programs. The donation was raised from the Twelfth Annual Bob Hope/AFA Charity Golf Tournament held last summer at March and Norton AFBs, Calif. With Mr. Hope at the presentation were (from left): Lt. Gen. James P. Mullins, Commander of Fifteenth Air Force at March AFB; Edward A. Stearn, AFA National Director and Chairman of the Advisory Council for the Charity Golf Tournament; hospital chief of staff Dr. Edward Wright; Mr. Hope; Mr. Stanford; and Col. Claudius E. Watts III, Commander of the 63d Military Airlift Wing at Norton AFB.

The Golden Triangle Chapter, Columbus AFB, Miss., recently awarded AFROTC Cadet Cheryl Jensen a one-year honorary membership in AFA. Cadet Jensen is the first AFROTC graduate from the Mississippi University for Women—the nation's oldest and only remaining state-supported university for women. She received her AFA membership from Rod Adams, immediate past president of the Golden Triangle Chapter.

John V. Sorenson, center, Director of Aerospace Education at the national headquarters of the Civil Air Patrol, spoke to a recent dinner meeting of AFA's Middle Tennessee Chapter, Nashville, on aerospace education and the Soviet military threat. With Mr. Sorenson at the meeting were (from left): Thomas O. Bigger, AFA's South Central Region Vice President; Middle Tennessee Chapter President J. Pat Maxwell; Mr. Sorenson; AFA Board Chairman Dan Callahan; and Gen. William G. Moore, Jr., USAF (Ret.), former Commander in Chief of MAC and Middle Tennessee Chapter member.

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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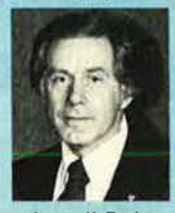

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For military retirees and their dependents . . . and dependents of active duty personnel . . . more and more medical care is being provided through the government CHAMPUS program.

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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.

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AFA CHAMPLUS protects you against that kind of financial catastrophe *and* covers most of your share of routine medical expenses as well.

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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.
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YOUR INSURANCE IS NON-CANCELLABLE

As long as you are a member of the Air Force Association, pay your premiums on time, and the master contract remains in force, your insurance cannot be cancelled.

ADMINISTERED BY YOUR ASSOCIATION . . . UNDERWRITTEN BY MUTUAL OF OMAHA

AFA CHAMPLUS insurance is administered by trained insurance professionals on your Association staff. You get prompt, reliable, courteous service from people who know your needs and know every detail of your coverage. Your insurance is underwritten by Mutual of Omaha, the largest individual and family health insurance company in the world.

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Once you reach Age 65 and are covered under Medicare, AFA offers you protection against hospital expenses not covered by Medicare through the *Senior Age Benefit Plan* of AFA Hospital Indemnity Insurance. Members enrolled in AFA CHAMPLUS will automatically receive full information about AFA's Medicare supplement program upon attainment of Age 65 so there will be no lapse in coverage.

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 $5.00 per day subsistence fee, not covered by CHAMPUS.	CHAMPLUS pays the $5.00 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 $5.00 per day, whichever is greater.	CHAMPLUS pays the greater of $5 per day or $25 of the reasonable hospital charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $5.00 per day fee, not covered by CHAMPUS.	CHAMPLUS pays the $5.00 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.

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CHAMPLUS

QUARTERLY PREMIUM SCHEDULE

Plan 1—For military retirees and dependents

In-Patient Benefits

Member's Attained Age	*Member*	*Spouse*	*Each Child*
Under 50	$19.03	$23.30	$11.00
50-54	$23.78	$29.10	$11.00
55-59	$30.13	$36.90	$11.00
60-64	$39.65	$48.55	$11.00
In-Patient and Out-Patient ***Benefits***			
Under 50	$26.80	$31.05	$27.50
50-54	$33.48	$38.80	$27.50
55-59	$42.43	$49.18	$27.50
60-64	$55.83	$64.73	$27.50

Plan 2—For dependents of active duty personnel.

In-Patient Only	None	$ 8.80	$ 4.40
In-Patient and Out-Patient	None	$35.20	$22.00

Note: Plan II premiums are listed on an annual basis. Because of the very low cost, persons requesting this coverage are asked to make annual payments.

LIMITATIONS

Coverage will not be provided for conditions for which treatment has been received during the 12-month period prior to the effective date of insurance until the expiration of 12 consecutive months of insurance coverage without further treatment. *After coverage has been in force for 24 consecutive months, pre-existing* conditions will be covered regardless of prior treatment.

EXCLUSIONS

This plan does not cover and no payment shall be made for:

a) routine physical examinations or immunizations

b) domiciliary or custodial care

c) dental care (except as required as a necessary adjunct to medical or surgical treatment)

d) routine care of the newborn or well-baby care

e) injuries or sickness resulting from declared or undeclared war or any act thereof

f) injuries or sickness due to acts of intentional self-destruction or attempted suicide, while sane or insane

g) treatment for prevention or cure of alcoholism or drug addiction

h) eye refraction examinations

i) Prosthetic devices (other than artificial limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and contact lenses

j) expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS)

APPLICATION FOR
AFA CHAMPUS SUPPLEMENT INSURANCE

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 $13 for annual AFA membership dues (includes subscription ($9) to AIR FORCE Magazine).

☐ I am over 65 years of age. Please send information on AFA's Medicare Supplement.

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	☐ Member & Children
	☐ Spouse Only	☐ Spouse & Children
	☐ Member & Spouse	☐ Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Premium payments are normally paid on a quarterly basis (see table for rate table). Upon request, however, they may be made on either a semi-annual or annual basis.

Quarterly premium for member (age____) $_____

Quarterly premium for spouse $_____

Quarterly premium for ____ children @ $____ $_____

Requests for active duty dependent coverage under Plan 2 should include annual premiums.

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

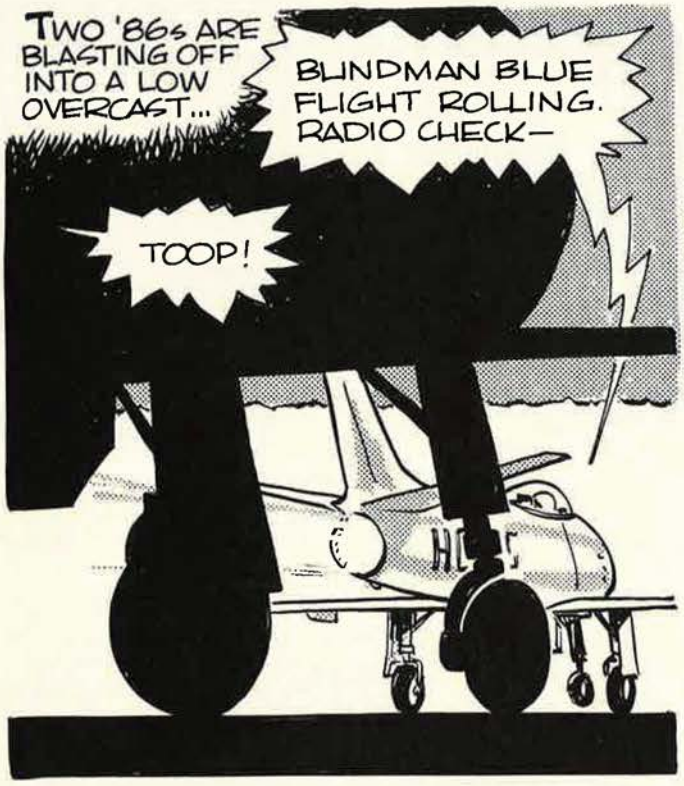
NOTE: Application must be accompanied by check or money order.
Send remittance to:
Insurance Division, AFA, 1750 Pennsylvania Ave., NW, Washington, D.C. 20006.

Form 6173GH App.
5/81

Bob Stevens'

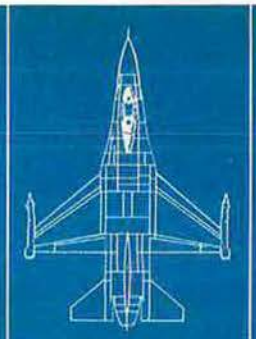
"There I was..."

GOOD WINGMEN WHO "HANG IN THERE" WHEN THE GOIN' GETS TOUGH ARE ESSENTIAL TO AIR COMBAT. THERE IS ALSO A TIME-HONORED TRADITION THAT GOOD WINGMEN KEEP THEIR RADIO TRANSMISSIONS TO A MINIMUM.



THANKS TO LT/C PRAZNIK 428 TFS, APO S.F.

Bob Stevens



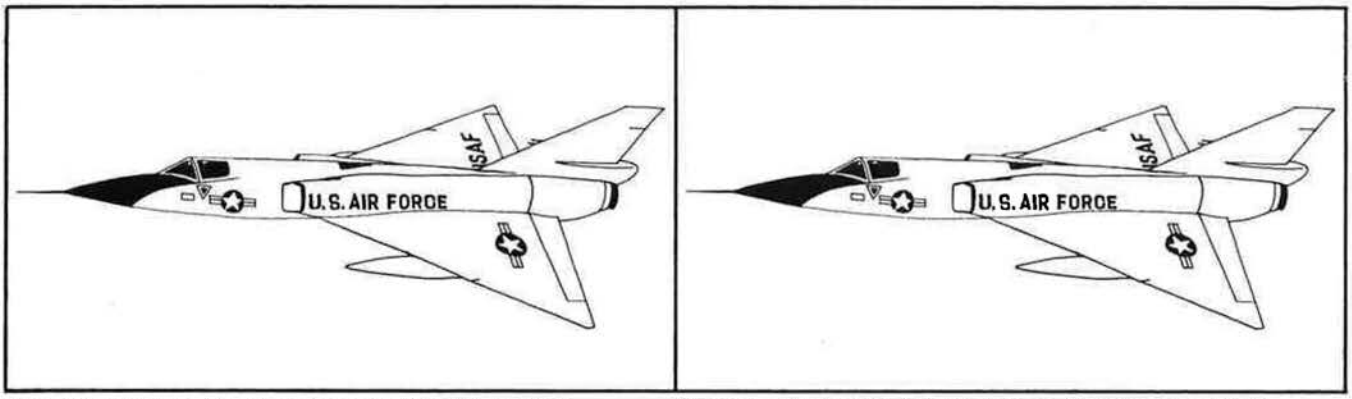
Length: 47.64 ft.
Wing span: 31 ft.
Wing area: 300 sq. ft.
Weight empty: 15,200 lb.
Max. takeoff weight: 35,400 lb.

F-16 Fighting Falcon
Combat radius: 500+ nautical miles
Speed: Mach 2+
Load capacity: 15,200 lb.
Weapons capabilities: Sidewinder heat-seeking missiles, rapid-fire Vulcan 20mm M61 gun, free-fall and guided bombs, and ordnance dispensers. Systems upgrade to include Sparrow and AMRAAM radar-guided missiles.

F-16 Fighting Falcon. High performance. Outstanding reliability. Flexible multimission capability. Now in operation with the 388th Tactical Fighter Wing, Hill AFB, the 56th Tactical Fighter Wing, MacDill AFB and the 47th Tactical Fighter Wing, Nellis AFB.

Advantage America

GENERAL DYNAMICS



America's top Air Defense fighter for 1956 **America's main Air Defense fighter for 1981**

America's Air Defense is riding on a plane that's older than some pilots flying it.

It's sad but it's true. We still have to depend on a fighter from the 50's for continental defense —an aircraft that was once supreme, but now is not only range-limited, but radar-limited, armament-limited and expensive to maintain.

There is a fighter selected for USAF strategic defense that is without compromise. It can outfly, outfight, and outperform any other aircraft in the air. It can carry out continental and world-wide defense assignments—bomber threat, cruise missile penetration, line-of-communication protection and even anti-satellite.

The F-15 Eagle.

The Eagle's multi-mission avionics give unprecedented advantage in air-to-air intercept. Sidewinder missiles, Sparrow missiles, 20mm cannon, anti-satellite weaponry, and remarkable fuel capacity combine for long range and an awesome arsenal to confront any foe. The F-15 Eagle. Its very presence is evidence of national resolve.

F-15 Eagle
MCDONNELL DOUGLAS