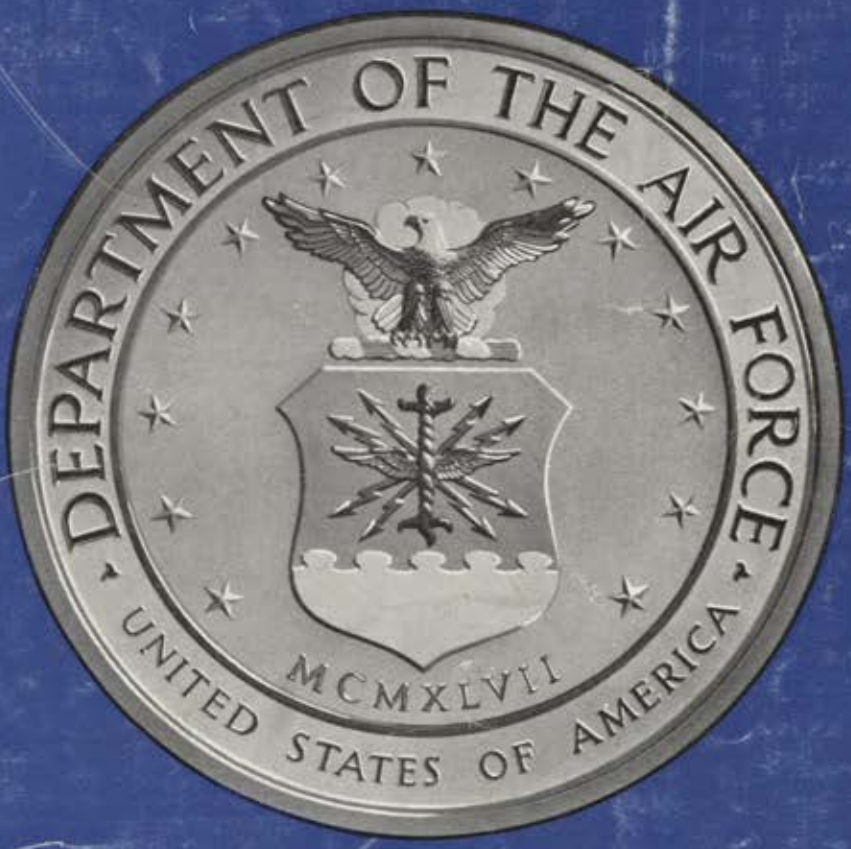
SEPTEMBER 1961 / $1.00

AIR FORCE

and **SPACE DIGEST**

The Magazine of Aerospace Power / *Published by the Air Force Association*



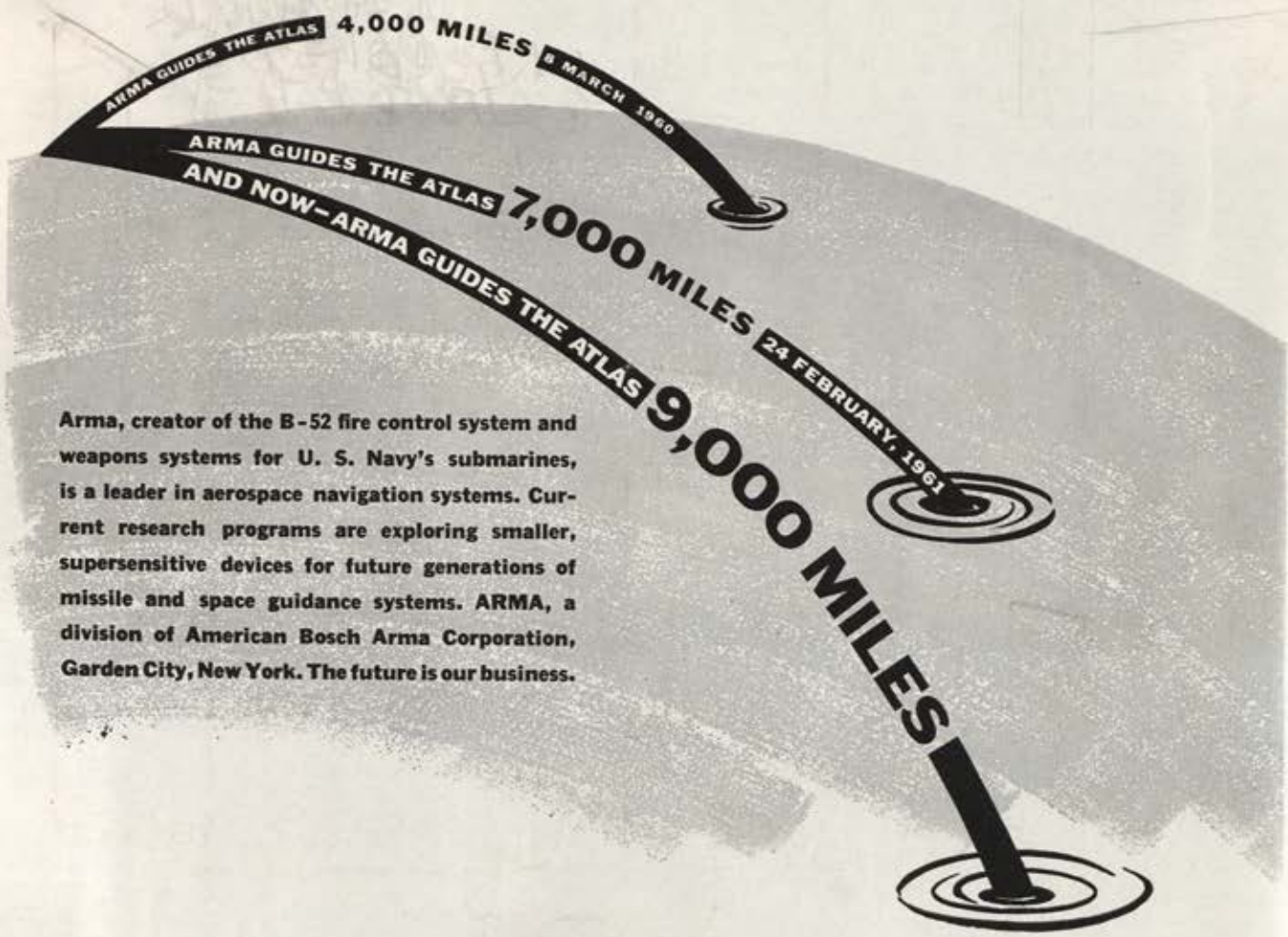
1961 AIR FORCE ALMANAC

ARMA guides Air Force ATLAS in first full-range inertial flight

Cape Canaveral July 7, 1961. The Air Force announced the successful flight of an Atlas ICBM guided by the Arma inertial system 9,000 miles into the Indian Ocean.

A giant step in missile and space technology, this important feat of pin-pointing a target nearly half-way around the world demonstrated the phenomenal accuracy and reliability of Arma inertial guidance—America's first inertial guidance system of intercontinental range accuracy. This flight was another achievement of Arma inertial guidance which has performed successfully on every flight since the initial test in March 1960. Today the Arma system is in full production.

Arma inertial guidance provides our nation's ICBM arsenal with all the advantages inherent in inertial guidance—salvo firing, all-weather capability, immunity to outside interference, a minimum of costly ground equipment. Although specified for the Atlas missile, the Arma inertial system as a completely self-contained, self-correcting navigation system is adaptable to other aerospace programs and space exploration projects.



Arma, creator of the B-52 fire control system and weapons systems for U. S. Navy's submarines, is a leader in aerospace navigation systems. Current research programs are exploring smaller, supersensitive devices for future generations of missile and space guidance systems. ARMA, a division of American Bosch Arma Corporation, Garden City, New York. The future is our business.

AMERICAN BOSCH ARMA CORPORATION

MISSILE BOMBER. New "H" model is latest version of famous Boeing B-52 missile bomber, most versatile long-range weapon system in U.S. Air Force arsenal. B-52H here carries mock-ups of four Skybolt air-launch ballistic missiles. B-52s can also carry supersonic Hound Dog missiles for in-flight launching toward distant targets. Flying high or low, B-52s will provide an almost undetectable launch pad for missiles. They can also carry regular load of gravity bombs, and strike up to five targets on single mission.

Capability has many faces at Boeing

SKY FIGHTER. Supersonic Boeing Bomarc is a U.S. Air Force defense weapon against airborne missiles and attacking bombers. New "B" models have scored test intercepts 446 miles from base at altitudes of more than 100,000 feet.

MINUTEMAN. U.S. Air Force's first solid-fuel ICBM, is compact, quick-firing weapon scheduled for operational status by mid-1962. Minuteman will be stored in underground silos ready for instant action.

SPACE GLIDER. Drawing of Dyna-Soar, U.S. Air Force manned space glider designed to rocket into space, then re-enter earth's atmosphere for conventional pilot-controlled landing. Dyna-Soar is being developed by U.S. Air Force in cooperation with NASA, with Boeing as contractor for both the system and the glider.

BOEING

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FLUIDS TO HELP TAME FIRE HAZARDS

Fire-safe hydraulic lifts, loaders, and launchers!

A hydraulic oil leak sprayed from an underground service elevator can ignite on contact with a welding torch, an arcing circuit breaker, even a broken light bulb. Chance ignition of a flammable fluid in a missile launcher, mobile lift, or weapon loader could cause disaster, destroying both missile and base. Monsanto can supply a whole series of fire-resistant *all-synthetic* hydraulic fluids that operate reliably over a wide temperature range. They will not corrode metals; will not clog pumps or valves; will resist change in composition or physical properties even after *years* of storage and service. For maximum fire protection of below-ground military installations, put Monsanto fluids specialists to work—checking out ignition dangers with *your* "hard" base hydraulic equipment designs.

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1. Sophisticated application experience with fluids
2. Years-ahead research on new types of fluids
3. Time-saving facilities for testing new uses
4. More *job-proven* functional fluids than any other manufacturer in the world
5. Design-oriented *know-how* to help you develop more compact, safer, and more reliable equipment

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SKYDROL® 7000	**−40 to 200**	**15.5 @ 100 4.00 @ 210**	**<−70**	**200**	**1.08**	
SKYDROL 500A	**−65 to 225**	**2300 @ −65 11.5 @ 100 3.92 @ 210**	**<−85**	**225**	**1.07**	
PYDRAUL® 60	**−25 to 200**	**10.0 @ 100 2.45 @ 210**	**−70**	**200**	**1.09**	
PYDRAUL 150	**−15 to 200**	**30.8 @ 100 8.0 @ 210**	**−55**	**200**	**1.13**	
PYDRAUL F-9	**+50 to 300**	**47 @ 100 5.5 @ 210**	**0**	**300**	**1.28**	
PYDRAUL A-200	**+50 to 300**	**31 @ 100 2.86 @ 210**	**+10**	**300**	**1.42**	
PYDRAUL AC	**+60 to 300**	**88.2 @ 100 5.15 @ 210**	**+20**	**300**	**1.35**	
OS-81	**+50 to 300**	**34.0 @ 100 3.1 @ 210**	**+20**	**300**	**1.40**	

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St. Louis 66, Missouri

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	308,000	**30.8**	**0.00045**	**YES**	"	**YES**
	328,000	—	**0.0004**	**YES**	"	**YES**
	319,000	—	**0.00042**	**YES**	"	**YES**
	387,000	—	**0.00041**	**YES**	"	**YES**
	400,000	—	**0.0004**	**YES**	"	**YES**
	375,000	—	**0.0004**	**YES**	"	**YES**
	—	—	—	**YES**	**Development Product**	**YES**

ASSURE RELIABILITY AND SAFETY

The Magazine of Aerospace Power / Published by the Air Force Association

AIR FORCE

and SPACE DIGEST

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AIR FORCE ALMANAC • 1961

SPACE DIGEST

REPORTS FROM THE USAF COMMANDS

AN AIR FORCE ALMANAC

DEPARTMENTS

An Editorial

THE NUCLEAR THRESHOLD

John F. Loosbrock
EDITOR, AIR FORCE/SPACE DIGEST

THERE'S an old boxing story about a Catholic priest sitting at ringside with a Protestant friend. At the beginning of the main event one of the fighters crossed himself before leaving his corner.

"Will that really help, Father?" needled the friend.

"Of course it will," said the priest, "if he can fight."

This gets to the core of the power relationship between this nation and its allies and the Sino-Soviet bloc, and it is a point that too frequently gets lost in the welter of verbiage that pours forth about "what we should do." It's good to have world opinion on our side—if we can fight. A prosperous economy and a high standard of living are fine—if we can fight. The virtues of a free society are undeniable—if we can fight.

Napoleon was a believer in the Voltairian thesis that "God is always on the side of the stronger battalions." Napoleon was ultimately defeated and exiled but not before he had bled white most of Western Europe. And at Waterloo it was the stronger battalions of Wellington and Blücher that turned the trick.

The common interpretation of the nation's response to the Berlin crisis is that nuclear war and nuclear weapons are now discredited, that we must build up our capability for conventional conflict and, by thus raising what is called the "nuclear threshold," avoid a thermonuclear holocaust that might well destroy our civilization. We are told that the old doctrine of "massive retaliation" no longer applies and has been replaced by a wider range of choices and a so-called "flexibility of response."

The school of military thought that finds bayonets and flame throwers eminently moral weapons but even low-yield nuclear weapons immoral puts forth the thesis that nuclear war, even in the fraction of a kiloton range, cannot be confined to the battlefield and that use of the first small tactical nuclear weapon will set in motion an escalation process that will automatically and inevitably result in all-out thermonuclear war. Their answer is to add more conventionally armed divisions to our military capability and thereby postpone the point at which, in order to attain our political and military objectives, we decide to substitute kilotons for warm bodies. This same school identifies the Air Force with "inflexible" nuclear weapons, the Army with conventional "flexibility," and puts the Navy conveniently in between.

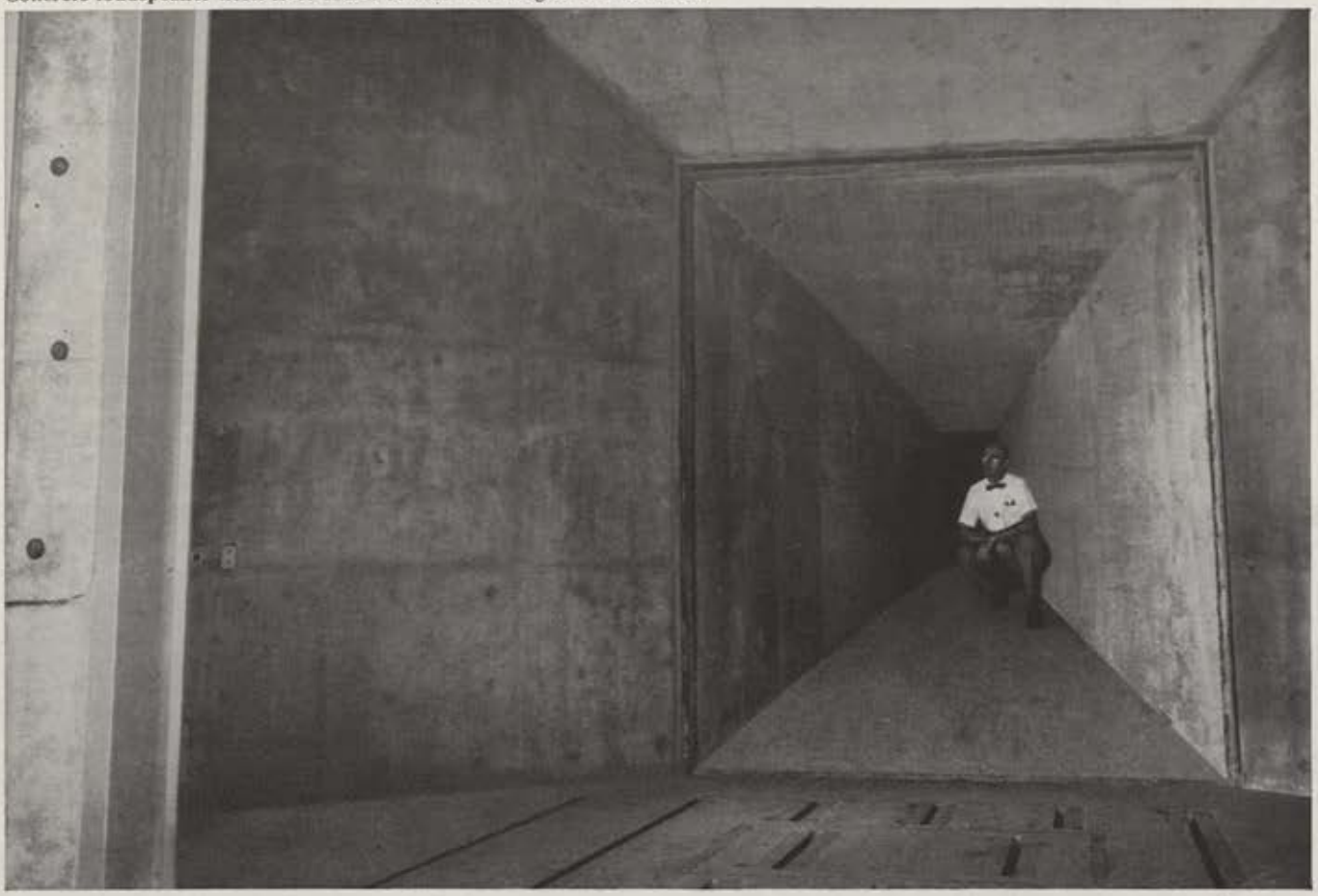
The problem—and the Berlin crisis is only an example—is that of identifying the "nuclear threshold." Just what level of conventional capability is required to attain flexibility of response, and does progress beyond that point inevitably call for an exchange of the big bombs between Moscow and Washington? If the argument is pursued to its ridiculous extreme—and there are those who do so—then ten more divisions would provide more flexibility than three, thirty would be better than ten, and so on up to the ninety-odd of World War II. Thus the "escalation" phenomenon is applicable to conventional as well as to nuclear forces.

There is much in the nature of the Administration's response to Berlin to give comfort to defenders of this thesis. The emphasis is on a buildup in conventional capability. But there is strong and encouraging evidence that at the highest levels of government, there is an acknowledged limit beyond which the "nuclear threshold" will not be raised and that we stand ready to respond to Soviet aggression across the full range of our weapons capability. This is good news, especially if the broad policy is to be reflected in our military structure. Undoubtedly this more realistic approach stems from the President's disillusioning encounter with hard-nosed communism when he met Khrushchev in Vienna.

At the same time, while we are worrying about Berlin, Khrushchev is making it clear that he understands quite well the fact that the nuclear arena is the only decisive arena in modern conflict, through his announcement that the Soviets are contemplating a 100-megaton warhead. It is safe to predict that, when this becomes a matter of public discussion, a sizable body of influential scientists and military experts will explain that the Soviets cannot build such a weapon, that if they could they couldn't deliver it, that even if they achieve both capabilities we must not because such a weapon would suit neither our military posture nor our moral position. It is also safe to predict, based on past Soviet disclosure techniques relating to their nuclear weapons, missiles, and space achievements, that they will indeed have tested such a weapon within the next two years.

So our job cannot cease with a sigh of relief if we squeak by in Berlin. If our policy is to be able to respond across a broad spectrum we had better look to our military capability across that spectrum, with especial attention to the end where the decisive power lies. This will not be cheap, it will not be easy, it may not make us the best-loved nation in the world. But if it costs us a little affection from our friends it will earn us a lot of respect where respect counts—from our enemies.—END

Concrete loudspeaker horn is 47 feet x 30 feet—the largest in the world.



Mach 3 Technology

Torturing aircraft structures with the world's largest "gramaphone"

To predetermine in-flight stresses on an aircraft as advanced as the Air Force's Mach 3 B-70 Valkyrie, it was necessary to make sweeping advances in the state-of-the-art of testing procedures.

One way the Los Angeles Division of North American Aviation met this challenge was to build the largest, loudest acoustical test chamber in the world. Here, a mammoth 47 foot by 30 foot concrete loudspeaker horn can blast aircraft structural specimens with up to 170 decibels of noise. This is the equivalent of 54,000 five-tube radios going full blast, yet ingenious soundproofing keeps this noise to no more than a discreet whisper outside the lab. The noise inside the lab is so great that the heat generated could ignite fiber glass insulating material.

Specimens up to 6 feet by 25 feet can be tested in the acoustical lab. It has the capacity for: progressive wave as well as reverberant sound fields; grazing or normal incidence specimen orientation; discrete frequency or random noise at sound levels up to 170 dbs; thermal environment testing from $-100°F$ to $+1200°F$; frequencies of 50 to 10,000 cycles per second. This is indeed a remarkable facility for acoustical testing, fatigue testing, and vibration testing.

This giant acoustical laboratory can not only carry out testing on tomorrow's Mach 3 aircraft, but can perform tests on aerospace craft still ten years from reality. The lab is only one of the many that the Los Angeles Division has developed to conquer problems of space age flight.

Builders of the B-70 Valkyrie

THE LOS ANGELES DIVISION OF **NORTH AMERICAN AVIATION**

BENDIX COUNTDOWN FOR SPACE

7

PNEUMATIC CONTROLS: Hot gas equipment is being developed for space control subsystems using rotary and linear actuation, reaction jets, and pneumatic computation. A complete subsystem is now being built at E-P under USAF contract.

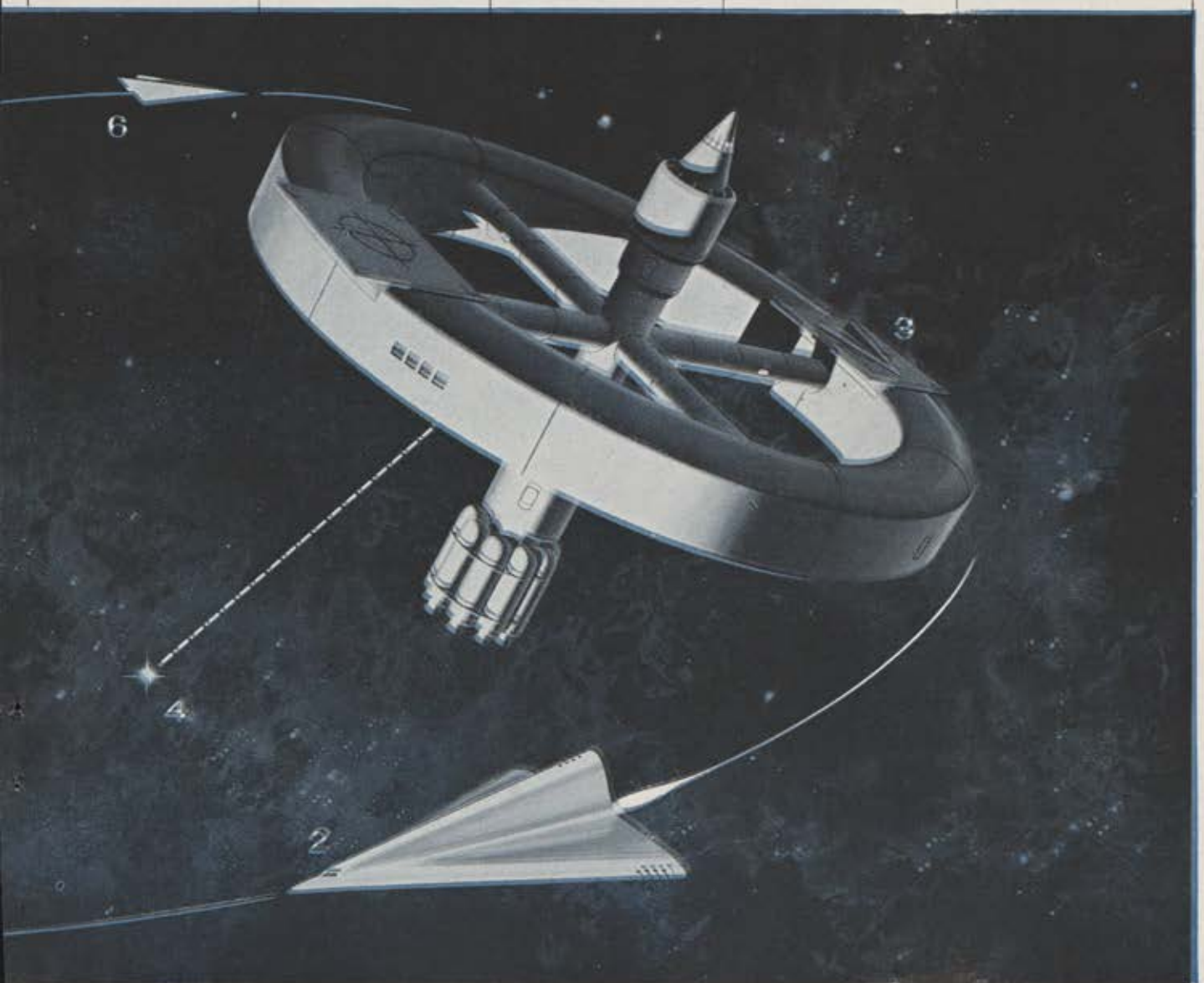
6

SELF-ADAPTIVE CONTROL SYSTEM: Capable of measuring dynamic sensitivities and adjusting feedback gains in stable fashion without sensing external environment. Automatically blends control of aerodynamic surfaces and reaction jets. Being developed under USAF contract.

Knowmanship in Action

Technical knowledge, management ability, and craftsmanship all add up to Eclipse-Pioneer's space-age Knowmanship. We pride ourselves on anticipating our customers' needs—and meeting them with technical advancements based on specific requirements. The manufacture of precise components and total subsystem capability are typical of our creative ability as a major contributor to the field of space technology. By applying principles of Knowmanship, we're able to

5	4	3	2	1
SATELLITE CONTROL AND STABILIZATION: Eclipse-Pioneer has total in-house capability for producing spacecraft attitude-control systems. In production: ADVENT reaction wheels. In development: sun-sensors and star trackers.	**STAR TRACKER SYSTEM:** A system incorporating multiple star tracking heads, designed to operate without a protective dome in the environment of space; digital readout accuracy of ±5 arc seconds.	**SPACECRAFT RENDEZVOUS COMPUTER:** Complete solid-state mechanization for analog and digital airborne computation of navigation, guidance, and attitude-control circuitry required at time of rendezvous. Digital computation at 10 megacycle rate.	**ADVANCED DISPLAYS AND CONTROLS:** Development currently in progress. Human-factor display studies directed toward rendezvous, re-entry, energy-management. Electronic and optical devices will present correlated data with minimum panel space.	**LETDOWN, APPROACH, LANDING:** Safer, more reliable letdown and landing systems—such as inertially augmented flare and runway-alignment, computers, advanced instrumentation (including real-time displays)—are now being developed, flight-tested.



achieve our space mission: research and development for tomorrow's intriguing challenges; products for the critical needs of today.

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Eclipse-Pioneer Division
TETERBORO, N. J.

THE Bendix CORPORATION

AIRMAIL

Laurels from a Non-airman

Gentlemen: You have been very thoughful in sending me copies of AIR FORCE Magazine reproducing some of our pictures. I have always thumbed through this book with interest. However, this being vacation time, I have had a chance of really reading and studying your July issue, and I must say that I have done so with a sense of excitement and true satisfaction.

Being decidedly a non-airman I was rather taken by the broad viewpoint of your magazine and the great variety of articles you feature, such as the fine excerpts from Dr. Dubos' "Are Scientists Learned Ignoramuses?" and Ed Murrow's article.

I compliment you on this wide viewpoint and the fine graphic presentation you give to your contents.

Otto L. Bettmann
The Bettmann Archive Inc.
New York, N.Y.

Missed Part of Journey

Gentlemen: I have just finished reading *Journey of the Giants,* by Gene Gurney, the June selection of the AeroSpace Book Club. The book appears to be well written and certainly presents a good picture of the problems experienced by both the air and ground crews alike.

However, I was disappointed that no mention was made of the 315th Wing, based at Northwest Field on Guam, since I served in this unit as an airplane commander.

The B-29s of the 315th Wing were stripped of all turrets and blisters except the tail turret. We flew no formation, and our missions were all flown at night. We bombed only by radar, using a new type of set, the APQ7. This made the airplanes of the 315th easy to distinguish, since the radar antenna was contained in a fourteen-foot "wing" suspended beneath the airplane. Our targets were the Japanese oil refineries, which we almost completely destroyed; so I feel that the author missed an important part of the complete "Journey of the Giants."

George Stieber
Newton, Bucks Co., Pa.

Reliability Chart

Gentlemen: The article on "Men to the Moon," on pages 44 to 48 of the July '61 issue of AIR FORCE/SPACE DIGEST, was quite interesting.

The NASA curve which you reproduced on page 46 points up a very significant problem with all one-shot type endeavors. I was confused, however, by the chart and would like some clarification. The chart plots reliability in percent versus accumulated launches. Does this mean that the reliability is the accumulated figure over the total number of launches? If so, it is hard to understand the rapid drop of Redstone, for example. If I can interpolate on the chart at approximately thirty-five launches, ninety percent reliability was obtained for a total of thirty-one successful launches. Ten more launches later, reliability is fifty percent, or, therefore, only twenty-three successful launches. How come?

Further, Jupiter shows an increase from seventy percent at fifteen launches to 100 percent, which is not possible because of the earlier failures. Likewise, the dotted curve shows a reliability of stretching beyond 100 percent. This represents no mean achievement in any program! May I have some clarification of this?

Frank S. Preston, Chief Engineer
Norden Div., United Aircraft Corp.
Norwalk, Conn.

● *Each point on the curve represents the accumulated reliability for ten launches. The points covering the first ten launches for all of the missiles are shown as the reliability at the fifth launching and so on. Therefore, the Jupiter shows 100 percent reliability at the twenty-fifth launching because it had no failures between the twentieth and thirtieth launchings. This also explains the sharp drop in the Redstone curve. As for the dotted line running beyond the 100 percent mark, this was an oversight we noticed as soon it was too late to correct.*—THE EDITORS

Not in Fatal Accident

Gentlemen: Reference your article in the August 1961 issue " 'Bombs Away' from 60,000," by Col. J. K. Johnson.

Although I am on Major Payne's crew and did make the flight across the Atlantic to Paris, I was not in the crash on June 3 with Major Murphy's crew. A very good friend and former student of mine, 1st Lt. David F. Dickerson, was the Defensive Systems Operator on that fateful day. On the day of the accident, much confusion existed as to which crew was actually on the aircraft. Apparently many people have taken this article as the final word.

Therefore, I ask that you please print a correction of this fact, because even at this early date my wife has received several telephone calls and cards.

Capt. Raymond R. Wagener
Ft. Worth, Tex.

● *The material was reported correctly in the July 1961 issue. Photos were also run of Captain Murphy's and Captain Payne's crews. We sincerely regret that we made this unfortunate error one issue later.*—THE EDITORS

Paperwork

Gentlemen: More power to Colonel Tarr! ["USAF's Paperwork Pipeline," by Col. James L. Tarr, June '61]. I wondered who was going to give up first, the Air Force or the paper manufacturers.

My last assignment on active duty was Wing Special Weapons Officer in a Strategic Fighter Wing (the 31st). Although we had just one bomb that would fit our aircraft, I received complete distribution on *every* nuclear and thermonuclear weapon in the arsenal. All Top Secret RD, of course. My master sergeant assistant spent most of his time stoking the incinerator. If he read the article, I'm sure the part he likes best is the one where new methods of destroying classified material are being investigated.

I am reasonably sure that I won't be infringing your copyright by quoting from Colonel Tarr's article in correspondence within my employers' corporation. We, as an organization, compare to a medium-sized Air Force

(Continued on page 13)

From tow targets to target missiles...
From underwater bogeys to helicopter systems...

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base, although spread throughout the country; and we have a communications problem that is very analogous to that of the Air Force. I am quite sure that the application of principles outlined in this article will save our corporation important sums of money.

David H. Rust
Rock Springs, Wyo.

Former Chief of Staff

Gentlemen: I would like to compliment you and your staff on the July issue of AIR FORCE/SPACE DIGEST.

Too, I would like to say that Claude Witze's story of "Just What the Air Force Needed" brought to many AFA members, including myself, a closer and more intimate bond with our former Chief of Staff, Gen. Thomas D. White.

Ruth E. Young
Nat'l Adviser to Angel Flight
AFROTC Det. #720
University Park, Pa.

Air Raid on Dresden

Gentlemen: I am writing on account of the Allied air attack on Dresden, successfully carried through as a joint RAF and USAAF mission on the night of February 13, 1945, and noon of February 14. I have managed to obtain from some of the survivors of that raid, both military and civilian, personal accounts of the events leading up to the raid and the raid itself. The British press is similarly cooperating with me in my wish to discuss the raid with former and present members of the RAF who took part in that mission.

Since I am keen to have the account as objective as possible, I badly need to be able to discuss Dresden with any USAAF officers and men who took part at that time.

Will readers who were in the US Force on February 13 and 14, or who know anybody who was, please get in touch with me?

David J. Irving
Gibbes Cottage
Shelley, Ongar
Essex, England

Flying Pay

Gentlemen: As a veteran, an AFA member, but most important, as a taxpayer, I hope you have the consideration to print my letter.

I quote an editorial from the Chicago *Sun-Times:* "Tradition of extra pay for hazardous military service is an ancient and honorable one. Unfortunately, once the definition of hazardous service is embedded in regulations and pay scales, it tends to be as firmly resistant to assault as Fort Knox—and to become as attractive a haven for goldbricks."

So with flying pay. There was a day when anyone who ventured aloft, as a passenger or pilot, deserved every penny of his bonus. Many types of flying still warrant the higher scale. But an unfortunately large number of people are, so to speak, along only for the safe and lucrative ride.

These extra payments designed to keep up technical "proficiency" frequently have nothing to do with a man's particular skill. And a ride in an ordinary military plane is no more hazardous than a ride on a commercial airliner. . . .

For the last two years in publicity work I've flown all over the country on all types of airliners, and my employer didn't believe it was hazardous work, justifying extra pay. . . .

Mack Harbin
Chicago, Ill.

● *First of all, the number of those eligible for flying pay is being steadily reduced. Second, some acceptable alternate system must be devised to retain those highly capable people who, without the relatively small added inducement of flying pay, would leave the service and take their chances on the airlines with the employer's expense account.*

—THE EDITORS

Adriatic Sea Ditching

Gentlemen: I am attempting to locate and correspond with American airmen who were forced to ditch in the Adriatic Sea during World War II and who subsequently were picked up by an aircraft rescue boat commanded by myself.

Flt. Lt. E. R. H. Watson (Ret.)
The Bosham Sea School Limited
and Yacht Agency
The Grange High Street
Old Bosham, Sussex, England

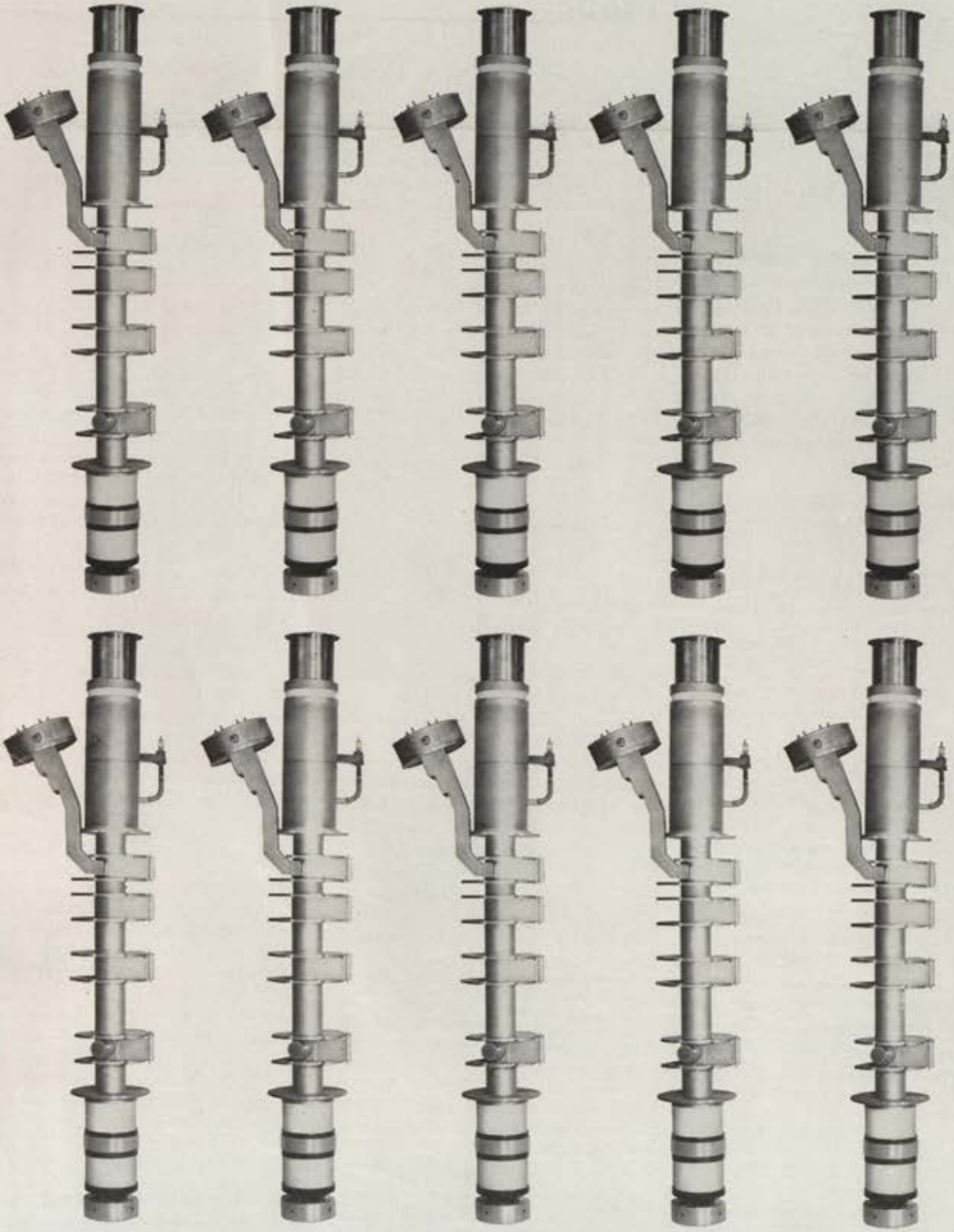
UNIT REUNIONS

1st Air Commando Group—Sept. 23, 1961

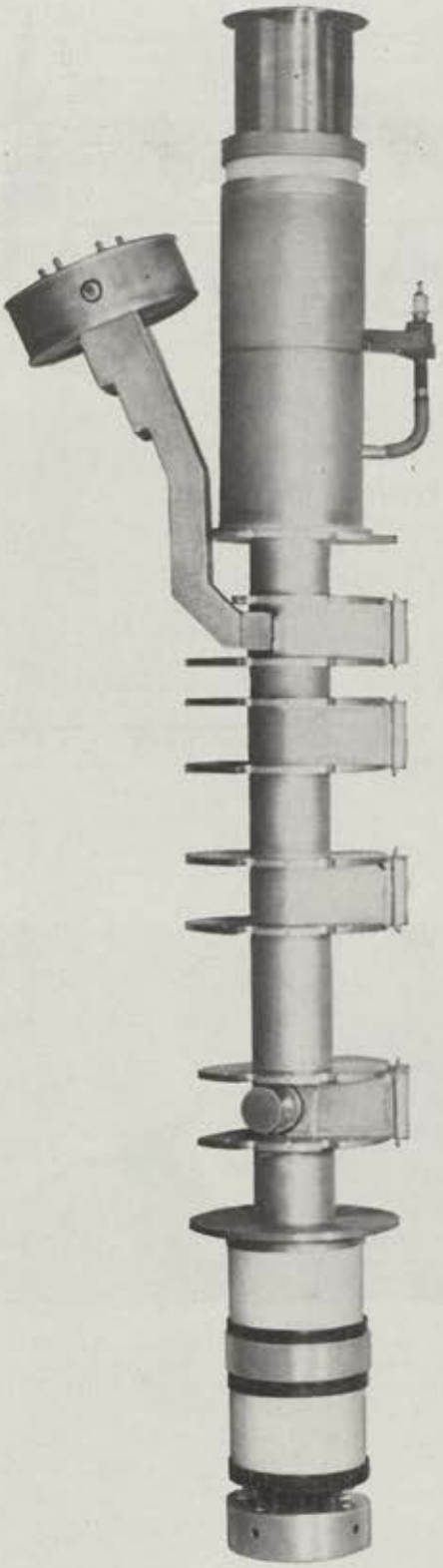
Annual reunion of the group will be held coincident to AFA Convention in Philadelphia, Pa.
Contact: Lt. Col. R. E. Moist
2567th Air Reserve Center (CONAC)
17000 Vanowen St.
Van Nuys, Calif.

60th Fighter Sqdn., 33d Fighter Group—Oct. 12-14, 1961

Reunion is being held in Dayton, Ohio. All World War II members of the group are welcome to attend.
Contact: John Brindle
121 Delaware Ave.
Stirling, N. J.



Today it would take ten super-klystrons to generate more than a megawatt of average power. But now Eimac is ready to do it



with one.

Today, the most powerful klystron available can produce 100KW of average power. But now Eimac is ready to develop a klystron with *ten times* this capability... a klystron that can generate more than one megawatt of average power!

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News,
Views
& Comments

AEROSPACE WORLD

Frederic M. Philips
ASSOCIATE EDITOR, AIR FORCE MAGAZINE

Three young men made news this month. Their names were Kennedy, Grissom, Titov.

President Kennedy met a new and grim Berlin crisis head on. In a historic address to the nation on the evening of July 25, he warned Russia that the United States would go to war to defend the German city against a Communist takeover. "We do not want to fight—but we have fought before," he declared. Then, addressing himself to his own countrymen, the President called for an emergency increase in the size of our armed forces, for stepped-up defense expenditures, for an enhanced civil defense program to protect the nation's citizens in the event of the worst. The boost in uniformed manpower, he said, would mean larger selective service calls for the months ahead and possible recall to duty for some of the nation's Reserve military manpower.

Translated into action in ensuing weeks by Congress and the armed forces, the President's immediate program added up to this. The Air Force listed sixty-four Air Guard and seven Air Force Reserve units for priority callup *(see pages 134 and 139)*. USAF also said it hoped to increase its manpower by voluntary recalls and extensions of active-duty tours but would order tour extensions if necessary. The other services took similar moves.

The House and Senate passed a record peacetime defense and civil defense appropriation of $46.6 billion —including $3.5 billion extra sought by Mr. Kennedy and more than half a billion dollars he did not request for continued bomber production *(see page 33)*. It appeared USAF would use much of this money for B-52s. The new funds also were to go to stepped-up B-70 development, airlift, strategic bomber alert, continuance in service of B-47s slated to be phased out, and fighter-bomber and missile production. Plans to curtail or drastically reduce operations at four B-47 bases were reversed. The bases were MacDill, Fla.; Chennault, La.; Donaldson, S. C.; and Laughlin, Tex. Draft calls, at the same time, shot up; the nationwide total reached 25,000 over the monthly average for the year to date.

As the nation thus prepared to fight hot war if the need arose, two manned spaceflights dramatized the balance of spacepower in our cold-war world. USAF Capt. Virgil I. Grissom became America's second man in space with a Project Mercury ballistic ride out over the Atlantic on July 21. Soviet Air Force Maj. Gherman S. Titov became the second Ivan in orbit with a twenty-five-hour-and-eighteen-minute, seventeen-orbit journey around the earth on August 6 and 7.

Captain Grissom's shot in his Mercury capsule, named Liberty Bell 7, was close to a carbon copy of Cmdr. Alan Shepard's first Mercury shot on May 5—up to a point. Captain Grissom landed 303 miles out in the Atlantic from Cape Canaveral to Commander Shepard's 302, was in the air sixteen minutes to the earlier fifteen, attained a top speed of 5,280 mph to 5,100, reached an altitude of 118 miles to 116. Major differences in the shots were these: Liberty Bell 7 had a larger viewing window than flight one's Freedom 7 capsule. Second, Captain Grissom had to swim for his life. An escape hatch accidentally blew off the million-dollar capsule after the water landing. The capsule

(Continued on page 123)

—NASA Photo

—Wide World Photos, Inc.

—Sovfoto

President Kennedy, shown above as he addressed the nation in a historic speech on July 25, acted this month to meet a new and grim Berlin crisis. Meanwhile, two spaceflights dramatized the balance of spacepower in our cold-war world. They were performed by USAF Capt. Virgil I. Grissom, left, and Soviet Air Force Maj. Gherman S. Titov, at the right.

DATA PRESENTATION FOR GLOBAL DEFENSE — SAC's mission is to maintain a force instantly ready to conduct strategic air warfare, on a global basis. Data generated in the SAC Control System is automatically displayed at SAC Headquarters on large display panels. Data and information can be updated or changed in a matter of seconds. ■ International Electric, the systems manager in the development and perfecting of this global digital command and control system, offers Electronic Systems Engineers and Computer Programmers a rare opportunity to advance in technical skill and imagination. Write to Mr. S. J. Crawford, Director of Industrial Relations.

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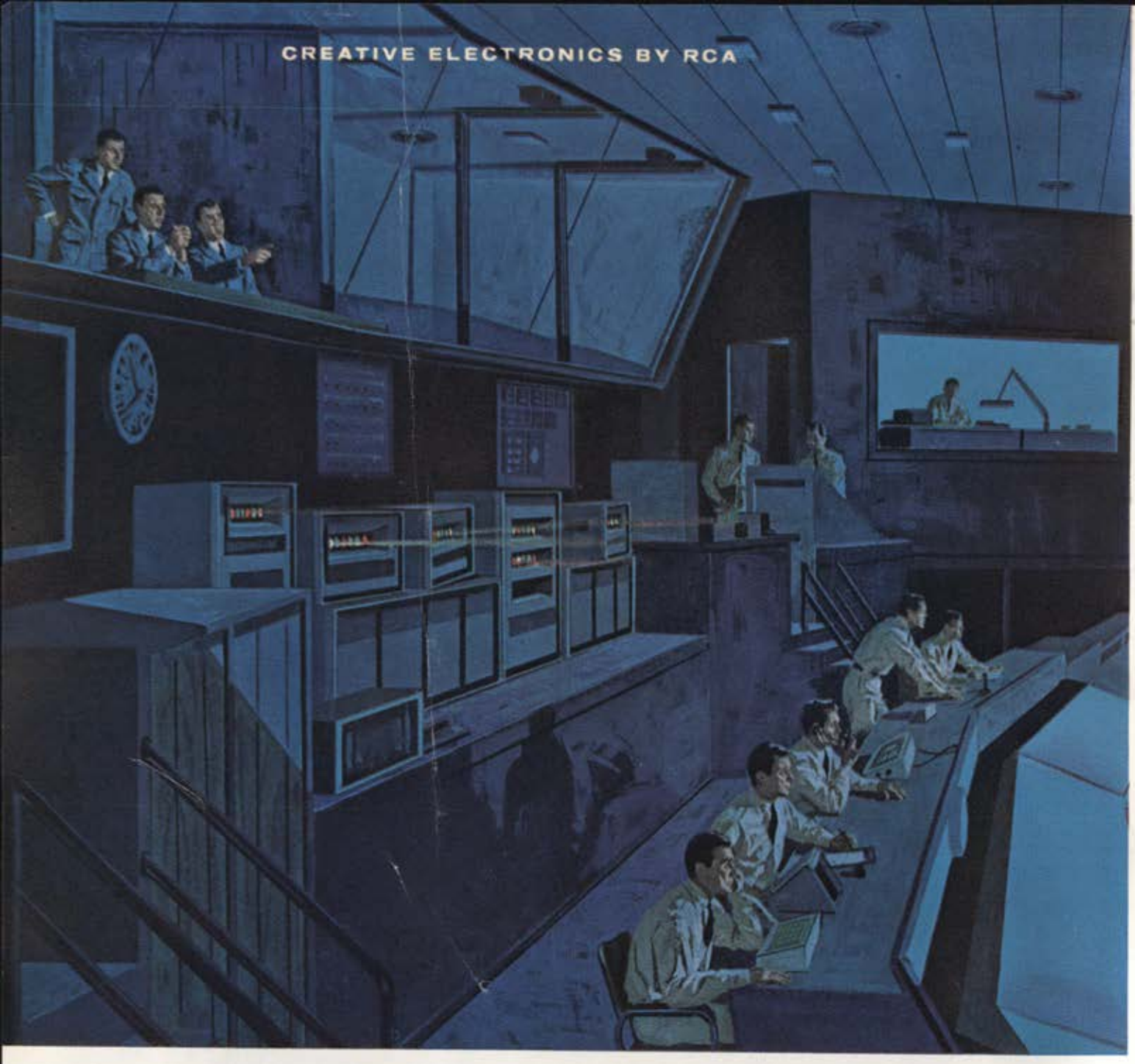

NORAD ON THE ALERT

Inputs from BMEWS Provide Instantaneous Missile Data Direct to NORAD Headquarters

From our vast outer defense perimeter, over thousands of miles, to the nerve center of the North American Air Defense Command at Colorado Springs, the most advanced concept of data handling and checkout is being utilized in the BMEWS system. The stakes are high, for the purpose is defense of the North American Continent.

At BMEWS installations operated by USAF Air Defense Command, computers read out missile tracking data from giant radars. This information is simultaneously relayed to NORAD's Combat Operations Center.

The Radio Corporation of America is prime systems contractor for BMEWS. At the COC, RCA's Display Information Processor computing equipment automatically evaluates missile sightings, launch sites and target areas. By means of data processing and projection equipment installed by RCA and a team of other electronics manufacturers, the findings are displayed on huge, two-story high map-screens in coded color symbols, providing the NORAD battle staff with an electronic panorama of the North American and Eurasian land masses.

The handling of BMEWS inputs at NORAD is an example of how RCA data processing capabilities are assuring the high degree of reliability so vital to continental defense.

At NORAD Headquarters, RCA computing equipment, the Display Information Processor (control console shown here) receives sightings data from BMEWS and processes it for automatic readout.

RCA is prime system contractor for the sprawling BMEWS three-site radar network whose probing electronic fingers reach deep into space to provide early warning of missile attacks.

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Out of the defense needs of today a new generation of RCA electronic data processing equipments has been born. For tomorrow's needs RCA offers one of the nation's foremost capabilities in research, design, development and production of data processing equipment for space and missile projects. For information on these and other new RCA scientific developments, write Dept. 434, **Defense Electronic Products,** Radio Corporation of America, Camden, N. J.

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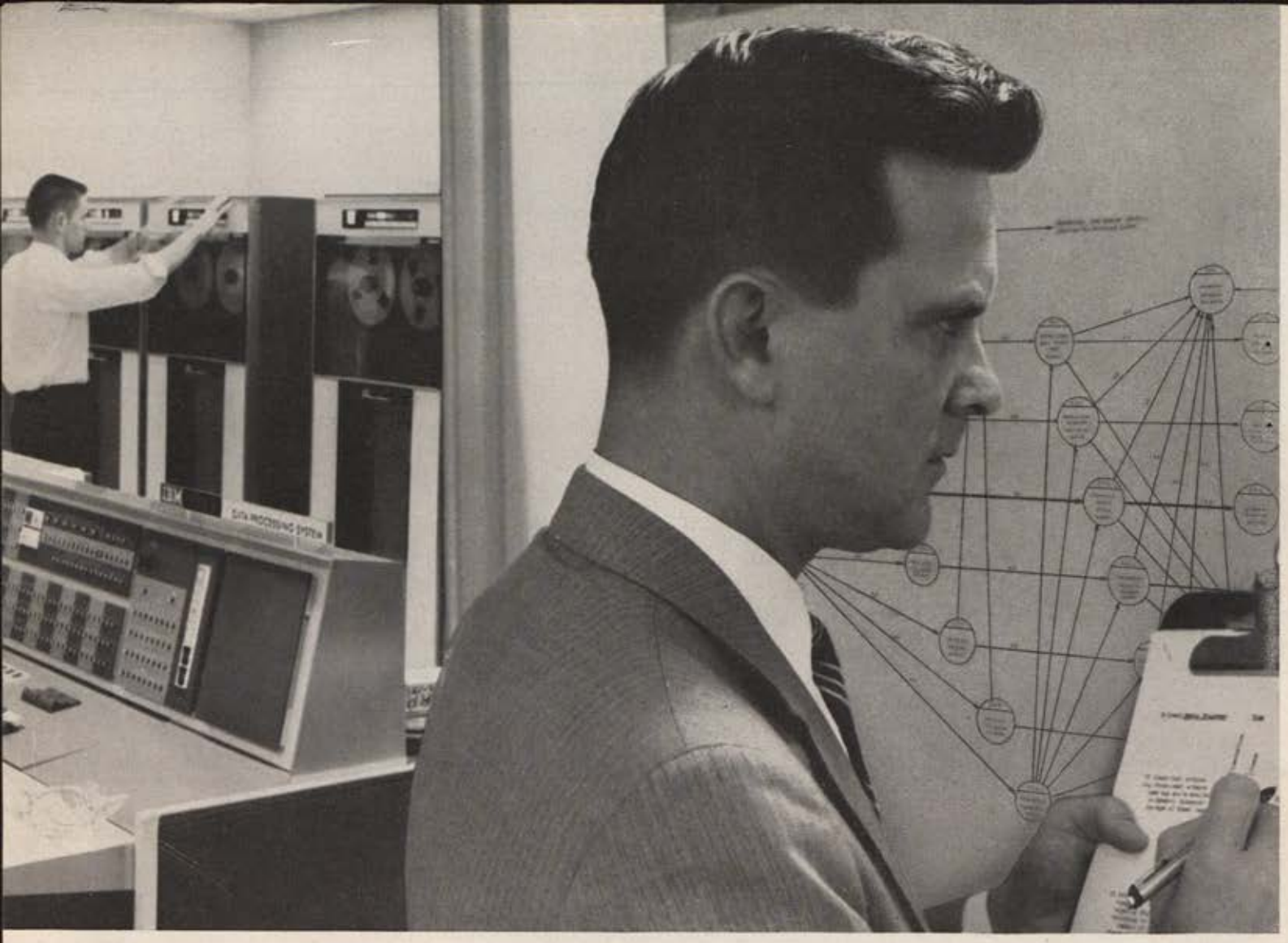

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flooded with water, went down with all instruments and the film record of the flight despite a Marine helicopter's efforts to haul it up. The second US Astronaut got clear, swam a short distance, was chopper-lifted to the waiting Navy aircraft carrier *Randolph*. The shot, substantially a success, moved the US closer to a manned orbital flight of its own.

Major Titov ate, slept, exercised, and talked over the radio while on his lengthy orbital trip. Red Air Force Maj. Yuri Gagarin had become the USSR's first Cosmonaut with a single orbital circle of the globe in one hour and forty-eight minutes on April 12. Major Titov covered 434,960 miles in his flight. By North American Air Defense Command calculation, his spaceship crossed North America ten times. Orbital distance from the earth was between 110 and 160 miles. Weight of his space vehicle was given as 10,430 pounds, about the same as Major Gagarin's, giving rise to speculation that the capsules used in the two shots were identical. The Russians did not reveal details of Major Titov's blastoff and landing. But he told a news conference ten days later that he ejected and parachuted at the end of the flight. The vehicle also landed safely, he said.

British space scientist Sir A. C. B. Lovell put the multiorbital Red shot in perspective in these words:

"This is another important step in the Russian plan to populate the solar system beginning with the invasion of the moon in a few years' time."

☆

All was well on the ICBM front.

A **Minuteman** streaked some 5,000 miles down the Atlantic Missile Range from Cape Canaveral on July 27. It was the second successful shot in three tries for the developmental second-generation missile. Minuteman's comparatively diminutive proportions and storable solid propellant should make it the closest yet to an always-ready, push-button big bird when it becomes operational next year. Minuteman is fifty-five feet long, weighs 65,000 pounds. By comparison, Atlas stands eighty-two feet, scales 260,000 pounds. Titan's height and weight are ninety feet and 222,000 pounds. Both are liquid propelled.

Atlas, the older and long-operational bigger bird, went two for two —one good shot each for its two most advanced versions. The "E" was up and away to a mid-Atlantic target on August 1. The shot, it was said, pro-

(Continued on following page)

Titan ICBM blastoff on July 21 at Cape Canaveral. Two Titans achieved successful shots during this month.

vided data for the "design of atomic power units for space vehicles." Three weeks earlier, on July 7, an Atlas-E had made a record flight of 9,050 miles from the Cape to the Indian Ocean. Next, on August 9, USAF inaugurated its new Atlas-F, designed for launch from silos 174 feet deep and protected with steel and concrete. "F" performed a programed flight, specifics of which were not revealed.

A **Titan** shot on July 21 featured a new wrinkle in rocketry. The missile, halfway out from the Cape on its 5,000-mile target run, released ten slender rocket decoys. They scattered over a wide area in the manner of a fireworks display. The tips of the decoys expanded, balloonlike, to simulate different warhead shapes. Radar operators on ships at sea and on downrange islands attempted to distinguish between the dummies and the actual nose cone. Details on the decoys were not available. Atlas missiles, the Air Force noted, have carried a number of types of decoys including graphite darts, pellets, and inflatable materials. Five days later, on July 26, a modified Titan packed the inertial guidance system that will go into the advanced Titan II on an equally successful full-range shot. Titan II, slated at present to be the most powerful free-world missile, was expected to undergo initial test firing late this year. The basic Titan approached operational status with these latest shots. Meanwhile, a Titan-site construction accident took five lives on August 8. A fifty-eight-ton launch silo door at a complex east of Denver crashed shut on a group of civilian workmen. Eight men were injured in addition to the five killed.

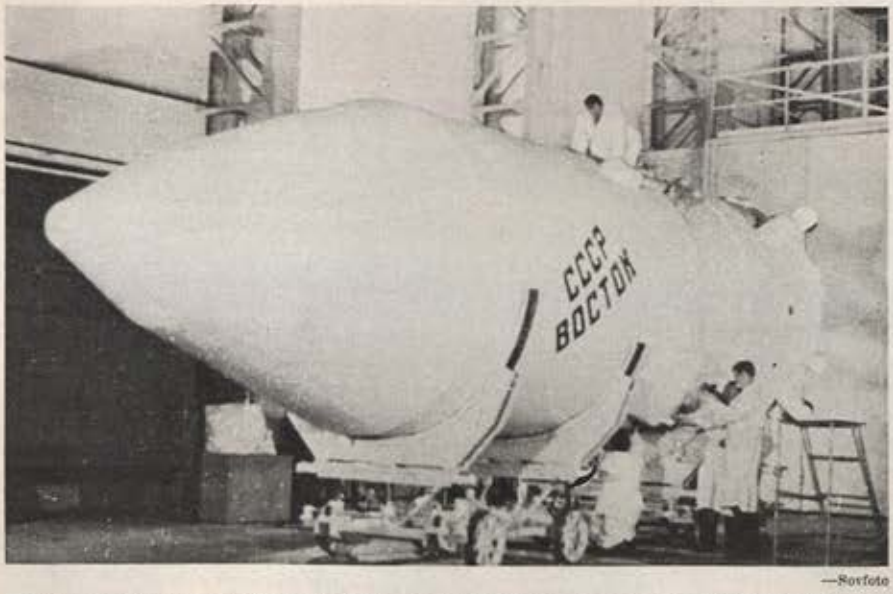
On the manned aircraft front, an **F-105** fighter-bomber made news by the ton. A nuclear-capable USAF Thunderchief demonstrated its limited punch by delivering more than seven tons of conventional bombs on target. Powered by its standard single jet, the plane carried aloft and plunked down twenty-six 565-pound bombs. This was believed to be the largest load ever carried aloft by a single-engine aircraft. The demonstration took place early in the month at the Systems Command's Air Proving Ground Center, Eglin AFB, Fla. In a further test of nonnuclear capability, a formation of four F-105s unloaded four tons of napalm on an Eglin target. The result was a man-made inferno.

—Wide World Photos, Inc.

Minuteman second-generation ICBM scored its second blue-ribbon shot in three tries on July 27 at Cape.

A 200-man **B-52H** Joint Test Force has commenced an extensive flight-test program at the Air Force Flight Test Center, Edwards AFB, Calif. The "H" is powered by longer-range turbofan jet engines, also has a collection of improved radar and electronic gear. The technicians represent more than a dozen industry concerns and four major USAF commands—SAC, the Systems and Logistics Commands, and the Air Training Command. They will work with four planes. The first will be flown for a thousand hours between now and early next year to evaluate the integrated weapon system. The second will check out electronics systems, the third test flight and stability with various combinations of armament.

(Continued on page 27)



—Sovfoto

Russian space capsule *Vostok*, flown by first Cosmonaut Yuri Gagarin in April, in a photo recently released by Russians. Details of Russian capsules are unknown.

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WITH THE AIR FORCE

Ryan Firebees will again be the jet targets at the Air Force's World Wide Weapons Meet, William Tell —1961 (Oct. 16–26). This is the third time Firebees have been selected for this important meet since 1958 when the Firebee pioneered the use of free-flying targets at a weapons meet. This year, 15 squadrons of the Air Force's best Century Series fighter-interceptors will pit their skills against Q-2C's, the most reliable "enemy" jet target to challenge the Air Defense Command!

WITH THE NAVY

Since 1956, earlier version Ryan Firebees have made hundreds of operational flights with the U.S. Navy. Today, the newest Firebee, the transonic Q-2C, is operational with Fleet units of the Navy and ordered in quantity for extensive use. Firebees pioneered as the first jet targets selected for Navy Weapons Meets—at Operation "Top Gun," in 1959—and have established unmatched records of reliability for continuous on-range performance at these extended military competitions.

WITH THE ARMY

Firebees are flying at White Sands Missile Range under Ryan logistics crews who assemble, fly and maintain the jet targets, in coordination with U.S. Army missile teams. For Army low-level target needs, Ryan developed the successful Firebee ground launch capability, in 1959, which is now available to all Military Services with all Firebees. Newest Army Firebees are transonic 124-E targets now used to evaluate Army missiles for both low and high altitude performance.

No other target compares with the recoverable Ryan Firebee for high-speed, high-altitude reliability and low cost per target mission. Ryan Aerospace—Ryan Aeronautical Company, San Diego, California.

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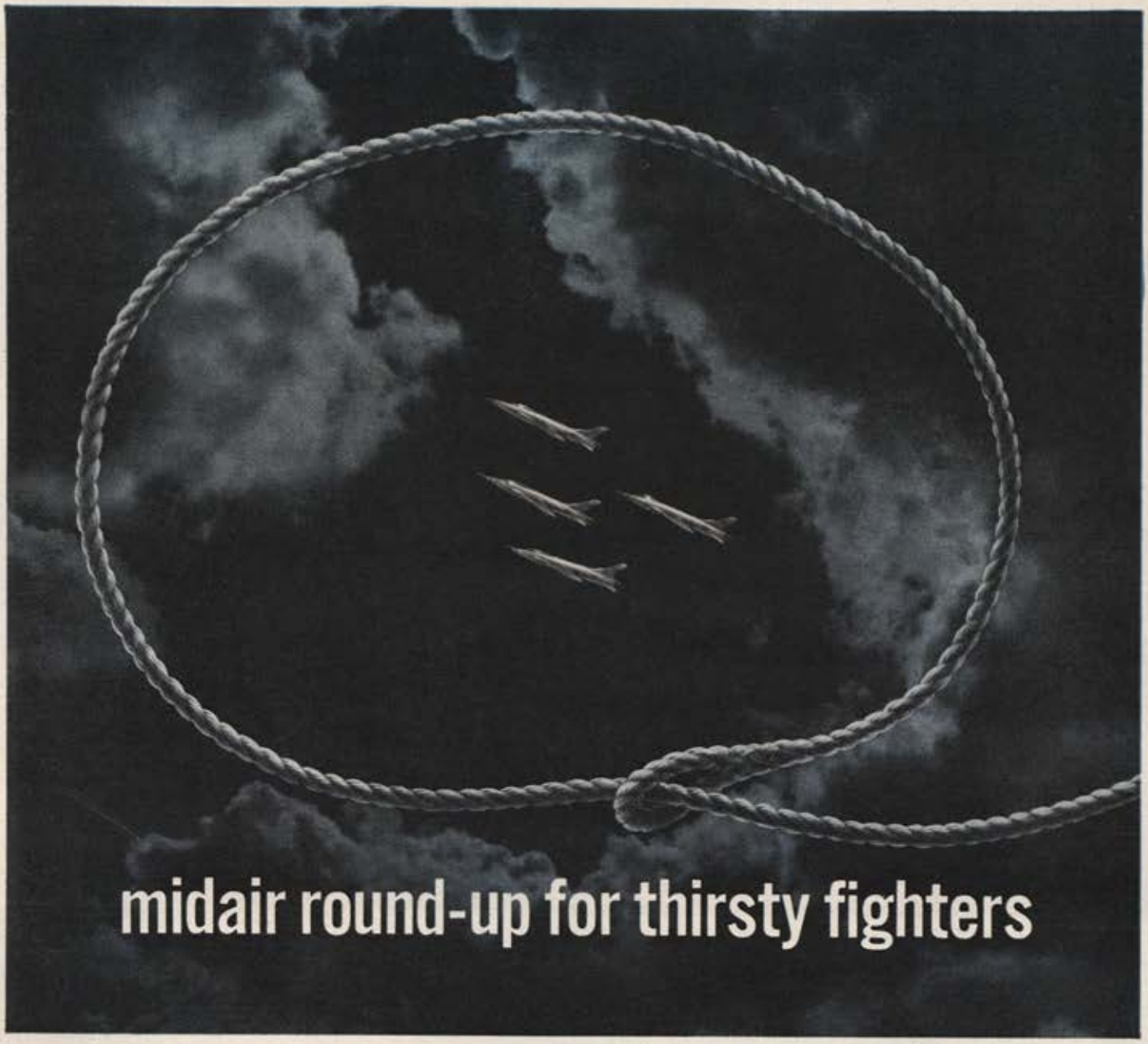

midair round-up for thirsty fighters

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The fourth will investigate the plane's performance in adverse weather conditions. Another flight-test program got under way as well on the C-130E, longer-range version of MATS' giant Hercules transport.

Spacewise this month, in addition to the Grissom and Titov flights: NASA launched a windmill-design **Explorer XII** satellite August 15 to study radiation. USAF attempted to orbit its **Discoverer XXVII** satellite on July 21, but it malfunctioned in the first minute after blastoff and was destroyed. The Air Force sent up multimillion-cubic-foot research balloons from Bemidji, Minn., on July 18 and 20, each bearing a cargo of 200 pounds of scientific radiation-study instruments.

☆

The Defense Department took another important step this month along the road to true unification of the armed forces. DoD established a joint military intelligence organization, the Defense Intelligence Agency. DIA, Deputy Defense Secretary Roswell Gilpatric said in announcing the move on August 2, "will combine a number of the intelligence functions heretofore carried out independently by the separate military departments." Still in being—at least for the present—but to be reduced in size were the separate intelligence units of the three services. Lt. Gen. Joseph F. Carroll, USAF's Inspector General who ran the recent investigation of DoD "leaks" to the press, was named first head of DIA.

The Defense Department said that in making this move it aimed at "greater unity of effort" in military intelligence and increased "over-all capability for collection, production, and dissemination of intelligence information." Under this unified approach, intelligence activities and resources were expected to be managed more effectively, with duplicating facilities, organizations, tasks eliminated.

Gradual phase-in was scheduled for the new group, which was to have a staff of about 1,500 when full grown. Current personnel of Army, Navy, and Air Force intelligence organizations will make up most of the DIA staff. The DIA joins an ever-growing family of joint defense agencies and activities.

In a less dramatic but highly significant move along these lines some weeks earlier, DoD set up a joint training program for defense personnel "engaged in the procurement of supplies, construction, and services." Fourteen joint courses of instruction were established to replace twenty-four given separately by the services. Six separate courses were retained.

John A. Lang, Jr., Air Force reserve colonel, Air Corps veteran of World War II, and old Washington hand, has been named Deputy for Reserve and ROTC Affairs in the Office of the Secretary of the Air Force. Mr. Lang, a North Carolinian, succeeds Ben Fridge in this post. Mr. Fridge is now Special Assistant to the Secretary of the AF for Manpower, Personnel, and Reserve Forces.

Mr. Lang brings to his Pentagon position thirty years of experience in education, government, and the Air Force. Prior to World War II, Mr. Lang was a teacher and educational administrator. He headed the English department at a Georgia military academy, served as an official in the National Student Government Federation, the US Office of Education, the National Youth Adminstration. When war came, Mr. Lang enlisted in the Air Corps, saw four years of active duty in the States, Alaska, North Africa, and Italy, returned to civilian life in 1946 as a Reserve major. Through the fifteen years since, Mr. Lang has served on Capitol Hill as administrative assistant to two congressmen and Staff Specialist for the House Government Operations Committee.

Left, Col. Jackson V. Rambeau, new AFA Director of Military Relations. Right, John A. Lang, Jr., new USAF Deputy for Reserve and ROTC Affairs.

Coincident with Mr. Lang's assumption of Pentagon duties, Reserve Col. Jackson V. Rambeau became the Air Force Association's Director of Military Relations, a post in which he will be deeply concerned with Reserve affairs and work closely with Mr. Lang's office. Colonel Rambeau, an Alabaman, retired effective September 1 as Chief of Reserve Forces, Hq. MATS, after twenty-one years of active service. Prior to four years with MATS, Colonel Rambeau was for four years Assistant for Air Force Reserve in the Directorate of Operations, Hq. USAF. In his duties at MATS and Hq. USAF, Colonel Rambeau played a major role in updating the mission, organization, equipment, and facilities of the Air Force Reserve and Air Guard. In prior service, Colonel Rambeau performed tours as a Professor of Air Science at Duke and in charge of all Reserve training in Louisiana and Arkansas. He served four years in Europe during and after World War II.

(STAFF CHANGES ON PAGE 30)

F-105 fighter-bomber, left, dropped record seven tons of conventional bombs on test target recently. Longer-range E version of C-130 transport, above, has entered testing.

Index to Advertisers

STAFF CHANGES. . . . **Brig. Gen. Milton B. Adams,** from Director of Systems Acquisitions, DCS/S&L, to Secretary, Designated Systems Management Group, Hq. USAF. . . . **Maj. Gen. Harvey T. Alness,** from Chief of Staff, to Vice Commander in Chief, Hq. USAFE. . . . **Gen. Samuel E. Anderson,** from Commander, AFLC, Wright-Patterson AFB, Ohio, to Air Deputy to SACEUR, Hq. SHAPE. . . . **Brig. Gen. Carl W. Andrews,** from Director of Materiel Programs, DCS/M, to Assistant for Materiel Programming, DCS/S&L, Hq. USAF. . . . **Maj. Gen. Glen R. Birchard,** from Deputy Chief of Staff, Operations, MATS, Scott AFB, Ill., to Commander, WESTAF, MATS, Travis AFB, Calif. . . . **Lt. Gen. Gordon A. Blake,** from Vice Commander in Chief, Hq. PACAF, to Commander, CONAC, Robins AFB, Ga., effective October 1, 1961. . . . **Brig. Gen. Irving L. Branch,** from Assistant DCS/D for Nuclear Systems, Hq. USAF, to Commander, AFFTC, AFSC, Edwards AFB, Calif. . . . **Maj. Gen. Robert A. Breitweiser,** from Military Assistant to Secretary of the Air Force, Hq. USAF, to Assistant Chief of Staff, Intelligence, Hq. USAF. . . . **Maj. Gen. Edwin B. Broadhurst,** from Chief of Staff, Hq. SAC, Offutt AFB, Neb., to Commander, 7th Air Division, SAC, High Wycombe, England. . . . **Brig. Gen. Robert S. Brua,** from Surgeon, Hq. MATS, Scott AFB, Ill., to Command Surgeon, Hq. PACAF. . . . **Lt. Gen. Robert W. Burns,** from Commander, 5th Air Force, PACAF, with additional duty as Commander, US Forces, Japan, to Chairman, Inter-American Defense Board, Washington, D. C.

Brig. Gen. Jack J. Catton, from Commander, 811th Air Division, SAC, Pease AFB, N. H., to Commander 822d Air Division, SAC, Turner AFB, Ga. . . . **Brig. Gen. John H. Chick,** from Deputy Director of Military Personnel, DCS/P, Hq. USAF, to Director of Personnel & Support Operations, AFLC, Wright-Patterson AFB, Ohio. . . . **Brig. Gen. Edwin S. Chickering,** from Member, to Deputy Director, Secretary of the Air Force Personnel Council, Hq. USAF. . . . **Brig. Gen. Robert H. Curtin,** from Deputy Director for Civil Engineering Operations, to Deputy Director for Construction, Directorate of Civil Engineering, DCS/O, Hq. USAF. . . . **Brig. Gen. George B. Dany,** from Commander, US Forces, Azores, and Commander, 1605th Air Base Wing, MATS, to DCS/Operations, Hq. MATS, Scott AFB, Ill. . . . **Lt. Gen. Gabriel P. Disosway,** from Senior AF Member, Military Studies and Liaison Division, Weapons Systems Evaluation Group, OSD, to Vice Commander, TAC, Langley AFB, Va.

Brig. Gen. John N. Ewbank, Jr., from Commander, 4520th Combat Crew Training Wing, TAC, Nellis AFB, Nev., to Chief of Staff, Hq. TAC, Langley AFB, Va. . . . **Brig. Gen. John T. Fitzwater,** from Vice Commander, 33d Air Division, to Vice Commander, 29th Air Division, ADC, Richards-Gebaur AFB, Mo. . . . **Brig. Gen. Jack A. Gibbs,** from Deputy Commander, AAC, to Assistant to the DCS/P, Hq. USAF. . . . **Brig. Gen. George B. Greene, Jr.,** from Deputy Commander, 17th AF, USAFE, to DCS/Operations, Hq. USAFE. . . . **Lt. Gen. Francis H. Griswold,** from Vice Commander in Chief, SAC, Offutt AFB, Neb., to Commandant, National War College, Ft. Lesley J. McNair, Washington, D. C. . . . **Maj. Gen. Victor R. Haugen,** from Assistant DCS/D, to Assistant DCS/Research & Technology, Hq. USAF. . . . **Brig. Gen. William Hipps,** from Director of Readiness Inspection, to Director, Systems Inspection, Office, TIG, Norton AFB, Calif. . . . **Lt. Gen. Kenneth B. Hobson,** from Commander, Ogden AMA, AFLC, Hill AFB, Utah, to Vice Commander, AFLC, Wright-Patterson AFB, Ohio. . . . **Maj. Gen. Joseph R. Holzapple,** from Assistant to Commander, AFSC, Wright-Patterson AFB, Ohio, to Assistant to DCS/S&L (Systems), Hq. USAF. . . . **Brig. Gen. Boyd Hubbard, Jr.,** from Assistant to DCS/P, Hq. USAF, to Vice Commander, 9th AF, TAC, Shaw AFB, S. C.

Gen. Truman H. Landon, from DCS/P, Hq. USAF, to Commander in Chief, USAFE. . . . **Brig. Gen. Eugene B. LeBailly,** from Deputy Director, Office of Information, OSAF, to Commander, US Forces, Azores, and Commander, 1605th Air Base Wing, MATS. . . . **Maj. Gen. Elvin S. Ligon, Jr.,** from Director of Personnel Planning, DCS/P, Hq. USAF, to Chief of Staff, Combined Military Planning Staff, Central Treaty Organization, Ankara, Turkey. . . . **Lt. Gen. John P. McConnell,** from Commander, 2d Air Force, SAC, Barksdale AFB, La., to Vice Commander in Chief, SAC, Offutt AFB, Neb. . . . **Gen. William F. McKee,** from Vice Commander to Commander, AFLC, Wright-Patterson AFB, Ohio. . . . **Brig. Gen. Stephen B. Mack,** from Inspector General, Hq. TAC, Langley AFB, Va., to Deputy Commander, 9th AF, TAC, Shaw AFB, S. C. . . . **Brig. Gen. Robert B. Miller,** from Commander, 14th Air Division, SAC, Beale AFB, Calif., to Commander, 4310th Air Division, SAC. . . . **Lt. Gen. Troup Miller, Jr.,** from Vice Commander to Commander, AU, Maxwell AFB, Ala. . . . **Brig. Gen. Dwight O. Monteith,** from Chief of Staff, Hq. ATC, Randolph AFB, Tex., to Commander, Amarillo Technical Training Center, ATC, Amarillo AFB, Tex. . . . **Maj. Gen. Ernest Moore,** from Acting Vice Commander, ADC, to Assistant to Commander, ADC, Ent AFB, Colo. . . . **Maj. Gen. Thomas S. Moorman, Jr.,** from Commandant, War College, AU, Maxwell AFB, to Vice Commander in Chief, and Chief of Staff, Hq. PACAF. . . . **Lt. Gen. George W. Mundy,** from Commandant, Industrial College of the Armed Forces, Ft. Lesley J. McNair, Washington, D. C., to Commander in Chief, Alaskan Command.

Brig. Gen. Paul W. Norton, from Staff Judge Advocate, USAFE, to Staff Judge Advocate, SAC, Offutt AFB, Neb. . . . **Brig. Gen. Arthur J. Pierce,** from Deputy Commander, Aerospace Technical Intelligence Center, Hq. Command, Wright-Patterson AFB, Ohio, to Commander, Foreign Technology Division, AFSC, same base. . . . **Maj. Gen. Charles H. Pottenger,** from Commander, Amarillo Technical Training Center, ATC, Amarillo AFB, Tex., to Vice Commander, AU, Maxwell AFB, Ala. . . . **Maj. Gen. Joseph J. Preston,** from Commander, 22d Air Division, SAC, Malmstrom AFB, Mont., to Commander, 1st Strategic Aerospace Division, SAC, Vandenberg AFB, Calif. . . . **Maj. Gen. Romulus W. Puryear,** from DCS/Operations, to Chief of Staff, Hq. USAFE. . . . **Maj. Gen. John M. Reynolds,** from Commander, 3d Air Division, SAC, to Deputy Director, The Joint Staff, Office, JCS, Washington, D. C. . . . **Brig. Gen. Kyle L. Riddle,** from Chief of Staff, to Deputy Commander, 17th AF, USAFE. . . . **Lt. Gen. John D. Ryan,** from Commander, 16th AF, to Commander, 2d AF, SAC, Barksdale AFB, La.

Maj. Gen. William O. Senter, from Assistant DCS/M, to Assistant DCS/S&L (Logistics), Hq. USAF. . . . **Lt. Gen. Jacob E. Smart,** from Vice Commander, TAC, Langley AFB, Va., to Commander, 5th AF, PACAF, with additional duty as Commander, US Forces, Japan. . . . **Maj. Gen. Dale O. Smith,** from Commander 64th Air Division (Defense), ADC, Stewart AFB, N. Y., to Special Assistant to JCS for Arms Control, Washington, D. C. . . . **Gen. Frederic H. Smith, Jr.,** from Commander in Chief, USAFE, with additional duty as Commander, 4th Allied Tactical AF, to Vice Chief of Staff, Hq. USAF. . . . **Brig. Gen. Marion C. Smith,** from Director of Procurement Production, DCS/M to Director of Systems Services, DCS/S&L, Hq. USAF. . . . **Gen. Walter C. Sweeney, Jr.,** from Commander 8th AF, SAC, Westover AFB, Mass., to Commander TAC, Langley AFB, Va., effective October 1.

Lt. Gen. Robert H. Terrill, from Commander, APGC, AFSC, Eglin AFB, Fla., to Vice Commander, ADC, Ent AFB, Colorado Springs, Colo. . . . **Maj. Gen. William Thurman,** from Assistant for Production Programming, DCS/M, to Director of Procurement Management, DCS/S&L, Hq. USAF. . . . **Lt. Gen. Edward J. Timberlake,** from Vice Commander in Chief, USAFE, to DCS/P, Hq. USAF. . . . **Maj. Gen. David Wade,** from Commander, 1st Missile Division, SAC, Vandenberg AFB, Calif., to Commander, 16th AF, SAC. . . . **Maj. Gen. Horace M. Wade,** from Commander, 4310th Air Division, SAC, to Deputy Commander, 8th AF, SAC, Westover, AFB, Mass., effective October 1. . . . **Maj. Gen. Russell L. Waldron,** from Commander, WESTAF, MATS, Travis AFB, Calif., to Assistant DCS/P, Hq. USAF. . . . **Maj. Gen. James H. Walsh,** from Assistant Chief of Staff, Intelligence, Hq. USAF, to Chief of Staff, Hq. SAC, Offutt AFB, Neb. . . . **Maj. Gen. Robert H. Warren,** from Assistant to Commander, to Commander, APGC, AFSC, Eglin AFB, Fla. . . . **Maj. Gen. Charles B. Westover,** from Commander, 7th Air Division, SAC, High Wycombe, England, to Assistant DCS/O, Hq. USAF. . . . **Maj. Gen. Albert T. Wilson, Jr.,** from Assistant AF Comptroller, Hq. USAF, to Deputy Commandant, Industrial College of the Armed Forces, Ft. Lesley J. McNair, Washington, D. C.—END

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AIRPOWER in the news

Claude Witze
SENIOR EDITOR, AIR FORCE MAGAZINE

The Budget Cycle . . . Again

WASHINGTON, D.C.

The budget exercise, vastly complicated by the fast pace of history in 1961, is over, so far as fiscal 1962 is concerned. The fray for fiscal 1963 already is under way in the Pentagon and the Bureau of the Budget, dignified but little by the new management concepts introduced by the New Frontier.

It was pointed out last month that the Defense Department seemed headed for an almost certain clash with Congress on the issue of further investment in long-range bombers. Given the money that was not requested, Defense Secretary Robert S. McNamara said he would recommend that it not be spent. At that point the House had handed him $238 million in this category, making a total of $448,840,000, with the recommendation that first choice be given to acceleration of the B-70 program, second choice to continuation of the B-52 and B-58 lines.

Then the Senate Defense Appropriations Subcommittee heard from Gen. Curtis E. LeMay, USAF Chief of Staff. The Senators took the General seriously and recommended that he be given what he asked for: $449 million for B-70 development and $525 million for B-52 or B-58 production, knowing by this time he favors the B-52. After a conference the bill was sent to the White House calling for $400 million for B-70 development and $515 million for production of B-52s or B-58s. The President had requested no money for the existing bombers and only $220 million for the B-70.

In his appearance before the Senate Subcommittee, General LeMay was asked for his opinion, and he gave it: He does not think the United States should close down its bomber lines. Rather than modify the B-58 to improve its range, size, and speed he would place that money on the B-70. For immediate purchase, he looks upon the B-52 as the best weapon system per dollar expended. He knows of no other system that will fill the role that the B-70 was designed for. He is in favor of the ICBM program as it stands and feels certain the missiles will give a good account of themselves in the combat inventory.

Senator A. Willis Robertson, presenting the committee report, said that the Senate always has supported the mixed-force concept and indicated that the advent of neither computing machines nor missiles dictated a change in that policy.

"We believe," he said for the committee, "that even in the 1970s there will still be a vital role for the manned bomber."

In the committee report it was pointed out that money put into manned bombers in the past has been well invested.

"Now we approach a new and relatively untried era in the field of missiles, space, and advanced technology," the report said. "On one hand, we are told that ballistic missiles, once they are proved and are of sufficient quantity, will replace the manned systems as a deterrent. We are also told by the Air Force Chief of Staff that, even in the age of ballistic missiles, there are still two incontestable, overriding mandates for the continuation of manned systems, the first of these concerns the awesome decision to commit the force. . . . The second mandate for the manned systems concerns the perpetual requirement for operational flexibility. . . .

"Thus, we view the B-70 cutback and stretchout with grave concern and serious reservations. We question whether this nation can afford to place full dependence on an operationally untried and untested missile force."

The report contended that the United States must respond in the "entire spectrum of conflict," and said, "We still have a huge stake for scientific development within our own atmosphere. We feel the B-70 offers the most advanced step in manned strategic systems for the operational inventory."

Then there was an edict:

"It is the committee's desire that the DoD plan a firm program for the B-70 which will have as its goal placing the required number of wings in operational configuration at the earliest possible date and that this program be presented to the Congress not later than January 1, 1962."

This is a clear request for action, not by an Air Force clinging to a project with "emotional fervor," as has been alleged by some. It is a request from the same sage Congress that has been urged in the public prints to "earnestly inquire into why we made the incredible mistake of virtually abandoning advanced manned aircraft development to put all of our eggs in the ICBM basket long before this weapon reached operational reliability and technical maturity."

Goering's Name Is Meyer

There is an old story to the effect that Hermann Goering, polishing his medals on the eve of World War II, said that if Berlin ever were bombed, his name would be Meyer. The General acquired this kind of cockiness not from a computer, as utilized at Harvard and MIT and RAND Corporation, but from some arithmetic worked out by a Dr. Ludwig, a "whiz kid" in the German Air Force. With pencil and slide rule Dr. Ludwig evaluated antiaircraft artillery and came up with impressive evaluations of its effectiveness. Then came the dawn and Allied bombers over Berlin. What Goering's ack-ack did in action was to produce a kill score against the bombers that was only one twelve-hundredth of what Dr. Ludwig had given as a probability. If Goering had a tombstone, the name on it should be Meyer.

Dr. Ludwig's mistake is a common one when theorists study isolated aspects of weaponry without a firm knowledge of tactics. It is pointed out in military textbooks that tactics in air warfare are just as fluid and dynamic as the technology—sometimes described as "galloping"—which produces weapons and delivery systems. Failure to

(Continued on following page)

grasp this aspect of air warfare can, even in 1961, lead to evaluation errors just as serious as the one that led the Luftwaffe's chief astray. As we read *Aviation Week*, some unidentified advisers to Defense Secretary McNamara are following this path. They are reported to hold the conviction that bomber penetration of Soviet key targets now would be ineffective. The reason they give to Larry Booda of *Aviation Week* is that the Reds have made tremendous advances in "antiaircraft technology." Mr. McNamara, these advisers continued, has "technical and intelligence reasons" for knowing how good the Russian defense system is. They say that in the near future a mass raid of B-47s and B-52s "would result in an attrition of seventy-five to ninety percent." Further, these sources say the Secretary will disclose all the facts "if need be" when the "current political furor over manned bombers" ceases.

So far, there is no evidence that the Defense Secretary has been incensed by this "leak" from inside his official family. The indignation is evident, however, from a number of congressmen, military leaders, and men in the aircraft industry. Senator Stuart Symington, himself a former Secretary of the Air Force, says, "Those of us who know anything about manned aircraft were shocked at the inaccurate attack on these aircraft by Mr. Booda. It is a fact that recent investigations of the Congress have verified what many of us have felt for a long time; namely, that the weapon feared most by any would-be aggressor is the airplane with the weapons it can now carry."

Senator [Carl] Hayden: Will the B-70 be able to penetrate enemy defenses and perform its assigned missions?

General [Curtis E.] LeMay: There is no doubt in my mind that it will be able to penetrate defenses. It is designed to do this. It has the capacity in weight-carrying ability and space ability to carry all the penetration aids that you might want to use to penetrate enemy defenses.

Senator Hayden: What are the technological problems which must be solved to permit successful penetration by the B-70?

General LeMay: I don't think there are any technological problems to solve. We see the answers to all of them. . . .

Senator Hayden: Thank you, sir, for your very clear-cut answers to my questions.

—*Hearings before the Subcommittee of the Committee on Appropriations, United States Senate, page 1545 (July 18, 1961).*

Mr. Symington, in common with other members of Congress reached their conclusions on the basis of intelligence at hand, and they feel that if Mr. McNamara's advisers have different information they have a responsibility to share it with Congress and the military-industry team on which we depend for our national security.

The material these advisers passed along to the *Aviation Week* reporter served excellently the purposes of Senator William Proxmire of Wisconsin. Mr. Proxmire had offered an amendment to the Defense Appropriations Bill to delete $525 million in procurement funds for long-range manned bombers. The amendment was rejected, eighty-seven to four. Stinging with this rebuke, the Senator called the *Aviation Week* article a "report on our official intelligence estimates of Soviet capabilities." This is a claim to authenticity not advanced by the magazine or its reporter.

The article contains a great deal of material about the techniques of detection, identification, interception, and destruction, all of which are known to the Air Force and its Strategic Air Command. The disturbing thing about the report is that it indicates that some men around Mr. McNamara and possibly the Secretary himself assume that if an enemy has, or can get, a defensive system that operates in the same environment as the manned bomber, then the bomber can't live. This is palpably false. Some of the bombers will live and, despite what the computers or the Dr. Ludwigs figure out as the kill probability, the rate of attrition will be far below seventy-five percent.

The kill probability always will look high on the basis of one defensive weapon against one bomber, but that is not the way an air battle is fought. What must be considered is the action of *all* offensive forces against the entire ground environment. It is not expected that bomber attrition rates in a nuclear war would be as low as they were in World War II. But the rate of loss will depend to a great degree not on the offensive weapon capability as opposed to the capability of the defensive weapon as much as it will on tactics. This is the unpredictable factor that led Stanley Baldwin to warn in 1932 that the man in the street should know "there is no power on earth that can protect him from bombing. . . . The bomber will always get through." Yet it is just as true that Goering, among his other failures, did not win the Battle of Britain despite the statistical odds in his favor.

Basically, Mr. McNamara's "advisers" appeared to be laying the groundwork for a further attack on USAF's B-70 Mach 3 bomber project. Gen. Curtis E. LeMay, the Chief of Staff, has some convictions about the capabilities of this system, quoted in the box on this page. About a year ago his predecessor, Gen. Thomas D. White, told Congress that one of the reasons he picked the B-70 instead of a Mach 3 interceptor (the F-108) for development was because it would create a bigger problem for the Russians.

It may be that the significant thing about this Ludwigian approach by the men around the Defense Secretary is what it discloses about the way some decisions are being reached in Washington. On top of the method, which ignores the lessons of military experience, there is a great deal of distortion of fact. An example of this appeared in the *US Naval Institute Proceedings* for July. So far, it has not been put in the *Congressional Record*, but that danger exists.

This essay says that "figures quoted on the B-70 indicate that the first two prototypes will run close to $1 billion each." Figures used by President Kennedy in his defense budget message show that the tag on the first three prototypes would be $433 million each. At another point, the author says "the projected cost per aircraft for sixty-six [production] planes, at the point where the learning curve levels out, is still some $473 million each." This also is incorrect. The "ball-park" figure for sixty-six aircraft, including spares, ground-support equipment, development costs, and flight test is $75 million each. Taking the learning curve into consideration, cost of the sixty-sixth article would be about $28 million. If four wings of B-70s were built, the total cost would be approximately $8 billion, or about $40 million per copy.

Given the kind of analysis that takes no notice of military tactics and the things that are learned by aircrews in action, plus some deliberate misinformation on price tags, there is a serious danger that the debate on the manned bomber will degenerate even more. Who's next for the name of Meyer?

(Continued on page 36)

HOW ADVANCED IS THE ART OF ENERGY CONVERSION?

Chemical–Electrical: Fuel Cells. The direct conversion of chemical energy to electrical energy via fuel cells has for years been regarded as a great potential power source. The problem has been to translate theory into practical, producible devices. Recent prototype testing indicates this need may now be met.

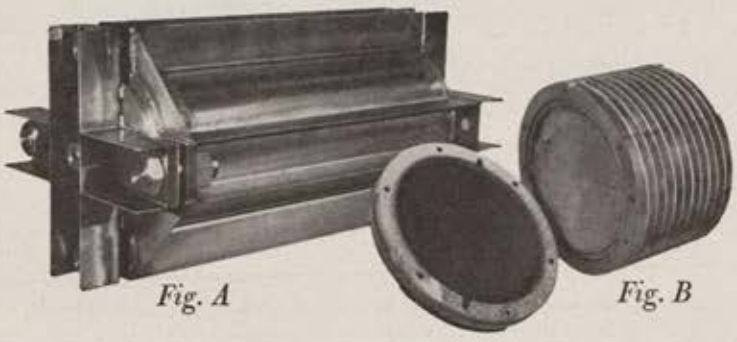

Fig. A *Fig. B*

■—The men at Leesona Moos Laboratories are responsible for a good deal of the early research on fuel cells. Present work is in two main areas: the hydrogen-oxygen Hydrox® cell, and hydrocarbon-air Carbox® cell. Thus far, prototypes of such cells have demonstrated good performance. Outputs with hydrogen equalling 150 watts per sq. ft. of electrode are readily achievable. The Hydrox® cell can be designed as a regenerative unit which utilizes the same fuel and oxidant over and over, or as a non-regenerative unit which produces potable water as a by-product. The Carbox® cell, still under development, offers the advantage of more economical fuel.

■—*A typical Hydrox® Fuel Cell test battery is shown here. Fig. A shows the complete assembly and Fig. B indicates the internal fuel cell electrodes. It is but one of many configurations designed by Leesona Moos Laboratories.*

■—Leesona Moos Laboratories has been actively involved in the field of energy conversion for 13 years. Thermoelectric, electrochemical, and nuclear power sources, ranging from megawatt reactors to microwatt batteries, have been investigated. Some of these are offered as products, for example, the Dynox® solid state battery, Raypak® nuclear power pack, and Betachron® nuclear timer. An informative brochure on current state of energy conversion techniques with emphasis on fuel cells is available from Department 31.

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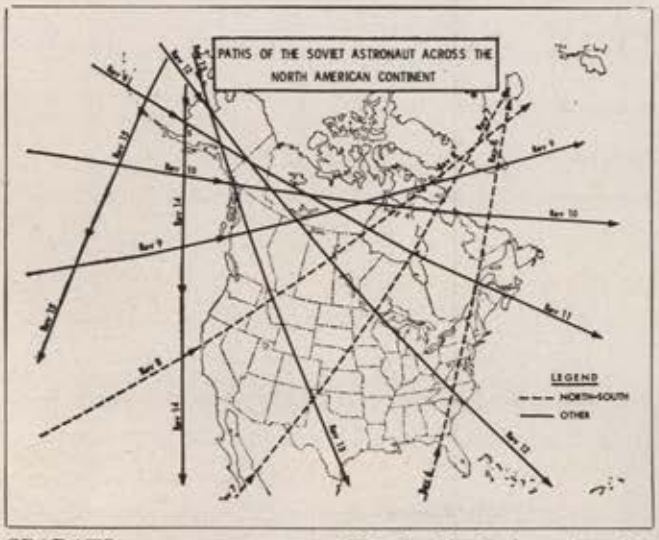

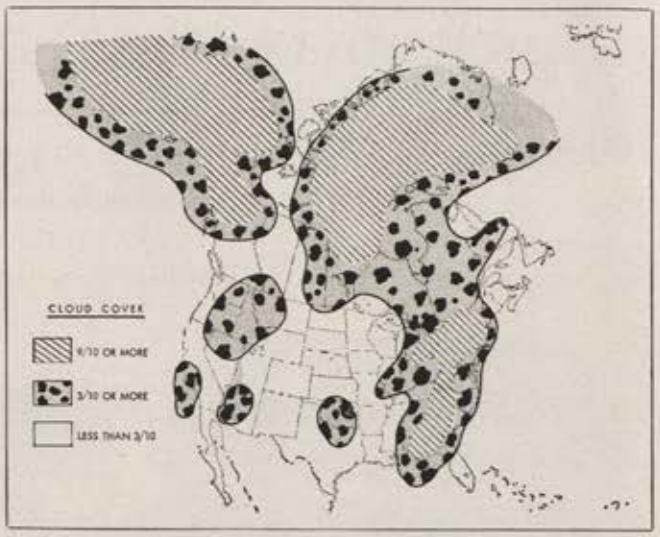

SPADATS, a computer operated by the North American Air Defense Command, tracked and calculated these paths taken by Cosmonaut Titov in his passes over the continent. Chart at right shows what he could see through existing cloud cover that day.

A Flight over Sand

When the Russians put a man in orbit for a single ride once around the earth, Gen. Thomas D. White, then USAF Chief of Staff, said the achievement "bears out the Air Force's previous estimates of the extremely high priority of Soviet space efforts.

"Furthermore," he added, "it is firm evidence of the Soviet's concentration on the earth's immediate envelope as the logical area for the near-term expansion of their own military aerospace power."

When the Russians put a man in orbit for a multiple ride, seventeen times around the earth, General White had retired and his opinion was not solicited. But the New York *Times* did report that the flight was dismissed by a "ranking Defense Department official" as having no military significance. The paper said this unidentified expert "summed up general reaction within the Pentagon's policy-making circles in these words:

" 'There is nothing new to this flight [by Maj. Gherman S. Titov in the *Vostok* II] from a military standpoint and so far as I can see it doesn't add to their military capability.' "

Of course, the same language could have been used when the Wright brothers pulled their silly stunt on the sands at Kitty Hawk in 1903. In fact, the reaction was not greatly different and it was a long time before the War Department started to take seriously any products out of that Dayton bicycle shop.

There is no doubt, however, that the Titov flight will bring about new exchanges about the military mission in space. It started right at the moment General White, appearing last April before the Senate Subcommittee on Defense Appropriations, gave his evaluation. The General was asked by Senator Dennis Chavez, the chairman, whether he was satisfied that Major Gagarin had been in orbit on April 12. The reply:

"I am completely satisfied that a man orbited the earth; yes, sir. I am convinced that failure on the part of this nation to recognize the warning, the challenge, and now the possible threat contained in this achievement and in the Soviet's well rounded and growing aerospace force, could prove disastrous."

This exchange followed:

Senator Ellender: Have we not been doing that to the fullest extent for the past four or five years?

General White: I believe we have as a nation been rather unimaginative about the future of space.

Senator Ellender: Are you not surprised and disappointed to note the great progress that has been made by Russia?

General White: I am not surprised.

Senator Ellender: You are not surprised?

General White: No, sir.

Senator Ellender: You expected it?

General White. We anticipated it.

Senator Ellender: In other words, that communism would beat capitalism?

General White: I thought you asked me whether I was surprised at the achievements of the Soviets in space, and I am not surprised at that.

Senator Ellender: That would mean that you expected it?

General White: If we don't really move in space I think we are going to be penalized in the future.

At this point it should go in the record that in December of 1957 General White's Deputy Chief of Staff for Development, Lt. Gen. Donald L. Putt, created a new Directorate of Astronautics that probably had the shortest life of any military office ever created. Its announced purpose was to plan, organize, and manage space programs. It could have been called an effort to help capitalism beat communism in this area. The order setting up the directorate was withdrawn in a matter of days, because a man named William M. Holaday, then the Defense Department's Director of Guided Missiles, said that it "jumped the gun."

If Mr. Holaday were around today he probably would have said that the North American Air Defense Command jumped the gun in early July, when it installed a space detecting and tracking system in the Combat Operations Center at Colorado Springs. This device, called SPADATS, charted the Russian Cosmonaut on his passes over North America and kept a record of the cloud cover. From the first orbit SPADATS knew that on the seventeenth pass the pilot would be in an area where he logically could expect to try a landing.

Major Titov, the chart shows, made ten passes over North America. In the history of the military utilization of space they are comparable to the pass of a few feet that the Wright brothers made over the sands at Kitty Hawk. —END

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Years of research and use-experience have brought increased reliability, cuts in weight and volume, and improved packaging. For example, both the WDP-167 and new WDP-400 have been developed to operate at 85° C.—where many others fail.

A molecularized computer, in which single semiconductor blocks perform multiple functions, is being developed at Air Arm for missiles or satellites. It is 1/10 the size of a conventional computer. Above, right, a tiny multi-purpose gate with resistors, diodes and transistors diffused on a silicon wafer, does the same job as the larger unit.

The missile designed to hide in the sky can save America billions of dollars

Air Force Douglas Skybolt, now under development, extends role of manned aircraft in Space Age defense.

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In the future, with the Douglas Skybolt—an air-to-ground missile of nuclear capability—the U.S. Air Force and Royal Air Force could add years to the useful lives of the B-52 and Vulcan bombers. These aircraft cost millions of dollars each, so you're talking in terms of fantastic savings!

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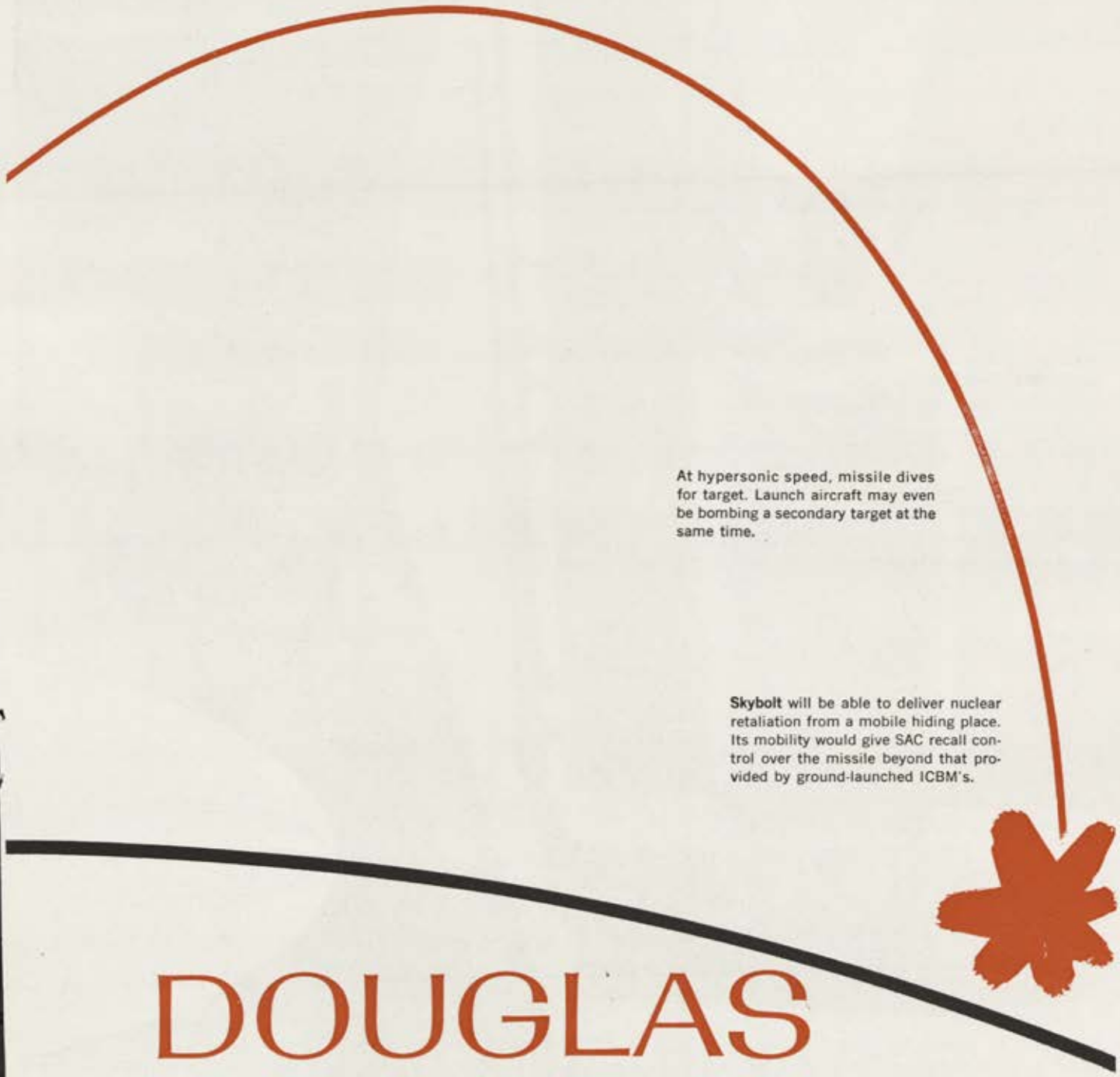
With this Air-Launched Ballistic Missile, Douglas is again proving its ability to combine various technologies—electronics, propulsion, guidance, metallurgy, many more—into a weapons system for the future.

Skybolt is designed to be launched from bombers flying at ranges of 1000 miles from target!

Skybolt will be able to climb out of the atmosphere on a ballistic trajectory. Missile will have accuracy, while being simple to maintain and fire.



At hypersonic speed, missile dives for target. Launch aircraft may even be bombing a secondary target at the same time.

Skybolt will be able to deliver nuclear retaliation from a mobile hiding place. Its mobility would give SAC recall control over the missile beyond that provided by ground-launched ICBM's.

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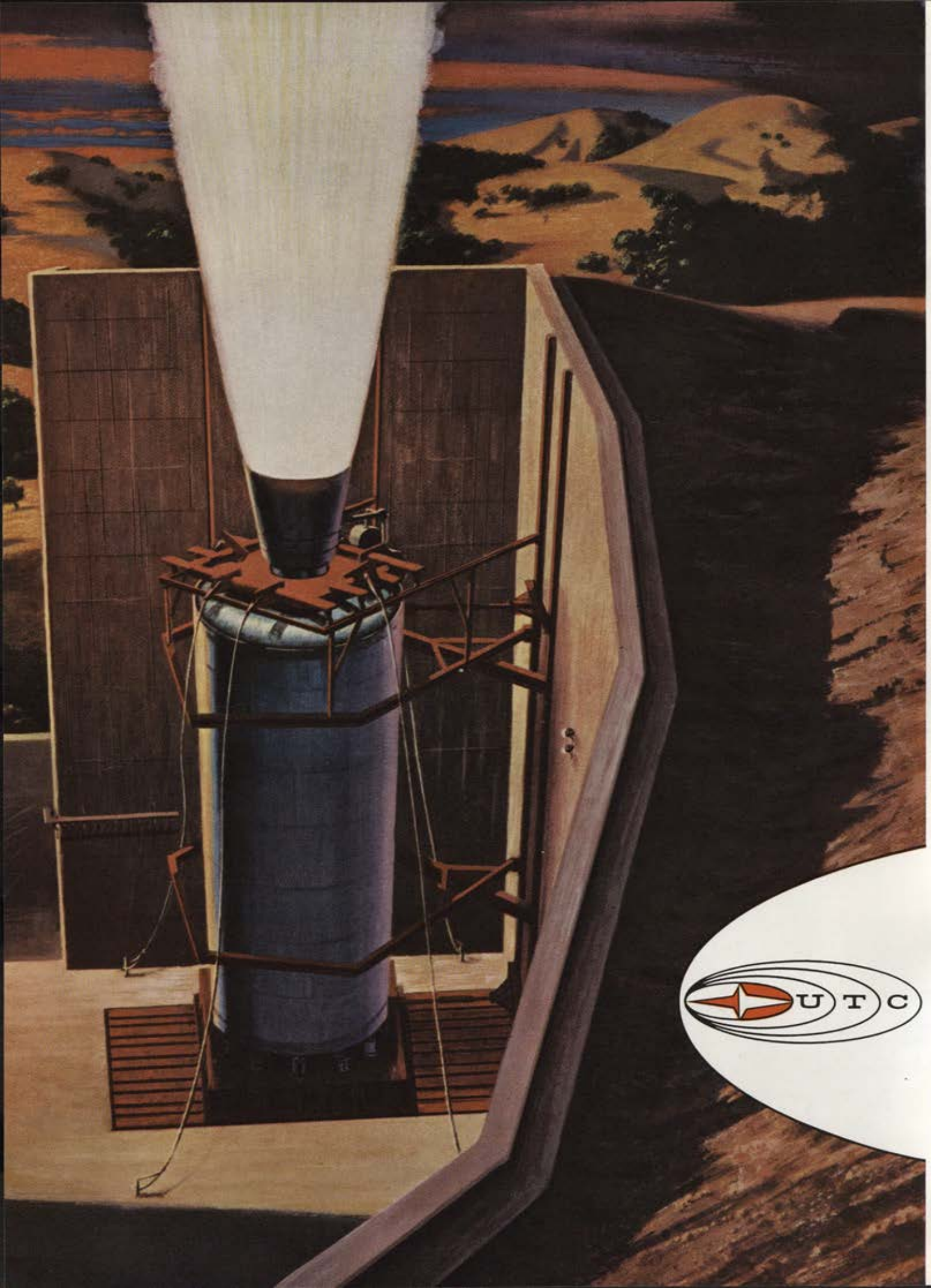
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As a regular reader of AIR FORCE Magazine I look forward to this annual Air Force Almanac Issue. It is an invaluable reference for all interested in aerospace power. This year, as in the past, the Almanac Issue conveys a sense of the size of the United States Air Force, the complexity of its organization, the scope of its global mission. I would ask all to recall, however, a fact which we who know and love the Air Force so well sometimes forget.

The Air Force is and must remain a means and not an end. It is an indispensable servant of our national policy, responsive to our national needs, reflective of our national spirit.

So Air Force service can never be just a job. Rather it must be a dedicated fulfillment of the responsibilities laid upon all of us by a nation which is always needful of that service and trustful that it will be rendered.

In this context, then, I recommend to you the proud history of accomplishment recorded in these pages.

EUGENE M. ZUCKERT
SECRETARY OF THE AIR FORCE

In days of hypersonic rockets, supersonic aircraft, satellites, outer-space probes, we may tend to overlook the key element in our Air Force . . .

Our First Priority: PEOPLE

Gen. Curtis E. LeMay, USAF
CHIEF OF STAFF, UNITED STATES AIR FORCE

Air Force Secretary Zuckert, General LeMay, and former USAF Chief of Staff, General White, at latter's retirement.

WHAT is the Air Force's most critical need?
Space systems?
More missiles?
Advanced manned weapon systems?

All are high priority, but there is one need that consistently outranks them in importance. And until machines can think creatively this need will continue to head the list:

PEOPLE.

Too often in these days of supersonic aircraft, hypersonic rockets, satellites, and outer-space probes, the key element tends to be overshadowed and forgotten—the people who develop, build, and operate the new technological marvels.

One of the most overworked phrases in our language today is "exploding technology." It is, however, still descriptive of the technological revolution and the constantly accelerating rates of progress. A good example of this acceleration can be found in the history of transatlantic crossing.

From the time man developed suitable sea-going vessels until Columbus made his voyage there was a span of about 2,500 years.

There was an interval of thirty years between the development of the first steamboat until one crossed the Atlantic.

Between the Wright brothers' first flight to the crossing of the Atlantic by the NC-4, there was fifteen years.

And it took man only four years from the time a suitable rocket booster was developed until he was able to launch a man into space.

Twenty-five hundred years—thirty years—fifteen years—four years.

The compression continues, daily putting man closer to wonders he dreamed and pondered about for centuries.

This process also magnifies the problems of national defense because the best people our nation produces are required for many national efforts. A democracy does not have nor condone the evil of forced labor. Thus the services must actively compete for quality people vital to the success of today's complex weapon systems. Despite the current fascination with computers and automation, the greatest computer devised is still the human brain. Man offers flexibility because of his ability to observe, discriminate, evaluate, and be a decision-maker.

Man-made computers are different. A computer remembers. It answers when asked. It knows what should be going on and can correct the process to get it on track. But thus far man has not been able to build one that can come up with original thoughts or display courage and love of liberty. Nor can the machine be dedicated to God and country.

Therefore man, by virtue of his brain and soul, is going to continue to be the most important element in our defense posture.

Since the composition of the Air Force is changing constantly as we progress into the aerospace age, the numbers and qualities of people needed are also changing.

The main reasons for the changing requirements in human resources are activation of missile squadrons; technical advancement of weapon and support systems; the complexity and cost of new weapon and support systems; and the reduction of manned aircraft requirements.

Men and machines are a partnership. A dual problem arises from this fact.

First, it is necessary to provide our units with the very best equipment as rapidly as possible. The time

(Continued on following page)

taken between development of an idea for a new weapon system and its development, procurement, and introduction into the inventory must be as short as practicable.

In our stepped-up management procedures, these phases often overlap, thus compounding the twin problem of people.

Planning for people and related actions must keep pace with compressed time schedules if trained personnel are to be available from the earliest planning efforts throughout the development and procurement stages, test and acceptance, and finally the manning of operational units.

Since weapon systems coming into the inventory in the future are going to be vastly more complicated than those on hand today, it is obvious that more preparation is required. The Air Force therefore concentrated on more refined management techniques, seeks a higher level of individual education, and stresses motivation and dedication to the task. There are positive actions now being taken or contemplated to identify and retain the highly important resources of qualified people. Initial actions are to control input, retention, and retirements. This introduces quality control measures that will permit a balancing of skills and requirements with experience.

In order for the organization as a whole to keep pace with its weapons, a constantly refined educational base is required. To a great extent, this will be the responsibility of the individual.

Those people who cannot grow with us will not be with us.

A personal reading program, for example, should be a continuing project for everyone. The individual officer and airman should have broad interests. He should read not only in his technical field. He should read also timely and thought-provoking publications such as the *Air University Quarterly Review*, *Airman Magazine*, and AIR FORCE and SPACE DIGEST, to mention a few.

Education and professionalism go together to produce top-quality people. The Air Force is a professional force—from top to bottom. There is no place today or in the future for those who do not approach their specialties and jobs in a professional manner and with the intent of constant learning and personal improvement.

Many airmen and officers are now taking advantage of the educational opportunities being offered. Tomorrow there will be greater opportunities, but intellectual development in a military career is the same as in civilian life—desire marks the difference between the winner and the follower.

So that it can perform its mission, the Air Force of the future must be composed of vastly larger numbers of intellectually trained people. The critical shortage will be in the scientific and engineering fields.

We have the human resources in this nation. The Air Force has as its goal the obtaining, training, and retaining of quality people. This is an effort of great magnitude, an effort that can succeed if we move in the direction of personal satisfaction, *esprit de corps*, individual awareness of the Air Force role, and recognition and appreciation of the serviceman by the public.

What is the Air Force doing for its people in the way of future programs?

By stressing good management and human relations, significant improvements are going to be made to further broaden opportunity and compensation. While we do not foresee the day when the military will be able to compete with industry in take-home pay for skilled personnel, we will, however, continue to work for comparable compensation. This means pay adjustments, housing, restored commissary and exchange privileges, and other fringe benefits. All these things are needed to help attract quality people, but the Air Force member must also have inherent qualities that cannot be bought—a dedication to the mission and a willingness to work to the breaking point because the job is important and must be done. The Air Force, fortunately, has always been composed of this type of person.

The current priority projects of the Air Force relating to the management of people are:

- Education programs for both officers and airmen.
- Expanded housing program.
- Adjustment of quarters allowances.
- Revision of reenlistment bonus payments.
- Pay adjustments to include incentive pay, full implementation of proficiency pay, alert pay for combat crews, and responsibility pay.
- And an increased number of Regular appointments for officers.

What are the chances of becoming and staying a member of the Air Force? Excellent—if the individual works for the job and is willing to improve himself.

Many trends are emerging.

Air Force people can expect to be trained and retrained to meet the changing needs. It is our firm intention to do the task with the people we have on hand—the career people who are due our first loyalty.

In turn, these people must recognize and help solve the problem. Voluntary retraining is one of the answers. If an individual resists retraining, it will be a self-imposed roadblock in his career.

Without question, one of the most critical problems posed to the Air Force today is in the officer career field. In general, our aim is to encourage those officers on active duty who do not have a baccalaureate degree to take advantage of the programs in existence—such as AFIT and Operation Bootstrap.

The majority of future officers will be college graduates entering from the Air Force Academy, AFROTC, and Officer Training School programs. Other sources will be the aviation cadet program and officer candidate school. Through the latter, capable airmen and college-trained men will be able to compete for commissions even though they do not have a degree. Additional progress up the ladder of command and

chances of gaining a regular commission will be problematical, however, without further education.

We will continue with our basic approaches to retention of the younger officers. This group leaves us at the rate of six out of ten after serving their minimum obligated tours, despite our efforts to retain them.

Procurement is being aimed toward programs that produce not only well educated but also well motivated officers. This approach prompted restudy of the major sources of procurement, AFROTC, resulting in the new Officer Education Program (OEP). This program provides a scholarship plan, longer association of students with the military environment, and selectivity of highly interested applicants.

Secondly, informing and counseling of the individual is being refined to more clearly point out the advantages and satisfaction of a service career. Project Top Star was initiated to meet this need.

Among the newer management devices designed to increase our retention rate are:

- Extending the nonrated officer's tour of duty to interest highly motivated and qualified applicants in an Air Force career.
- Selection of officers for regular commissions without requiring them to apply.
- Legislative relief on the Officer Grade Limitation Act and the Bolte Committee recommendations to attain uniformity in all services with regard to promotion opportunity and grades.
- A flight pay accrual system.

The Air Force is currently short 11,000 officers with scientific and engineering degrees. In two years this shortage can be decreased by 4,500 through education programs available to officers now on active duty. In three years, this gap can be further closed by an additional 4,500 officers through utilization of the same education programs by the on-board officer resources. It is apparent there are great educational opportunities open now and in the future.

It must be obvious that the chances of success are in favor of those having the training, education, experience, or knowledge in the fields where expanding Air Force requirements are indicated.

This is equally true for airmen.

Our biggest problem in the airman field is still retention of first-term people. Many of the current projects are designed to make a USAF career for airmen more attractive and increase the number of applicants for further service. With greater numbers, the Air Force can be more selective and obtain quality as well as quantity.

The Air Force does not expect, nor does it wish to attain 100 percent retention of the newer people. The 55-45 program is designed to provide the desired balance of new people with those already having experience—fifty-five percent career airmen and forty-five percent first-term people. This percentage, of course, will vary with career fields from a high of 62-38 in the electronics groups to 48-52 in services.

The 55-45 ratio is called the "optimum"—the most effective and practical. It was based on a study and analysis over several years. Ratios were developed after consideration of many factors and checked against these criteria for a career force:

- Be attainable.
- Be sustainable.
- Provide career progression and promotion opportunity.

The desired distribution of the career force will be obtained primarily through controlling input. Input controls on prior and nonprior service procurement are now in effect.

Reenlistment quotas are also in effect, but due to the fluctuations of enlistments, yearly selection ratios vary according to the number of airmen reaching the end of their first enlistment. Under the quota system, entrance into career status becomes more than ever a matter of selective retention.

On the horizon are further controls. Selective retirements promise further quality and ensure progression and promotion for the force. Retraining is another solution to the problem and while it often creates short-time personal hardships, it is a long-term advantage to the individual.

And as with the officers, the broader the educational base, especially in technical fields, the broader the opportunity.

Promotional opportunity will invariably remain the greatest incentive for the individual. The Air Force will continue to take positive and determined action to ensure this opportunity remains available, since without it stagnation will quickly come and undermine combat capability.

Controls for quality and quantity are therefore viewed as the most efficient long-range methods at our disposal to acquire and maintain a professional force. These actions will prompt redirected thinking because in the past there have been people, in and out of the Air Force, laboring under the misconception that service careers were more or less sinecures. Under this theory a man had a job as long as he kept out of trouble and did his work with reasonable results.

It was a fallacy in any era, but in the aerospace era it is a deadly impression that not only halts an individual's progress, it may well endanger national security.

The acquisition and retention of quality people is still one of the best forms of insurance for national security. The task requires the understanding and vigorous support of each man and woman in the Air Force.

And the public at large must recognize and actively support our efforts to further improve what I believe to be the finest military force ever assembled.

There are challenging years ahead, challenging jobs for people who move with the times. The future holds no fear for people of courage who ready themselves as professionals. These are the people who will make up the Air Force in this and the coming decades. —END

USAF's new Chief of Staff earned a reputation as "the toughest cop of the western world" during his years as SAC Commander. He is, more than that, an airman of broad experience and keen administrative ability . . .

GLOBAL ORGANIZATION MAN

By Claude Witze
SENIOR EDITOR, AIR FORCE MAGAZINE

WHEN Gen. Curtis E. LeMay appeared for confirmation as USAF Chief of Staff before the Senate Armed Services Committee in early June it was pointed out, but not emphasized, that he "understands organization." This understatement, possibly a deliberate one, was put in the record by Senator Stuart Symington, a former Secretary of the Air Force now sitting in the upper chamber as a delegate from the state of Missouri.

The Senator's purpose, he made it clear, was to shift the center of attention. Somehow, in the halls of Congress as in the public prints, General LeMay has been viewed erroneously and exclusively as the advocate of strategic airpower with all of the parochialism that label might connote. Said Mr. Symington:

"One point often overlooked about General LeMay

Air Secretary Zuckert swears in General LeMay as Chief of Staff in White House ceremony on June 30, 1961. General LeMay had been the Vice Chief of Staff for four years. In his previous service, time and again he held posts that required him to reach painful, life-or-death decisions.

is the mistaken idea that he has been identified almost entirely with strategic airpower, because he happens to be the world's foremost authority on strategic air.

"But I knew him and worked with him when he ran the Berlin Airlift, and I also knew him and worked with him when he ran R&D for the Air Force.

"The truth is this General has probably had more experience in more diversified fields of airpower than any other high-ranking officer in the Air Force except General [Thomas D.] White."

The Senator was right. But he did not dissuade Congress, the public, the dailies, and the Sunday supplements from their concept of General LeMay as a gruff, tough, scowling disciplinarian. Said the caption on a LeMay photo in a current newsweekly: "Chews cigars and airmen."

The men who know General LeMay best feel that this image of their Chief has its origin in some of the stern chapters of his career. The roots, they say, are not only in his organizational capability as displayed in nine years as head of the Strategic Air Command, but in his combat record in World War II. He has, time and again, been in the seat where tough decisions had to be made, the kind of decisions that meant success or failure to a mission, life or death to hundreds of men in combat crews.

It is not necessary to list them all. Even before the war started, in 1937 and 1938, he was lead navigator on good-will flights of B-17 Flying Fortresses to South America and helped win a Mackay Trophy. On the verge of war, he pioneered the ferry route to Africa over the South Atlantic and won the Distinguished Flying Cross. In 1942 he trained and led the 305th Bombardment Group to England and with it studied strategic bombing tactics. It was with this unit that General LeMay carried out his insistence that it was bombs on target that measured success. He was told that his proposed tactics were suicidal but he personally led the 305th on straight-in bomb runs and formation pattern bombing. Then there was Regensburg, where he was up in front with the first shuttle mission that flew out of England, dropped its bombs, and went on to North Africa. He got his first star, as a brigadier general, after this raid in September 1943. He was thirty-six years old.

In the official history of the Army Air Forces in World War II, it says that the decision to have the Marianas-based B-29 bombers undertake low-level night fire raids on Tokyo, although based on careful studies, was a decision made by General LeMay alone.

"It was a calculated risk," the history relates, "and like most such decisions it required great courage on the part of the commander. If losses should prove as heavy as some experts feared, the whole strategic campaign would be crippled and LeMay's career ruined. Instead, the gamble paid off extravagantly."

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Top right, General LeMay as an Air Cadet. His career as an air officer since has included distinguished chapters in blazing, flak-filled skies over Europe, the Far East. Center, the General in World War II. His air leadership in the assault on Hitler's Europe earned him his first star as brigadier general when he was young thirty-six. Bottom right, General LeMay and his familiar cigar at the time of 1948's Berlin Airlift, which he initially set up.

With Barney Giles, left, and "Rosie" O'Donnell in Japan.

But more pertinent than the war record is the history of SAC under General LeMay. That is where he got his reputation as "the toughest cop of the western world." It is an image that his colleagues believe grew out of SAC, not out of the General as a person. It is an image, they say, in which the man has been confused with the command.

When General LeMay took over SAC in 1948 it was suffering, like most of the military organizations, from the casual anemia that was put in its veins by Louis Johnson, the Secretary of Defense who made a mission out of debilitation. General LeMay, possibly alone of all our high-ranking military commanders, took what he had and proceeded on the assumption that war might break out any minute. He was described at this point as "relentlessly efficient" and "a quiet and implacable perfectionist."

It doesn't make colorful copy for newspapers and magazines, but General LeMay's closest colleagues say that the history of SAC is the proof of his "genius for organization." A brigadier general who has been associated with him for many years says that this genius, almost universally unrecognized in the aura of the omnipresent cigar and SAC's spit-and-polish, is the new Chief's greatest strength. The man says General LeMay has an unsurpassed ability to set clear objectives, then select the right people and direct them toward these objectives.

A standard illustration, cited by every SAC veteran above the rank of lieutenant colonel, is the command's air safety program. Created by General LeMay, it is stern and successful. Every wing commander in SAC knew that if one of his bombers or tankers had an accident he would personally be facing the top commander in a matter of hours. His story would have to be told with facts and facts alone. He would have to explain what had caused the accident and also what had been done to keep it from happening again.

Then there was the SAC Management Control System. This was a technique used by General LeMay to locate every breakdown or potential breakdown of SAC's men and equipment. It resulted in new standards of reliability, separated the capable from the incapable. "MCS was flexible," says one officer who worked with it for years, "but airplanes and people could be made or broken by the speed with which the boss knew where the flaws were located. And flaws were not tolerated."

The Management Control System enabled General LeMay to measure the true capability of every SAC unit when it operated under wartime conditions. The missions always have been realistic and the results, on the General's desk, had to be measured in terms of targets destroyed, not bombs delivered or the percentage of aircraft that made it back to the home base. Combat capability was the measure.

When he became Vice Chief of Staff in 1957, one of General LeMay's innovations was to shift the scene of his 8:30 a.m. staff meeting from his office on the flourth floor of the Pentagon to the USAF operations center in the basement. That session still is held every day and in the same place, where operations officers must be prepared to answer every question on the forces, their disposition and dispersal, and any changes in the alert status. Already there is a marked trend to make this Pentagon site more of an operating headquarters than it has been in the past, ready with information without waiting to relay queries to the field.

In none of this activity is General LeMay concerned with the details of the operation. These are jobs that he delegates to competent people, and he expects nothing more than that they carry out their assignments. He works at an uncluttered desk.

Senator Symington's effort to portray General

LeMay as an *airpower* expert rather than a strategic bombing partisan should not have been necessary. Time and again the new Chief of Staff has told congressional committees that flexibility is essential in all the forces, that planes and missiles are complementary. He views himself as an airpower conservative in the sense that he jealously guards the force in being and approaches the introduction of new systems, from a practical point of view. This does not mean that he is opposed to change. It does mean that the existing punch will be retained by General LeMay until its technological successor is proven operational and represents true combat capability. And combat capability, he holds, is the measure of deterrence. In a speech about a year ago, General LeMay defined the "basic factors of genuine deterrence" as:

"Military forces capable of victory under all circumstances in the event of conflict.

"Public understanding of the capability of these forces and determination that they will be used if necessary.

"The enemy's understanding of this capability and of our determination and willingness to use these forces."

Then he added:

"Unfortunately there are people in this country who advocate reducing US strategic forces to a small, somewhat mobile, retaliatory capability suitable only for destroying cities.

"Due to the constant dollar squeeze on national defense, this concept offers the inducement of reduced over-all costs. The Soviets, incidentally, think this type of force is exactly what we should build.

"But what happens if we shave our deterrent margin so thin?

"First, we cannot win the war if deterrence fails because, once we have used up the force and are without a capability to restrike, we will be open to equal or worse destruction by the enemy's undamaged military forces.

"Second, such a force cannot deter limited war because the enemy will reason that we would use an inferior nuclear strike force only as a last resort and not to halt aggression that does not directly threaten our national survival.

"Third, this concept of force utilization is outmoded because destruction of cities is no longer a dependable deterrent factor if he can destroy our cities in return.

"Such destruction would contribute little or nothing to the outcome of the war. It would be an act of blind revenge.

"Plainly, an inadequate military force of this type cannot do the job. By accepting such a reduced force goal we would sacrifice our chances of winning should war come.

"Our forces, therefore, must be sufficient, prepared, and able to destroy any aggressor's military power to the extent that he no longer has the will or ability to wage war.

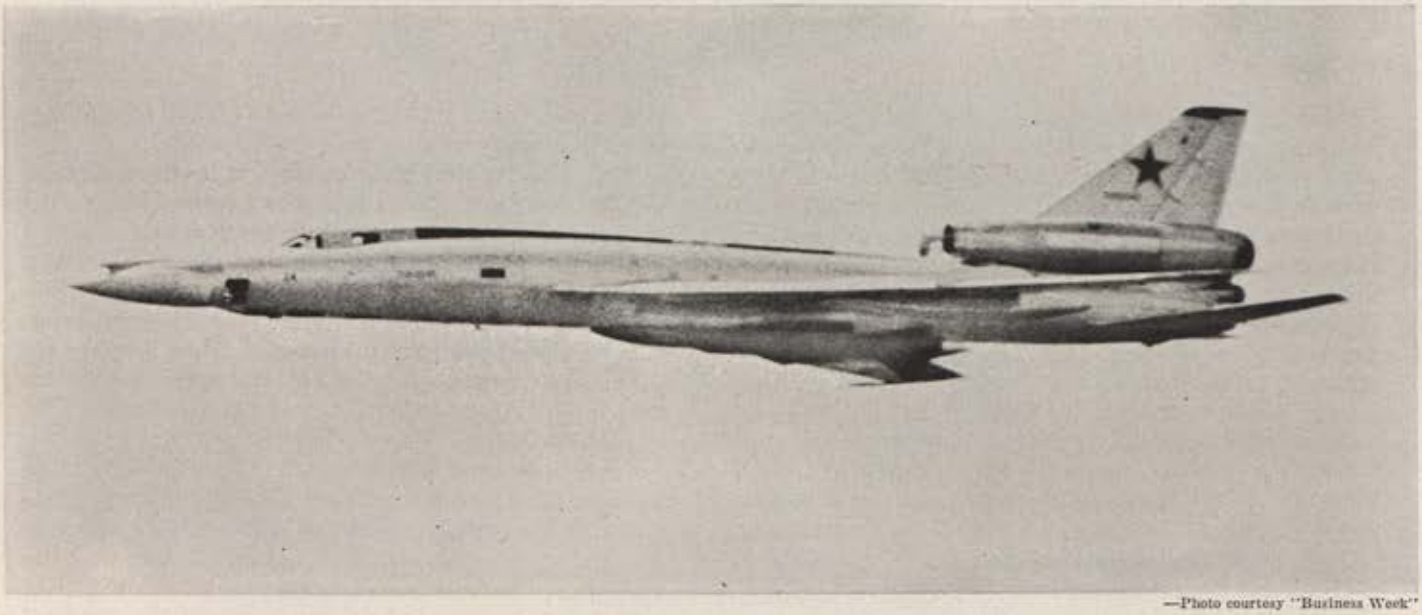
"This is the type of force we must maintain—a counterforce—a force that can win—the kind of military force that is essential to true deterrence."

This kind of straight military talk, it should be pointed out, finds its parallel in the recorded viewpoints of General LeMay's immediate predecessor, General White. For all the differences in their personalities and backgrounds—General LeMay was educated at Ohio State, not West Point—the two men have identical convictions about the role of airpower. They are equally persuasive in presenting these convictions and are held in equal esteem by the most knowledgeable men on Capitol Hill.

There is general agreement that there will be some changes in USAF with General LeMay at the helm, although the people who know him best are quick to cite his wide agreement with General White and the advantages he has gained from four years in Washington as General White's Vice Chief. It is expected that there will be a tightening of USAF policy and more uniformity of expressed opinion both at headquarters and in the field commands.

The "genius for organization" credited to General LeMay as his great unsung quality provides the kind of leadership most appreciated by competent and dedicated soldiers. It will bring new emphasis on responsibility, fixed on individuals with new firmness. Competence will be rewarded, incompetence penalized. The reputation and demeanor of General LeMay will be transfused into all of USAF.—END

General LeMay and Jimmy Stewart, screen actor and now Reserve brigadier general, at an AFA gathering in 1955.



—Photo courtesy "Business Week"

NEW THREAT: BEAUTY

HOW FAR IS THE RED

THE WORLD had a short, disquieting look at the Russian Air Force this summer.

More than a dozen modern Red aircraft flew by, low and slow, during the Soviet Air Force Day celebration on July 9 at Tushino Airfield near Moscow.

Reaction to the show was mixed. There was surprise, shock, skepticism, a few days' worth of headlines. Even today, with all the evaluations and intelligence information in, with all the photos of the Tushino display neatly filed away, there is wide disagreement among experts and responsible persons as to just what the Moscow air show showed.

But a sizable and convincing number of informed persons to whom the writer has spoken point out cogent evidence leading to this deeply disturbing conclusion:

The Russians are flying at least one new supersonic bomber and one new, long-range, Mach 2-plus interceptor that are superior to their counterparts in the United States Air Force.

Technical evidence indicates that the Beauty bomber (*see above*) and the Blinder interceptor (*above, right*) are better suited for their mission than any United States aircraft now in operation or even slated for production. Both appear to embody major advances in aerodynamic efficiency and range. Operationally, short-range and limited flying time are the most acute problems with high-speed, high-performance planes. The range improvements evident on both Beauty and Blinder are therefore especially significant.

The Blinder interceptor has been developed to fight the Strategic Air Command's B-52–Hound Dog missile combination. It appears that the Blinder, with less than two hours' warning, could intercept the B-52 more than 1,000 miles from Russian targets. This would be before the bomber was in close enough to launch its Hound Dog missile. And the Blinder could loiter at subsonic speeds in the interception zone for exceptionally long periods before or between combats.

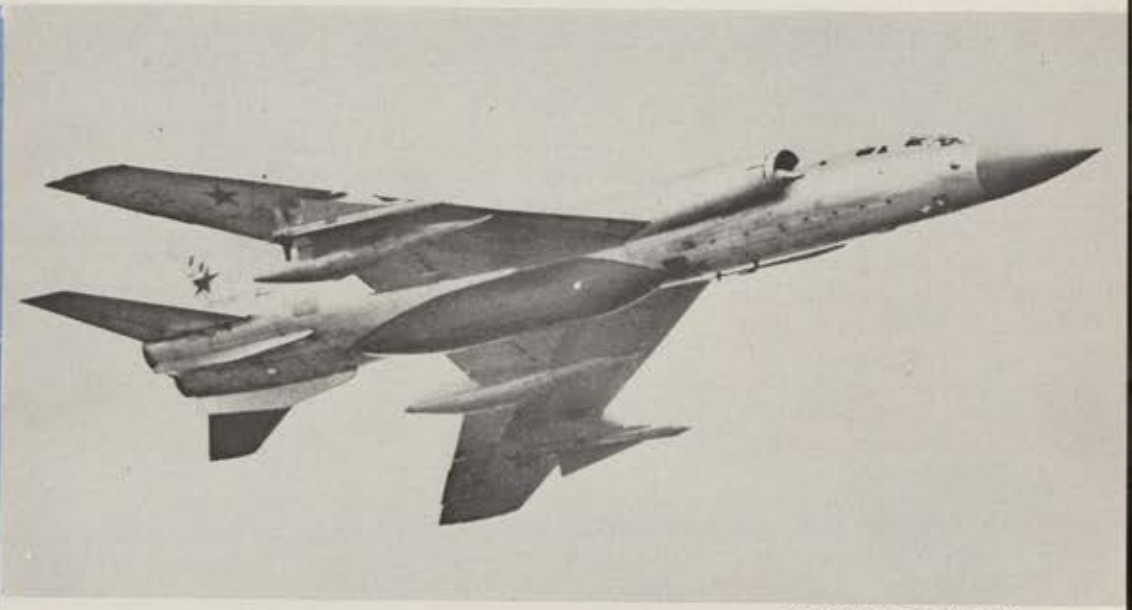
The Beauty bomber's mission is to attack over intercontinental ranges with relative immunity from existing air defense systems. The aircraft appears to have a range of about 4,000 miles without refueling—up to 1,000 of those miles at supersonic speed. It carries a large ballistic missile which undoubtedly could be launched before coming within range of defending fighters. The Beauty has the high-penetration ability of any aircraft that can maintain Mach 2 speed for significant periods over a defended area. It is extremely difficult to intercept a bomber with a fighter that isn't a good deal faster. Few operational fighter planes in the world could outrun the Beauty in a straight-course race, much less match it in a few feints or changes of course and then come into position to release their air-to-air missiles.

Several points can be cited to support the estimate that Beauty and Blinder are the world's best performers in their classes. One clearly visible feature of both aircraft—their wings—is especially important.

The wing planform indicates strongly that the planes were designed in line with aerodynamic research that took place in the 1955-57 time period. In contrast, all

Soviet Beauty Mach 2 bomber is shown with air-to-surface missile slung under fuselage. Infrared search unit protrudes ahead of cockpit.

Blinder, long-range intereceptor unveiled by the Soviets, has black search radar radome area-ruled neatly into bottom of fuselage, two air-to-air missiles about fourteen feet long under wings.



—Photo courtesy Business Week

AND THE BLINDER

AIR FORCE AHEAD?

J. S. Butz, Jr.
TECHNICAL EDITOR,
AIR FORCE MAGAZINE

US combat aircraft are based on 1951-1953 aerodynamic technology or even earlier knowledge. This holds true even for the newest aircraft entering the US inventory. It is a matter of record that the B-58, the F-105, the F4H, and other high-performance aircraft were all committed to their basic designs by the beginning of 1954.

Lead times for aircraft development and production in the United States have lengthened to the point that the services cannot buy "new" equipment that is less than eight or ten years old in concept. Regardless of the reasons—red tape, budget stretchouts, or any of a dozen other suspected causes—long lead time is becoming an almost overpowering burden for the US military.

Congressional and Department of Defense studies in the middle 1950s indicated that Soviet lead times ordinarily are about half of those required in the US. The appearance of Beauty and the Blinder ties in with these studies. These two airplanes clearly use an aerodynamic approach that wasn't experimented with in this country on an extensive basis until after 1955. Assuming that the Russians were not ahead in ideas, the lead time on the Beauty, at least, is five or six years at the most. More than one version of the Beauty flew in the Moscow air show and a total of at least ten of the aircraft was seen. Only one Blinder appeared, but it was equipped with missiles, and it had the earmarks of an operational configuration.

All of the other high-performance aircraft in the Soviet Air Force Day extravaganza were of 1951-1953 aerodynamic vintage or earlier. Most of them have been improved since the last Russian show in 1956. The Flashlight all-weather interceptor has been boosted to supersonic speed. The Bear and Badger bombers have been equipped with formidable air-to-surface cruise missiles. These improvements and noticeable changes on other aircraft has raised the over-all potential of the Russian Air Force. However, none of them can match the long step forward represented by Beauty and the Blinder.

In developing the Beauty and the Blinder it appears that Soviet leaders used their lead-time superiority to try to counteract the major offensive and defensive weapons scheduled by the USAF in the early 1960s. Few would doubt their wisdom in giving a high priority to construction of the best possible aircraft for defense against SAC's long-range subsonic bombers carrying Hound Dog or later missiles. The Reds are now taking the same logical steps to defend against long-range subsonic bombers carrying Skybolt ballistic missiles. On the offensive side, Soviet leaders obviously believe that second-generation Mach 2 bombers are needed to reach major targets. Beauty is their answer.

In assessing the aerodynamic implications of the Beauty and Blinder designs it is necessary to resort to some oversimplifications. A host of factors such as planform modifications, various twists and cambers, etc., all act in an interrelated manner to complicate aircraft design. However, a general recapitulation of the stages in supersonic design progress is clearly in order.

(Continued on following page)

The first phase ended in 1953. From the end of World War II until that time aerodynamic research centered on the problem of boosting operational speeds up to Mach 2. A great deal of effort was put into drag reduction and engine design improvement to reach this speed at all. Several years of work went into the stability problems involved in maneuvering safely at Mach 2.

All air forces wanted to be able to attack subsonic bombers with Mach 2 fighters because the kill probability is very high when the fighter has more than double the bomber speed. This enviable defensive position had existed on only one occasion in history—when Germany's ME-262 jet fighter flew against the B-17. A corollary problem of this 1945-1953 period was the development of the first Mach 2 bomber to throw the advantage back to the offense. But this was a much more expensive problem.

The second phase reached its high point in about 1955-1957. The major problem was improving range. All operational aircraft that grew out of aerodynamic knowledge accumulated in the first phase were designed to cruise at subsonic speeds and with supersonic dash speeds only over defended areas and over target. Wing designs for good subsonic and supersonic performance are diametrically opposed. A high aspect ratio or long span, is needed for good aerodynamic efficiency at subsonic speeds. The aerodynamic efficiency is expressed in terms of lift/drag ratio or L/D. The B-52, for instance, has a high aspect ratio and a high L/D. It is a very efficient aircraft and has a long range at high subsonic speeds.

For supersonic speeds, however, the aspect ratio must be low if drag and structural weight are to stay within reason. Therefore, when the supersonic airplane cruises at subsonic speeds, its efficiency and range are low.

From 1953 on, this problem of improving, simultaneously, subsonic and supersonic range has received major aeronautical research effort around the world. It is extremely interesting that in 1956 the National Advisory Committee for Aeronautics was testing in its Langley Field wind tunnels a family of modified arrow-shaped wings which had about thirty percent better subsonic and supersonic efficiency than any wing from the phase-one era. These percentage improvements in L/D can be translated directly into equal improvements in range.

This particular family of 1956-model arrow wings, designed in the United States, are almost identical to the wings on the Blinder. The Beauty wings are apparently an improved version of the Blinder's. For anyone who wants to say that the Russians copied us again, the detailed US research information on the 1956-style arrow wings was not released until October 1960. The basic idea of the arrow wing, however, was no secret. The English and French, along with aeronautical experts in this country, have openly discussed the general theory behind them. They represent a logical progression in aerodynamic thinking.

The Russians obviously put this knowledge to work. It is difficult to reason, after seeing US research data,

—Photo courtesy Business Week

Bounder bomber, seen publicly for the first time during the Moscow air show, is by far the largest supersonic aircraft flying today. The inboard engines have afterburners.

—Photo courtesy Business Week

Badger bomber, long a Soviet mainstay, has been given new potency with the addition of Hound-Dog-type missiles to their armament. Glass-enclosed bombardier position usually seen on Badgers has been replaced by a radome.

that the Soviets do not have a good edge in long-range interceptors and supersonic bombers.

Phase two is by the board now. The burning question is, what will the US do with its opportunities as phase three of supersonic research draws to a close? Actually phase three, in this definition, overlaps phase two in time. The major problem in phase three is to provide continuous supersonic cruise over long ranges. This means that the total flight efficiency of the airplane at supersonic speeds must be close to the total flight efficiency of aircraft like the B-52. The story of how this difficult goal was achieved with the B-70 design has been well told.

The US has booted the B-70 question until time has almost run out on the airplane. But the B-70, if it were pushed vigorously now and became operational within five years, still could present a massive problem to the Soviets. It could make their whole air defense system

obsolete in one move. Their newest aircraft, like the Blinder, would be marginal against the B-70. Without the B-70 to contend with, however, the Blinder and any close relatives it may have can do a much better than average job for the Russians for years to come.

As the B-70 would have guaranteed qualitative superiority to SAC during the early and middle 1960s, the F-108 Mach 3 interceptor would have kept the Air Defense Command well ahead of its adversaries. The order canceling the F-108 on the premise that it wouldn't be needed seems to warrant a review after the Soviet display of Mach 2 bombers.

The problem of improving subsonic and supersonic efficiency is not solved by any means. Research scientists are hard at work on the problem. Today there are several ways to improve on the B-70's performance to provide higher cruise speed, longer range at supersonic speeds, and an increased loiter capability at subsonic speeds that the B-70 does not have. One method under wide discussion is to use variable sweep wings. Research has shown that this device could improve over-all performance more than the arrow wing could in its day.

The B-70, as it stands today, has this great advantage. Its detailed design phase is essentially complete. About ninety percent of its drawings have been released from engineering to factory. Volume production could be initiated on command. If a new, improved aircraft were initiated and moved with normal US lead time, the B-70 could beat it into service by at least five years.

A number of experts and highly placed people do not agree with the conclusions arrived at in this article.

Roswell Gilpatric, Deputy Secretary of Defense, has reported to the Congress that the Russian air show revealed nothing of consequence.

Hanson Baldwin, military editor of the New York *Times*, reported, two weeks after the Moscow show, that US industry's reaction was mixed, that some Navy officers thought there was "nothing new" and that the "general consensus appears to be that there is little or nothing astonishing in the Soviet air show and that the state of the art in military aircraft is more fully developed in the United States than in Russia." Mr. Baldwin's comments were made after reported conversations with a number of US aeronautical experts.

One happy circumstance helps the reader who is trying to sift through such conflicting reports. It is not necessary to depend upon Soviet sources for their normally inadequate photographs and descriptions of the air show. A large number of exceptionally clear and detailed pictures of the new aircraft are available to the world press.

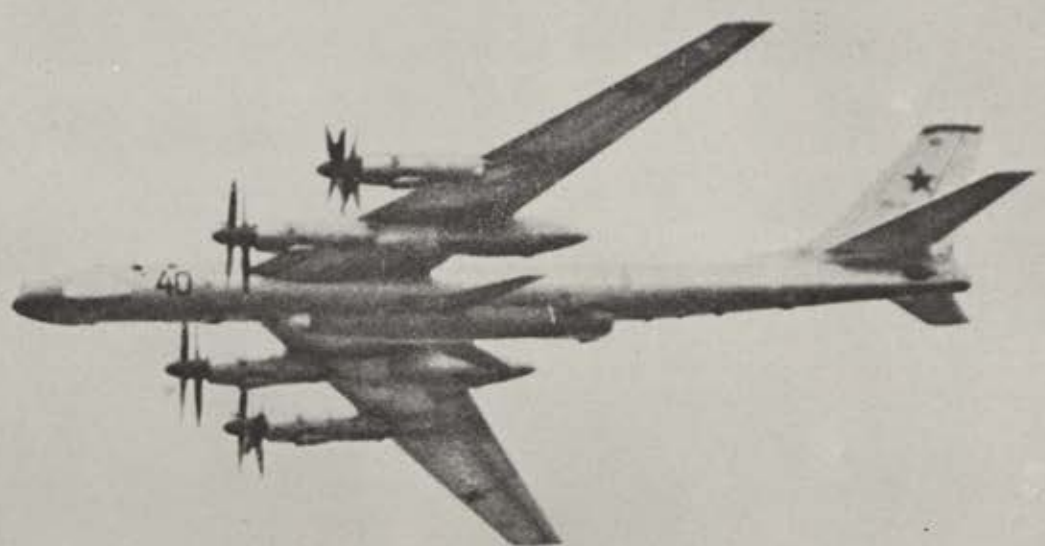
These fine photographs make possible a meaningful analysis of Russian progress in high-speed aircraft design. For the first time, the civil and military members of the US aviation community, even those who do not have access to intelligence information, are able to make their own evaluation of the latest Russian aircraft. This time no one needs to lean heavily upon the judgment, experience, and mysterious sources of that often misty personage—the Soviet expert. This time there is enough incontrovertible evidence available to reach some fairly sound conclusions on the aerodynamic excellence of the Soviet Air Force's supersonic equipment.

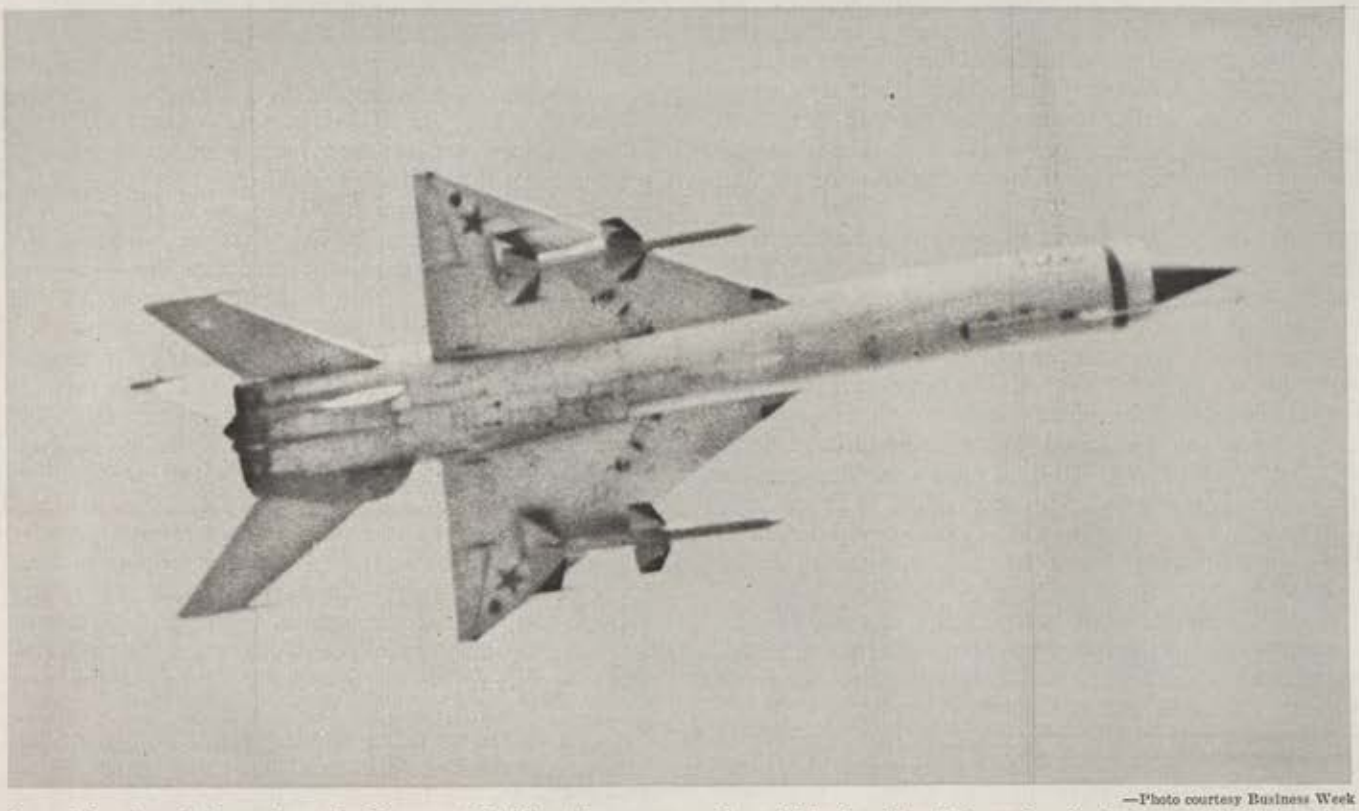
If this aerodynamic excellence is matched by up-to-date engine performance—and there is little reason to doubt Soviet propulsion capability—then over-all flight efficiency of the Beauty and Blinder aircraft is higher than that of any operational supersonic aircraft in the free world.

The following descriptions of the new Soviet aircraft and their missile armament were assembled after inspection of the photographs and discussions with several US experts in designing and conducting research on high-speed aircraft.

(Continued on following page)

Bear, turboprop bombers designed many years ago, have had their useful life extended by adapting them to carry air-to-surface cruise missiles. These large missiles are about fifty feet long and are approximately the size of the Regulus II missile once under development for the Navy. Sharp sweep on their wings indicates a cruise speed of about Mach 2.
—Photo courtesy Business Week





—Photo courtesy Business Week

New deltawing fighter shown in Moscow is believed to carry a throttlable liquid-rocket engine in the rear of its fuselage to improve its combat performance. Two turbojets are the primary propulsion units. This aircraft, and the other Mach 2 fighters in the Moscow air show at Tushino on July 9, had ventral fins to improve their stability during maneuvers.

HIGHLIGHTS OF THE NEW SOVIET AIRCRAFT

BEAUTY—Long-range bomber. 3-man crew. **Design Mach number** about 2.3. **Length** 110-120 ft. **Gross weight** about 190,000 lb. Bulge near center of engine nacelles may indicate use of turbofan engines. Excellent area-rule design with just about optimum placement of engines according to theory. **Radius of action** about 2,000 mi. About 25% of the distance would be covered at supersonic speeds. **Refueling** can increase radius substantially. Carries ballistic or stub-winged semiballistic missile with range at least 500 mi. Missile-carrying version of the Beauty seen in Moscow also equipped with radar bombing nose and section for cameras indicating dual attack and reconnaissance role on a single mission. Some observers believe that the Beauty size and fuselage shape shows it is outgrowth of Yakovlev Backfin bomber seen around 1957.

BOUNDER—Extremely large turbojet bomber. 4 engines. About 200 ft. long. **Gross weight** over 400,000 lb. **Engines** in 35,000- to 45,000-lb.-thrust class. **Wing sweep** 45 degrees. Aerodynamic design probably fixed in 1951-1952. **Top speed** about Mach 1.5 with normal shock engine inlets installed on aircraft seen at Moscow show. If variable geometry inlets were installed, top speed should go up to Mach 2 or better. These speed estimates contradict those in August Air Force which were made on incorrect assumption of 60-degree wing sweep. **Range** at Mach 1.5 over 1,750 mi. Aircraft could serve as bomber or tanker and with modifications as supersonic transport for about 80 passengers. Transport would be about half as efficient as one built with current aerodynamic technology.

BADGER—Subsonic, turbojet bomber design at least a dozen years old. **Useful life** has been extended through use of a Hound-Dog-type air-to-surface missile with about 300-mi. range. Radar bombing installation in the nose of this aircraft seen for the first time publicly at Moscow air show.

BLINDER—Long-range interceptor. 2-man crew. Twin engines. **Gross weight** 70,000-80,000 lb. **Length** 75 to 80 ft. Compared to other Mach 2 aircraft it has very long span in comparison to its length. **Design Mach number** 2.1 on variable geometry engine air inlets. **Engines** about 22,000-lb. thrust each. **Wing loading** of 60 to 70 lb. per sq. ft. is relatively low to aid performance at altitude and subsonic speeds. Deltawing air-to-air missiles carried by Blinder have 20- to 30-mi. range. Fire-control radar in nose and large search radar on bottom of fuselage underneath wing. Aircraft should be able to cruise out over 1,000 mi. at subsonic speeds, loiter 2 hours, fight for about 10 minutes, and cruise home at subsonic speeds.

BEAR—Turboprop-powered heavy bomber. **Weight** over 350,000 lb. **Normal range** over 9,000 mi. **Speed** just over 400 mph. Offensive potential increased by adapting it to carry 50-ft.-long, winged missile with speed near Mach 2. Missile about the size of Regulus II. Its range should approach the Regulus' 1,000 mi. but many sources report it as 300 mi.

FIGHTERS—At least **6 types of fighters** for relatively close-in air defense were shown at the Moscow show. Four were deltawing aircraft capable of about Mach 2 speeds. One was twin-jet powered, weighed over 30,000 lb., and possibly had an auxiliary rocket engine installed to improve high-altitude performance and maneuverability. The smaller deltas weighed under 30,000 lb. and one cut in an auxiliary rocket during the show. Sweptwing **Faceplate,** Mach 2 interceptors also appeared. The **Flashlight,** subsonic, twin-engine, all-weather fighter, in service over 5 years, was shown in a new supersonic version. The new airplane had leading-edge extensions on the outer wing, a lengthened wing root and spiked engine inlets. At least four types of air-to-air missiles were seen on the various Soviet interceptors. One of them was almost a direct copy of the Sidewinder configuration. The others apparently were longer ranged and are radar controlled from the aircraft during at least part of the flight.—End

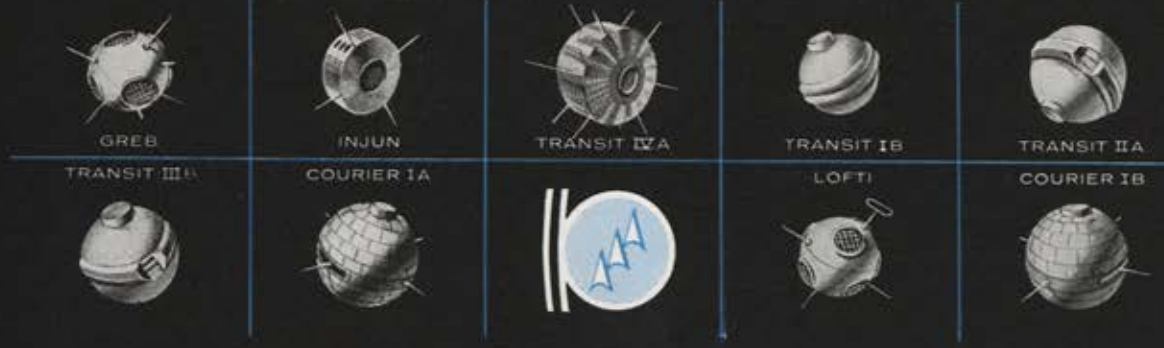
THE SPACE AGE IN PERSPECTIVE

SPACE DIGEST

VOLUME 4, NUMBER 9 • SEPTEMBER 1961

▸▸ The reliable Ablestar space vehicle recently added to its roster of accomplishments by lofting the space "triplets" Transit IVA, Injun and Greb into orbit. Satellites boosted by Ablestar now total nine . . . an unmatched record. ▸▸ Controlled from earth, restarted in space, Ablestar blends boldness in concept with simplicity and economy in detail and construction. Ablestar is a product of Space-General Corporation, America's uniquely capable source for complete space systems.

▸▸ Other advanced launching vehicles, commercial and navigational satellites, lunar landing systems, space-based weapon systems and nuclear-powered space vehicles are among new accomplishments-in-the-making at Space-General. ▸▸ **These programs now offer opportunities for scientists and engineers. Those capable of bringing high levels of skill and energy will be considered without regard to race, creed or national origin. We invite you to contact Pierre Brown, 777 Flower Street, Glendale, California.**



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PRIORITY FOR PROGRESS: SPACE-AGE EDUCATION

WILLIAM LEAVITT
Associate Editor

THIS issue of SPACE DIGEST carries three articles on education for the aerospace age—a problem which for the past several years has engaged the serious attention of the Air Force Association.

Dr. Wayne O. Reed, Deputy US Commissioner of Education, writes on what he calls the climate of learning. He points out forcefully that unless educational methods and content and the understanding of the learning process itself make quantum jumps in the relatively near future, our society may be headed for a future in which those who understand the implications of the new technology will control all power while the rest fall subject to the whims of the technocrats.

How can state and local authorities meet such a challenge?

Dr. Charles H. Boehm, Commissioner of Public Instruction for the Commonwealth of Pennsylvania, describes how his state is attempting to fulfill the educational requirements of the technological age. He relates how Pennsylvania, in a brief time, has consciously embarked on the vigorous updating and reform of its general science instruction program, initially from the ninth grade up, and eventually in the elementary grades as well.

M. Marcus Kiley, who is Deputy Superintendent of Schools in Springfield, Mass., addresses himself to the basic problem of motivation: How do you get youngsters to *want* to understand what they must understand in an age of science and technology? Mr. Kiley and Springfield believe that the youngster can best be motivated by an appeal to his own enlightened self-interest. If you can convince him at an early stage of his development

AFA'S SPACE-AGE EDUCATION TEAM

Hundreds of AFA local unit members, Arnold Air Society Cadets, Air Reservists, Civil Air Patrol people, and many others have helped in the AFA aerospace education effort. It would be impossible to list them all, but following are the names of the current members of the Board of Trustees of the Aerospace Education Foundation and of the Aerospace Education Council.

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DR. FRANK E. SORENSON, Lincoln, Neb.; Professor of Education, University of Nebraska.

that understanding the age he lives in is to his advantage, then at least half the battle is won. Thus in Springfield, as children enter the seventh grade for the beginning of their exposure to a broad-spectrum program of instruction in scientific principles, they receive a message from Mr. Kiley, which explains science and technology as a method of extending man's limited ordinary senses. By understanding scientific principles, the youngsters are told, they too are extending their own senses. This motivational approach is, of course, a variation of the adage that knowledge is power, but it is an effective variation, designed for the times, and specific. The message to students is reprinted here. It is a delightful example of how adult educators can communicate with the youngsters in their charge.

We are especially proud to publish these three selections, because they emerged from AFA's continuous program of contact with educators across the country. For example, in 1961, AFA, through its affiliated Aerospace Education Foundation and in cooperation with local educators on the state, city, parochial, and university level, has run a series of Aerospace Education Seminars in such major cities as Boston; St. Louis; Pittsburgh; Detroit; Shreveport, La.; Ogden, Utah; Las Vegas, Nev.; and Lincoln, Neb. At these meetings, educators have heard briefings from an Air University team which reports on national space programs, and significant panels and discussions have been held at which conferees have discussed—even argued vehemently on occasion—the problems of upgrading the school curriculum to meet space-age requirements. From these meetings many conferees have gone back to their schools with new ideas. These have been the aims in sponsoring the Aerospace Education Foundation's seminars—to dramatize the need for effective change and to stimulate the educators. For it is

their job to push for the changes in their own school systems.

What is AFA doing in the educational field? Why is it involved?

Since its inception, AFA has believed that the security and progress of the nation depend in great part on public understanding of the expanding role of technology in the modern world, not only the technology reflected by advancements in military capability, but also the revolutionary changes being wrought by science that are transforming the daily lives of ordinary citizens. This is a need, not only in the military *(see General LeMay's discussion on page 44)*. It is a *national* requirement.

In the years ahead, we will need, as the most recent forecast of the National Science Foundation has asserted, a far greater pool of qualified scientists and engineers. AFA fully subscribes to that goal. But *equally* important, our country will need a scientifically literate public. For it is the public that votes and sends representatives to Washington, the public that must support and understand expensive scientific and technological undertakings.

AFA believes that this need for public understanding would be vital even without the pressures of dynamic world communism and its continuing threat to free society. AFA believes that, as a national organization dedicated to the maintenance of security, it can and should make contributions to public understanding.

Education is the key to understanding, and it is in the field of education that AFA hopes to make an important contribution. To this end, AFA, and its affiliated Aerospace Education Foundation and Aerospace Education Council—both composed of distinguished citizens and educators—have for the past several years been analyzing national requirements and devising programs to help fill the national "education gap."

AFA works at helping educators do what is *their* proper job. AFA serves as a catalyst, does not assume the prerogatives of professional educators.

AFA's efforts to serve as a catalyst—to alert educators to present-day needs—date back to before Sputnik. Back in 1955, at AFA's National Convention in San Francisco, AFA announced its hope to encourage a new and important alliance between "airman and educator." For the next two years, Dr. Frank Sorenson of the University of Nebraska, acting for AFA, worked hard at establishing contact with educators across the US.

In February 1958, Dr. Sorenson invited a select group of educators to attend AFA's Jet Age Conference in Washington. At the Washington meeting, conferees discussed methods of integrating addition aerospace material into school curricula. Plans were made for AFA's first formal seminar for educators, held in conjunction with AFA's Convention at Dallas in September 1958.

The Dallas meeting, attended by some 100 educators, proved to be a turning point in the development of the AFA program. At Dallas, there was agreement among the convened educators that general science courses at junior high school level needed revision. This point became central to AFA's program. And plans were made at Dallas to sponsor, at the 1959 World Congress of Flight at Las Vegas, the first World Forum of Aerospace Education Leaders.

The World Forum brought together in April 1959 at Las Vegas some 257 educators from forty states and nine foreign countries. There they further examined school curricula, in the light of the dramatic display of aerospace technology to which they were exposed during the World Congress. The educators' analysis of school needs was a reaffirmation of earlier views, an overwhelming consensus that curriculum revision and improvement was a priority need.

The next focus for the educators working with AFA was the 1959 Miami Beach AFA Convention, where discussions and workshop sessions were held, and which featured a briefing on missilry and an inspection tour of Cape Canaveral.

By 1960, with the full support of the Aerospace Education Foundation and the Aerospace Education Council, the pace of AFA educational activity quickened. Educator groups received briefings at the Air University, Maxwell AFB, Ala., and at other aerospace installations. Meanwhile, local AFA units worked with educators in their areas, sponsoring seminars on aerospace education. AFA's Board of Directors, recognizing the strength of the growing alliance between educators and airmen, voted to dedicate the famed AFA Vandenberg Trophy to outstanding achievements in the field of aerospace education.

September 1960 saw another educators' conference at the AFA Annual Convention, with some 300 educators in attendance. Participants at the San Francisco meeting included the Commanders of the Air University, Air Training Command, Civil Air Patrol, the Commandant of the Industrial College of the Armed Forces, and the Superintendent of the US Air Force Academy.

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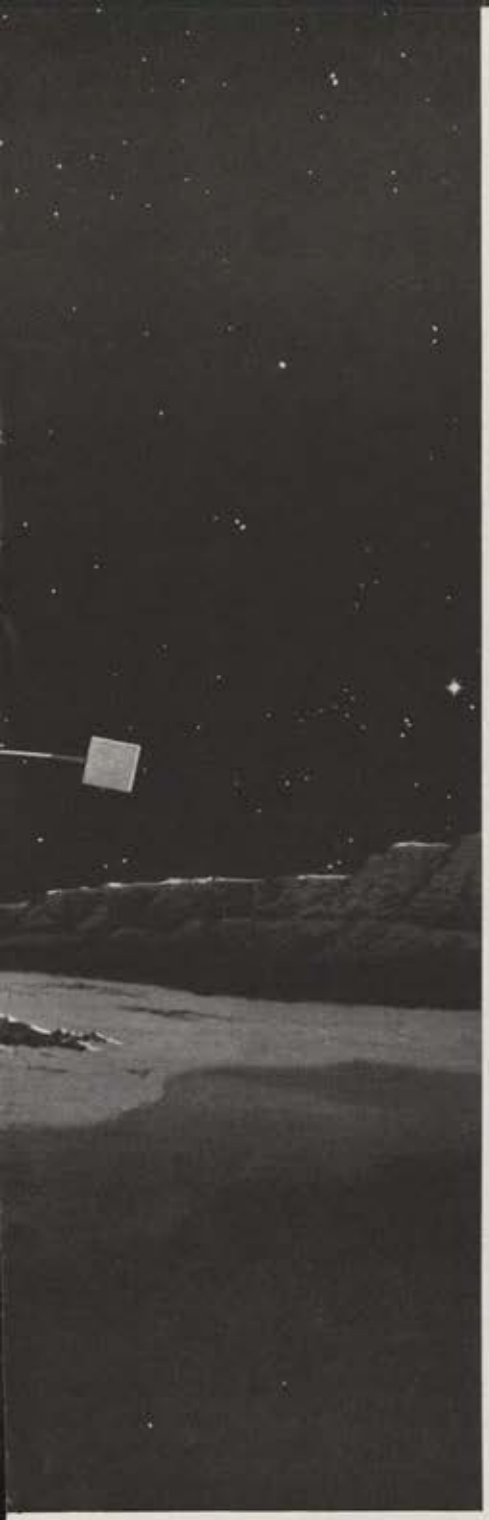

At San Francisco, the educators asked that the aerospace education seminars which had been undertaken by local AFA units across the country in cooperation with local educational authorities be expanded to a regional series so that educators from several states could participate in each program. This is expected to be done in the period September 1961 through May 1962. Also, at the Philadelphia 1961 AFA Convention, educators will meet again for a seminar and workshop. Continuing its contribution to the programs will be the Air University briefing team.

Serving as the professional advisory group for AFA's Aerospace Education Foundation is the Aerospace Education Council, composed of professional educators (*see list of members on page 61*). The Council at its most recent meeting proposed that aerospace briefings be given at national meetings of the educators' associations. Plans are under way to do so.

Meanwhile, the Aerospace Education Foundation (*see list of members of its Board of Trustees, page 60*) is studying additional contributions it could make to the cause of space-age education, such as the sponsorship of research in social, political, and economic ramifications of the aerospace age, and the distribution of specially prepared space-age material to selected students across the country.

The results of AFA's efforts in aerospace education have been heartening. Visible results in curriculum improvement, as exemplified by Pennsylvania's outstanding program, are evident in some twenty-three states, and the surface has only been scratched.

It has been axiomatic that it usually takes some forty years from the introduction of a new idea in the classroom to its implementation throughout the school system. AFA, through its Aerospace Education Foundation and Council, hopes to help shorten that impossibly long lead time.

Speaking of Space

Sir Bernard Lovell, the eminent British radio astronomer, is reported to consider that the Gagarin-Titov orbital flights may presage a Soviet plan to populate the solar system, where feasible, and plant extraterrestial Communist colonies. Whether Sir Bernard's suggestions prove out or not—it is, of course, too early to forecast—there is no question that the Soviets *are* taking a cosmic view of conflict. Their space feat announcements, of course, cite Communist peaceful purposes, but who can believe such assurances?

Some observers are wondering if we are kidding ourselves about catching up with the Russian thrust lead, reasoning that if the Soviets are now ahead of us and can be expected to push the state of their art ahead as fast as we do, won't they reach moon-launch capability well ahead of us? And if they reach the moon ahead of us and establish a manned station, what is to stop them from claiming the moon, perhaps not for the USSR (too blatant an imperialism) but in behalf of "socialist man," denying us access?

President Kennedy, at his August 10 news conference, said, and we quote in part: "But we cannot possibly permit any country whose intentions toward us may be hostile to dominate space." The President added that the US would press for international agreements ensuring peaceful uses of space. But until such agreements are made *and* enforceable, what choice has the US but to extend its military capability into space?

Yet the philosophy that manned military space capability is somehow unmentionable and damaging to our international image still persists in some quarters in Washington. It is fortunate that to balance the woolier thinkers there are strong realists in such groups as the National Aeronautics and Space Council who take an objective view of this country's military stake in the space arena.—END

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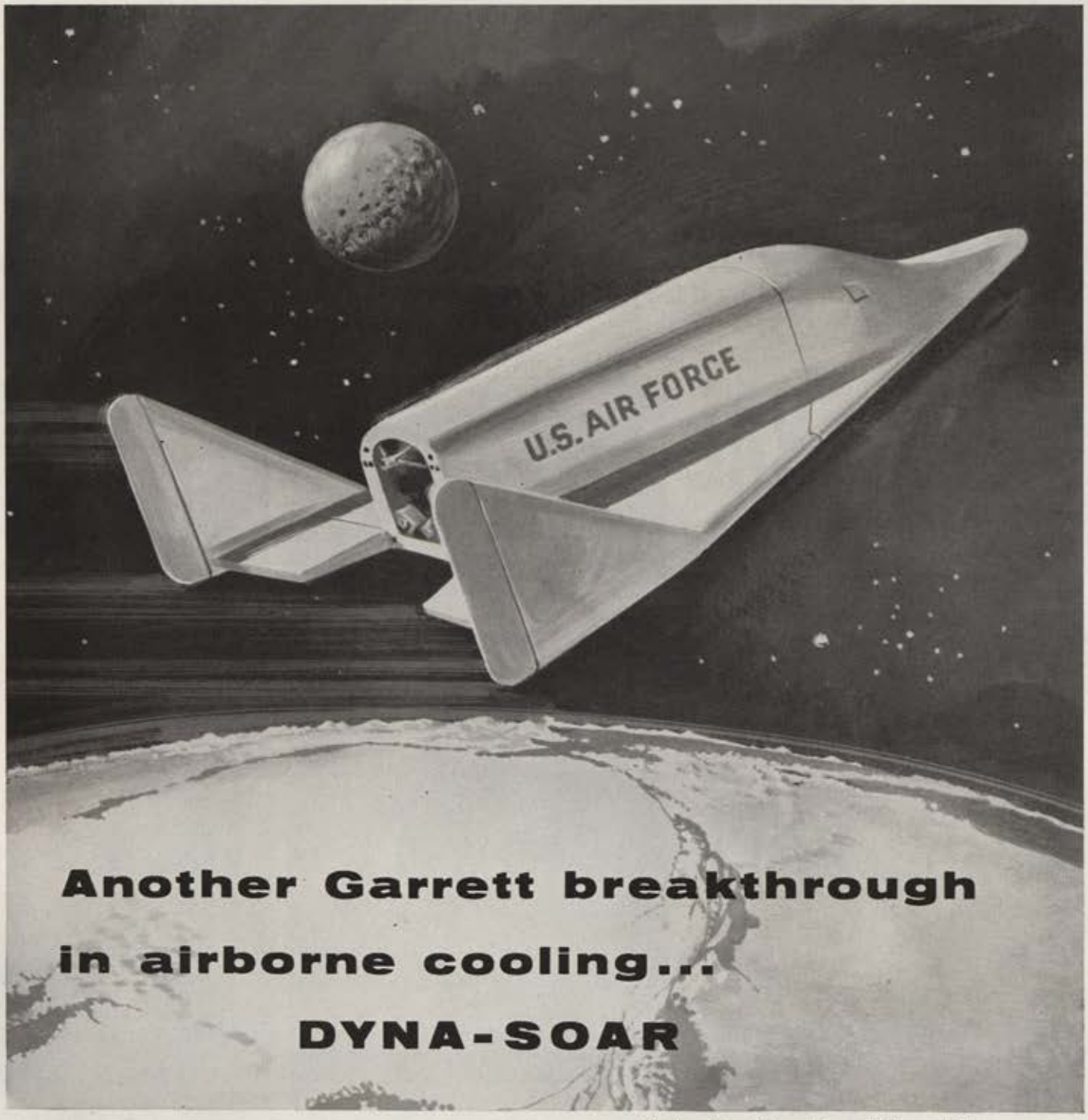

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In an age of technology, we must teach more, students must learn more, and we must better understand the process of learning itself, writes a distinguished federal education leader, who calls for an enhancement of . . .

The Climate of Learning

DR. WAYNE O. REED

TODAY those of us who work in the field of education and those who give us understanding, encouragement, and support are together facing a greater, more immediate, and more urgent challenge than ever before in our history. It is this: How can we improve and streamline the educational processes so that we may meet the demands ahead of us? True, we may employ many of the self-same materials and processes which brought the aerospace age into existence but we must employ them with more vigor, more imagination, more flexibility, and more understanding than we have ever done before. And we must find new materials, too.

In my work in Washington, I am daily concerned with questions of educational administration, business management, and personnel adjustment—with questions of classroom size, curriculum, and methods. But it is not these day-by-day occurrences which I wish to discuss, but rather the larger problems in which we must seek new solutions to our understandings of how and why and what a child learns (for learning is still an individual problem) and how we can improve our methods of instruction so that our youth may learn faster and better and more understandingly.

One of the most important reassessments we must undertake lies in the creation of a new climate of learning for a new era of progress. The climate of learning, like the climate of weather, is comprised of a number of factors. The learner, his teacher, the material resources of their classroom and school, the school atmosphere, the parent and the home, and the educational expectations and insights of the larger community are all vital elements in this climate. We should be wary about any oversimplification to the effect that a college is a log with the professor on one end of it and a student on the other, or a cubicle containing a student and a teaching machine. Education, tenuous and all-

pervading like the atmosphere, is complex and is not likely to be improved by efforts merely to clear the fog.

The climate of learning should emphasize the best that we know and the best we desire. It should not merely contribute to learning in sufficient amounts. It should also cause the best kinds of learning. Some people seem to suppose that the promoter of a new teaching device can prove his case by showing that learning occurs when the device is used. They may not realize that the quality of learning, which is influenced by many unknown factors, may be more important than the amount.

The climate of learning for the aerospace age should reflect our newer knowledge of the laws of human development. For we must realize that we are coming ever nearer to a clearer understanding of the nature of learning—the improvement of instruction and the science of teaching.

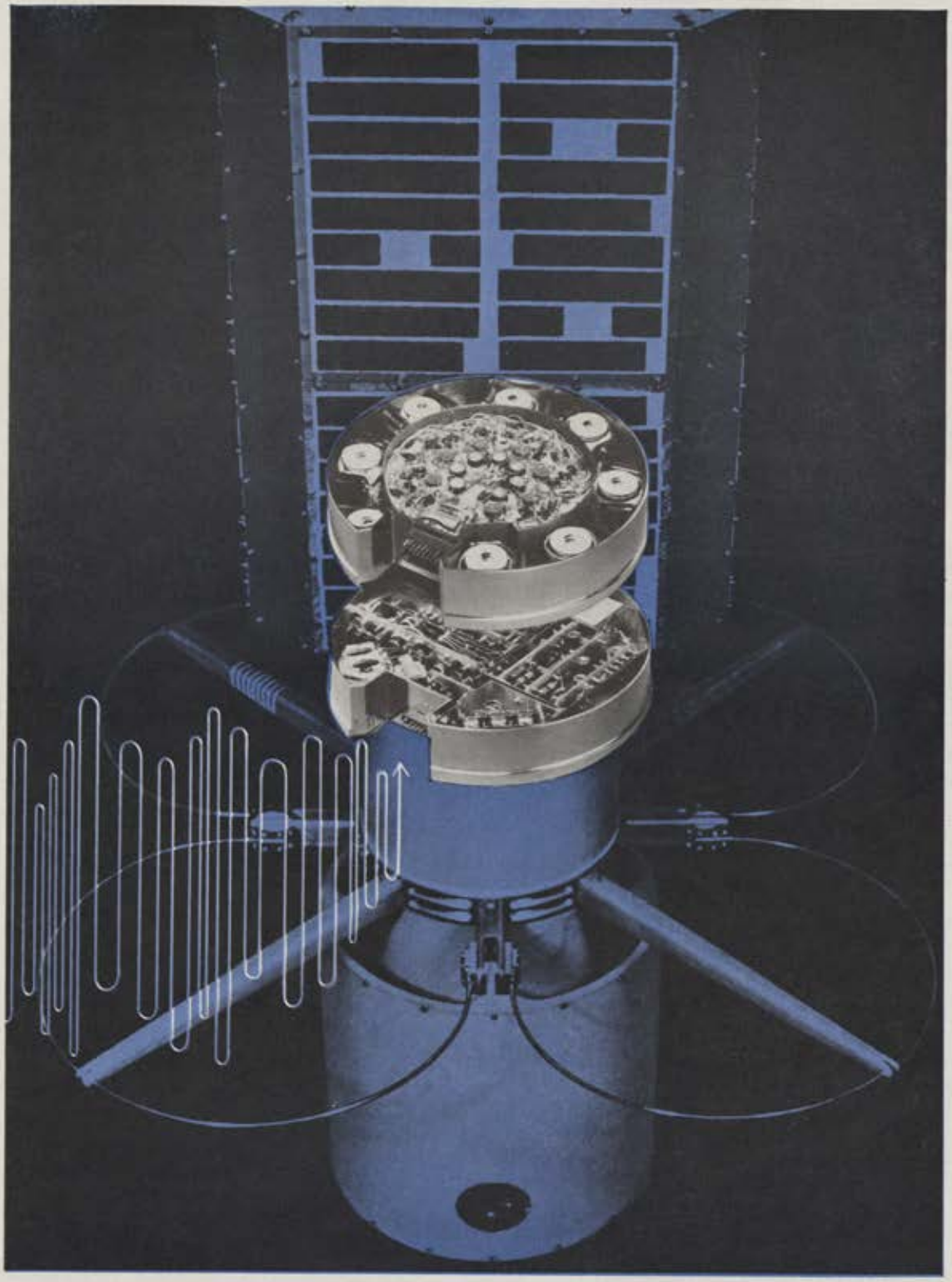
It must be a climate which will set on fire the initiative and the imagination of our young people—their ability to undertake hard, purposeful labor, their idealism, and their highest educational potential. It must be a vigorous climate demanding their best effort and accepting nothing less. It must be a climate of sacrifice and hard, tough application fortified with zeal and idealism.

In the educational climate for the aerospace age, we must reemphasize individual purpose and initiative, for these are substances which are crucially important at this juncture in our nation's history, and they will be even more important in the days ahead. In an earlier day a host of circumstances challenged personal initiative and inspired individual purpose. The mysteries, dangers, and opportunities of the frontier were direct and unavoidable. The hopes of a nation of immigrants inspired ambition and accomplishment.

But times change. The depression decade of the '30s disturbed and disillusioned many of our people. Many became skeptical. Today's increasingly regulated urban culture and affluent society seem to encourage more and more conformity. Today's challenges seem more remote than immediate, more national than personal. Many persons are more concerned for security than for individual initiative and personal purpose.

But, conversely, our society now actually confronts challenges which impose new requirements of personal initiative and effort. Learning to speak Arabic or to manipulate abstract mathematical symbols is different from learning to handle the woodsman's axe or to sail a clipper ship, but each requires initiative and persistent effort. We need a climate of learning today which puts a high premium on individual habits of accomplishment.

To create the kind of climate of learning which I have described, we must reinforce and strengthen the curriculum. It has been my privilege for some years to be acquainted with a number of dedicated persons and groups who seek to discern the implications and the future development of the air age, the space age, or if you will, the aerospace age. These men and women are scientists and administrative leaders from our universities, from industry, from the military, and from various other walks of life. These people are looking into a new world. It is a world of interplanetary communication, of fantastically precise and complex instrumentation, of drastic changes in the physical environments of mankind; a world of vastly



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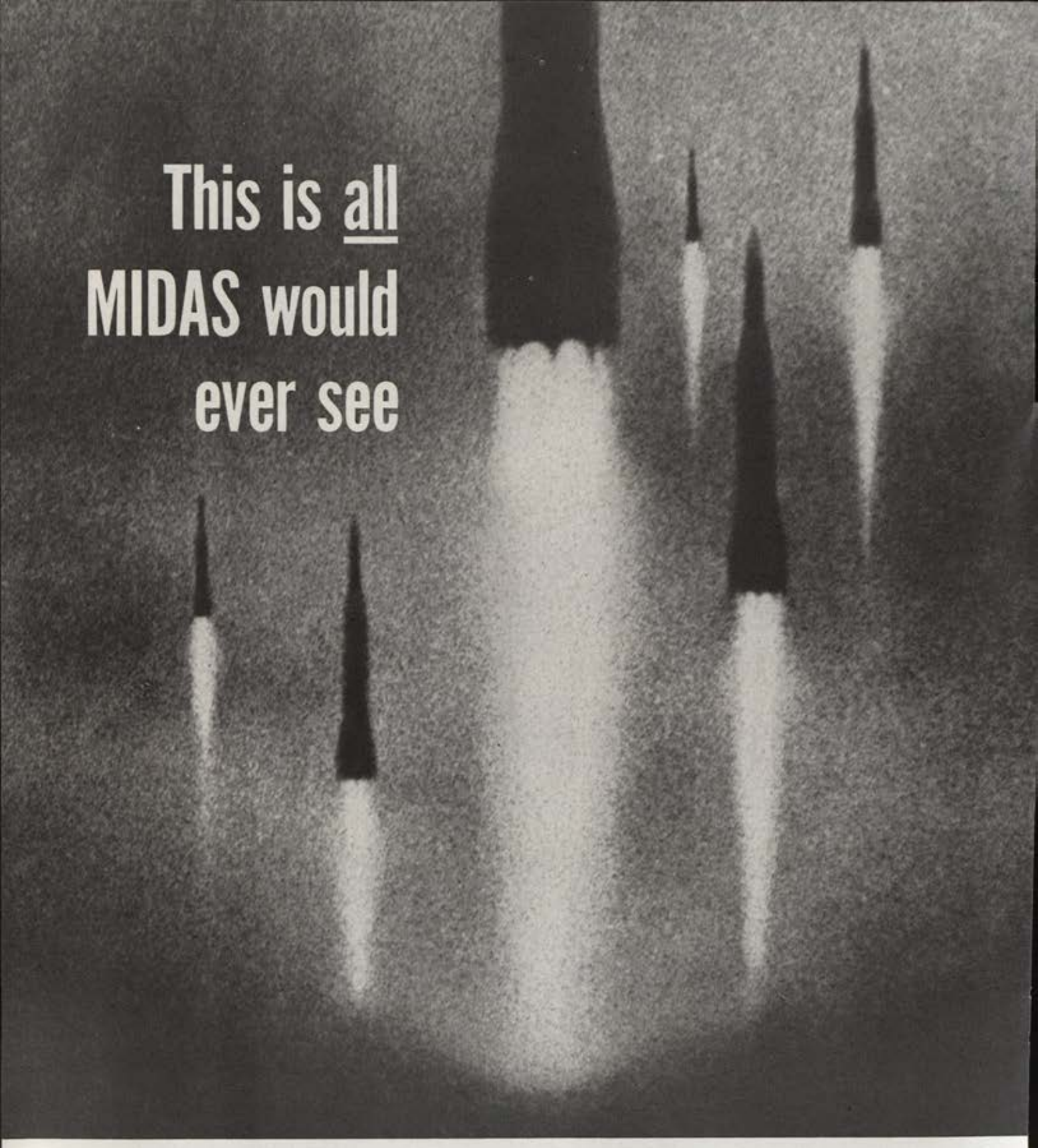

Satellites of the U.S. Air Force MIDAS (Missile Defense Alarm System) program are designed to see a weird infrared world – a complex pattern of heat waves. As they endlessly circle the earth, they'd pay no attention to the patterns of peace: the intense heats generated by foundry, forge, and factory. But should an all-out missile attack be launched against us, MIDAS would report it instantly – *doubling* the warning time we'd get from present systems.

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greater dimensions and of changed perspective in geography, in politics, and in the human psyche; a world in which electronic machines will be the extension of man's intellect in somewhat the way that his first crude iron-age tools were the extensions of his hands.

The imminence of this world of "intellectronics" (a word I am borrowing from Dr. Simon Ramo) and its fantastic novelty have powerful implications for the educator. No man can understand such a world, or even have access to it, unless he has been prepared for it. The unprepared man portends too great a hazard to himself and to others. Even if he could enter it, no man can learn to understand this world merely by living in it. Actually, it cannot exist for him until he has developed the concepts for it—insights from astronomy, from physics, from mathematics, from biology, from economics, from psychiatry.

Many of these concepts were themselves unknown to man fifty years ago. Quite understandably, many of them are but feebly employed in the curriculum of the schools. Long before we have learned how to place them appropriately in the curriculum, a host of other concepts in a changing era will be crowding in, requiring their due placement in order that men may be prepared to know this new world and to cope with it.

This seems to be one of the great and crucial problems of our time, and I am occasionally a bit dismayed at the ideas which appear when people decide to have a go at the modernization of the school curriculum. I am not too hopeful, for example, when some people repeatedly advocate that all will be well with the curriculum so long as it is planned locally, or when others say that all will be well if it can be planned nationally, or when some say it should grow out of the needs of the child, or when it is advocated that youngsters be made to take the tough courses merely for the sake of toughness.

I do believe, however, that our curriculum must help every person to understand the world of today, and prepare him to understand the world of tomorrow. I am convinced that much of what we now teach in colleges we must learn how to teach in high schools; moreover, that all our schools must learn to teach many concepts which are fundamental but which are not as yet well taught.

Indeed, recent educational research is opening up new concepts of teaching a new approach even to reading, writing, and arithmetic. Research may prove what some of us have long suspected: that *junior* high school students can grasp high school physics, chemistry, and mathematics to a degree with which we have never challenged them. Recent studies of subject placement and sequence seem to show an almost unlimited potential on the part of many children for abstractions which we have previously considered far beyond their grasp. This can be the greatest educational challenge which we have ever faced.

We must realize that there is more to learning than simply gathering existing knowledge and memorizing and recalling content. We must understand that learning is the ability to think, to make wise choices, to understand relationships, to project from the known to the unknown. Learning is more than the transmittal of knowledge to a learner conditioned and motivated to receive it. It is the awakening of the human mind to new understandings, new concepts, new ideas, new inventions, new searchings, new challenges.

In the curriculum for the aerospace age we must build so that every pupil will be made to know more, to have control of a higher level of mental discipline, to achieve a stouter and more stable mental outlook, and to stretch his mind and imagination.

The curriculum must become at once broader, and deeper, and fresher. All learners must achieve standards substantially higher than ever before. This improvement will call for a finer quality of vision than we have been applying to the development of our curriculum.

Failure to solve this curricular problem would have grave consequences in our society. If for lack of vision we fail to prepare everyone for a world which makes unprecedented demands on all men, it is probable that a new dualism will develop in our society. In this dualism there may be on the one hand a scientific élite, a sophisticated minority quite capable of shaping the new world as they envision it, and on the other hand, a majority incapable either of understanding it or of coping with a world of which they are less and less a vital part. That, I submit, is a definite probability unless we achieve new wisdom in improving the curriculum of our schools. A third important and immediate challenge to us is that we must increase our research and find dynamic, new ways for the improvement of instruction.

Our progress in expanding educational research and development is encouraging, but still very inadequate. We need to enlarge both our vision of its possibilities and the resources we apply to it. During the next decade, as never before,

we shall have ample warrant to work vigorously to increase our knowledge of education and to put that knowledge promptly to work in the form of educational innovations and improvements. Business and industry have learned that direct involvement in research is vital to growth and survival. Our schools and colleges must do the same. They should be studying and planning the kinds of experiments, curriculum-improvement projects, and pilot demonstrations which they themselves should be carrying on as we move into the next decade.

More research is the key to our educational progress just as more research is vital to the aeronautics industry.

In comparing yesterday with what is going on today, and what can be expected for tomorrow, David Sarnoff, Chairman of the Board of the National Broadcasting Corporation, points out that the Industrial Revolution was a haphazard affair. "The inventions of the eighteenth and nineteenth centuries were mostly the work of ingenious mechanics, often amateurs. Scientific principles were applied often before they were understood. The advances of science and technology no longer often result from a lucky breakthrough. For the first time in history, they are being deliberately and systematically developed on a massive scale—through research, group effort, and concentration."

I certainly agree with General Sarnoff up to a point but I am still mindful that research will always be greatly influenced by individual initiative, by the nonconformist, by the free thought of free men freely expressed, by the lonely thinker as he pursues the lonely process of thinking. For that reason, schools must continue to seek out our most gifted children and urge them on to their highest potentials. But I would not suggest that in our present vague and feeble understanding of the resources and capacities of the human mind that high ability is confined to scholastic achievement. There are as many variations and combinations of abilities as there are human beings. Ability blooms at odd times and in unexpected places. It assumes many forms and appearances. It produces a Lincoln, an Edison, an Einstein. It may flower in the so-called average child, in the juvenile delinquent, or in the underprivileged. This flowering, of course, is one of our greatest satisfactions in education.

In emphasizing this thought I can do no better than to repeat a part of the report which was developed a few years ago through the Office of Education at a conference on exceptional children.

"The American promise of equality and human worth extends to every child within the borders of our country no matter what his gifts, or his capacities," says the report. "At the same time it must be recognized that men are unequal in their natural capacities, their motivations and their attainments and that it is possible to cultivate the ideal of excellence while retaining the moral values of equality.

"We believe that the nation has an obligation to give all possible encouragement to the child who is endowed with special gifts. . . .

"We believe that research designed to increase present knowledge of personality and the learning process and studies aimed at the improvement of programs of special education for the gifted are essential to further progress. We believe that for the gifted child, his parents and teachers are the master architects essential to the planning and building of his future and to this end, the home, schools, churches, and all other community agencies must work together in his behalf."

Each year brings new evidence that research is one of the surest means of providing sound answers to some of our basic questions in education. Our investment in educational research is deplorably low. As contrasted with business, for example, where from five to fifteen percent of operating budgets are devoted to research, in education the figure is considerably less than one percent. It must be increased.

And finally—most important of all—we must give our youth a sense of urgency, a call to adventure, a feeling of challenge. Certainly, we are not prepared to admit to them or to ourselves that America has come to the end of the road; that we have lost the dreams of our fathers; that we are too lazy or too unimaginative to win the race of ideologies wherein we hold every advantage. Rather we must initiate new plans and open up new vistas.—END

Dr. Reed, US Deputy Commissioner of Education, is a member of the Aerospace Education Council. This article is excerpted from an address to the Nebraska Aerospace Science Clinic and Lincoln AFB Panorama, cosponsored at the University of Nebraska by the Aerospace Education Foundation on April 19 of this year.

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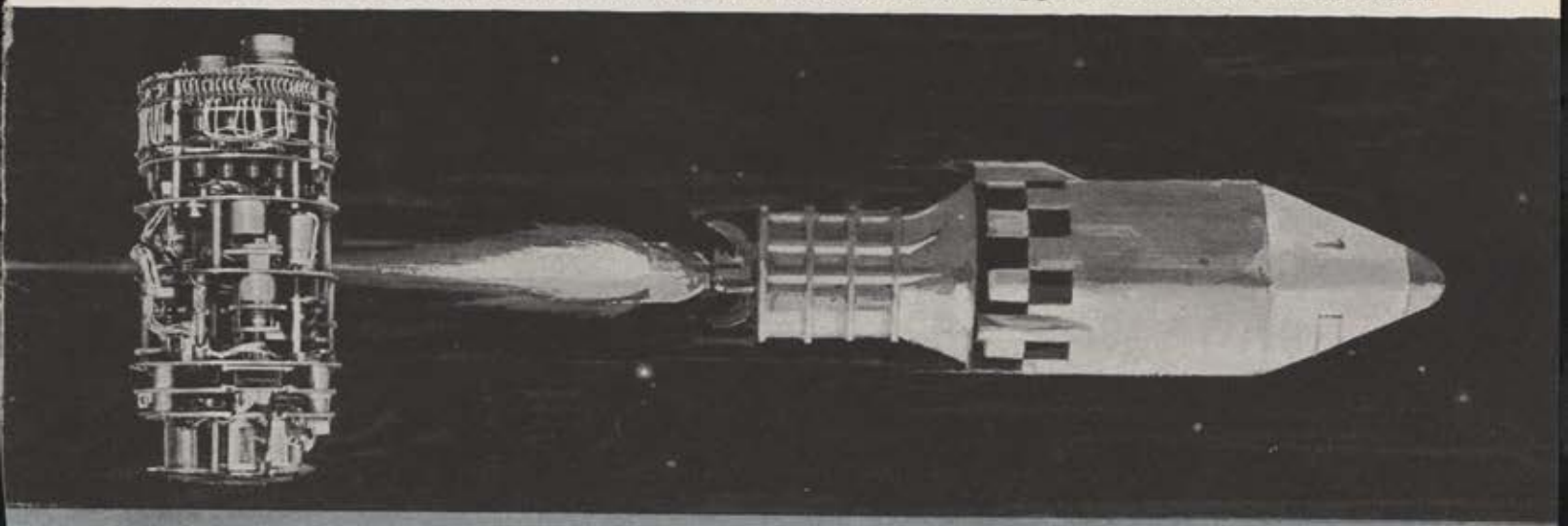
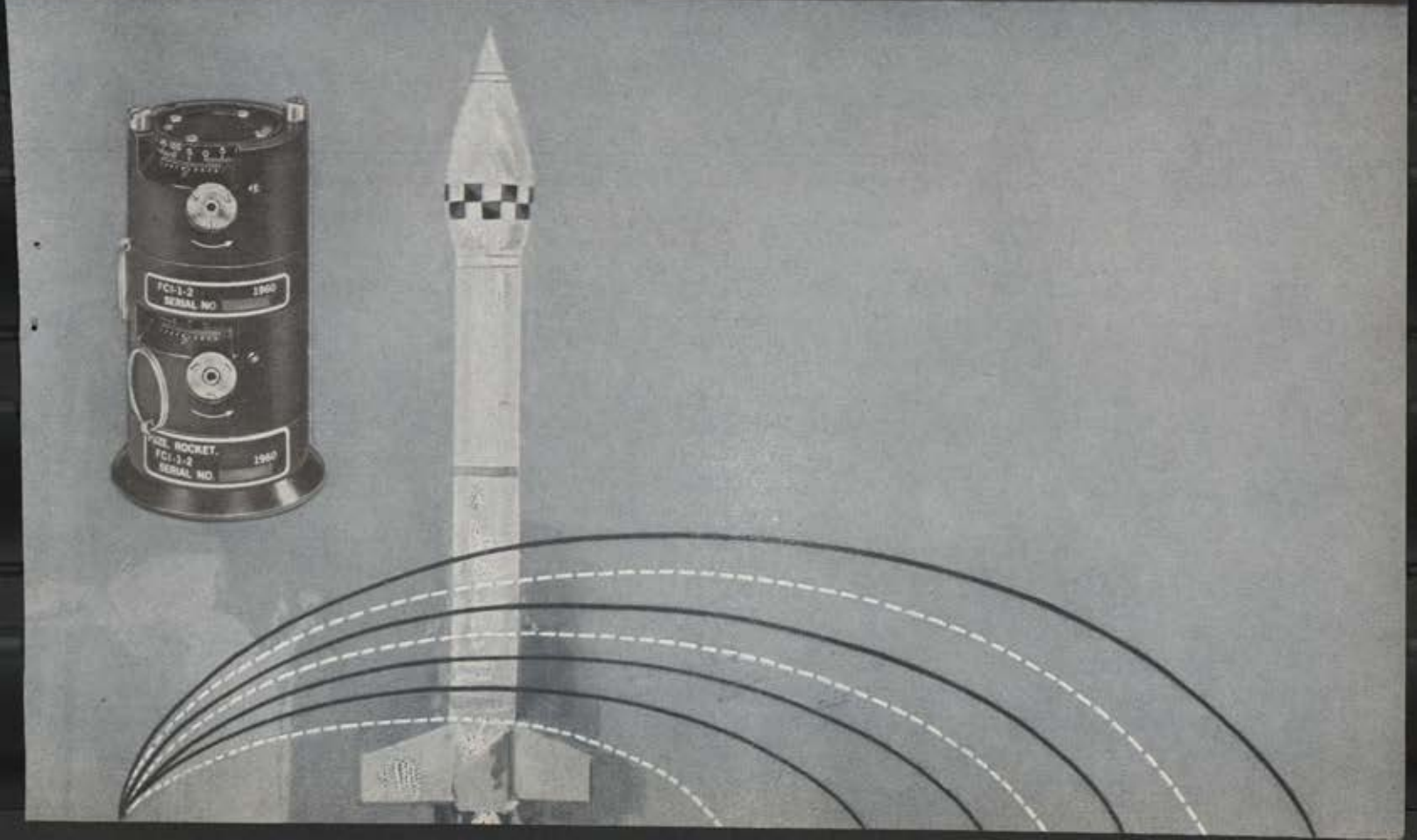
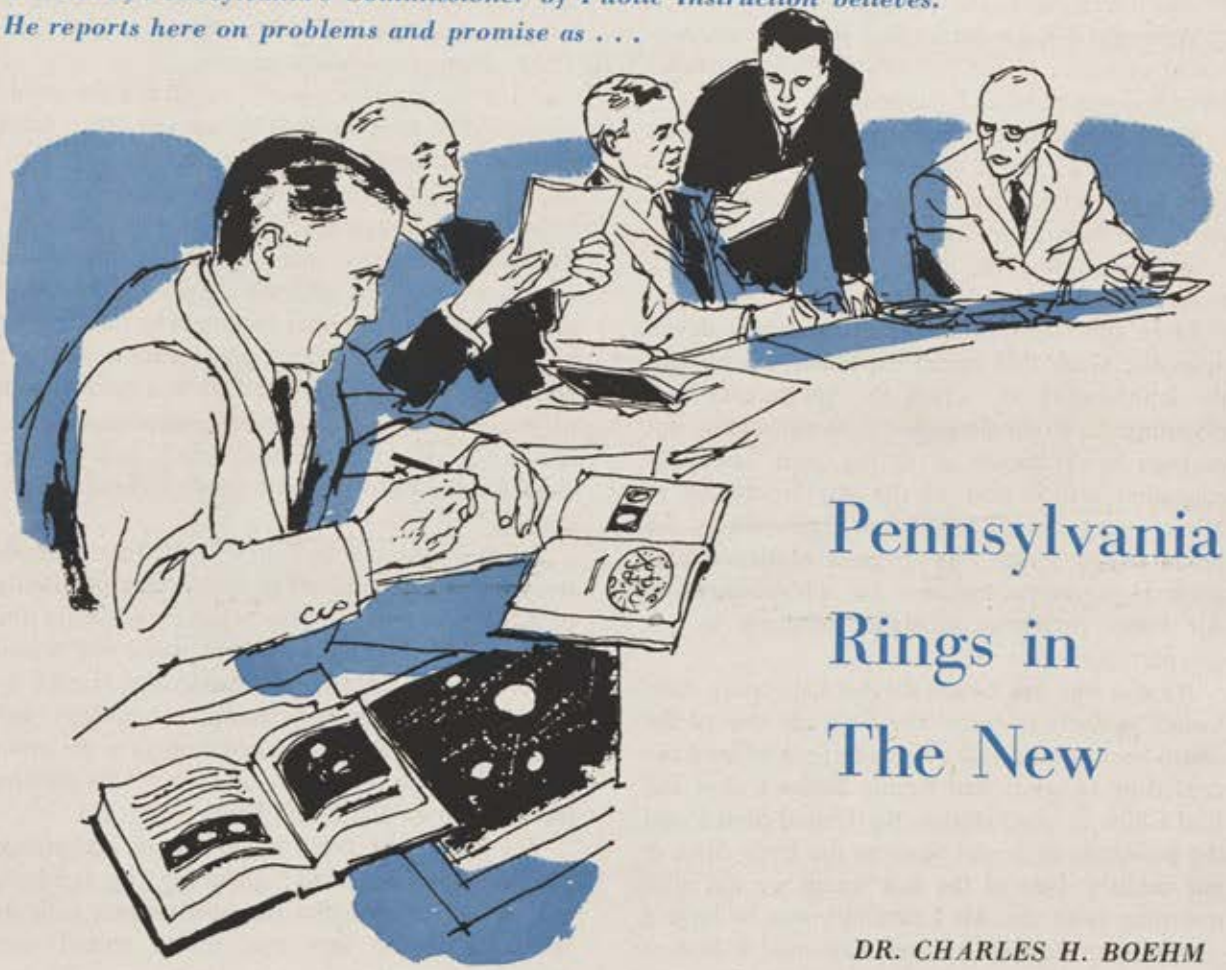




How does a state respond to the educational needs of the times? How does it try to improve education? Nothing less than a gargantuan effort is needed, Pennsylvania's Commissioner of Public Instruction believes. He reports here on problems and promise as . . .



Pennsylvania Rings in The New

DR. CHARLES H. BOEHM

IF WE are to meet the challenges to education in this age where survival itself is a central question, nothing less than a gargantuan effort is required. There has been a spectacular increase in new knowledge, automation is changing our way of life, modern technology for peace and war is advancing at a fantastic pace. We are living in a new age. Our children must be prepared for it.

Our curriculum, a patched-up program of 1918 vintage, must have a thorough, searching reappraisal. In Pennsylvania, we are trying to make this reappraisal, to ring in the new. And in three, four, or five years we hope to see a new educational program emerging.

How does a state in our democratic society respond to the demand for change and the new requirements of the times? How does it move to improve its educational program?

First there is the need to understand that fantastic forces are shaping this world and that our own survival is involved. Once this is understood, we can become sensitized to national needs. This has happened to us in Pennsylvania, and it may be helpful to trace some of the history of how this understanding evolved.

Back in March 1957, most educators will recall, Admiral Rickover wrote an article entitled "Stop Wasting Our Nation's Greatest Resources," for the *Saturday Evening Post*. In that article, he gave his initial analysis of the weaknesses in our schools, and called for a greater emphasis on quality of instruction, higher academic standards, and enrichment of courses. A month or so later, the Department of Defense invited some sixty leaders in education to the Pentagon and a four-day tour of military installations. I was fortunate enough to be invited, and I can say now that the

tour had a profound impact on me and presaged some of the new educational departures taken by Pennsylvania since.

What did I learn during that brief but concentrated exposure to the nation's defense structure? Here is some of what I learned:

- Fifty percent of the nation's manpower may someday be employed in electronics.
- High school graduates must be better prepared for the coming technological age.
- There must be more and better science, mathematics, and reading programs for our youth.

More specifically in terms of aerospace developments, since that initial exposure, I have had the opportunity to watch the spectacular and revealing Air Force firepower demonstrations. But perhaps most important in my own aerospace education was a visit to the Air University at Montgomery, Ala. There I was impressed by the broad efforts under way to meet academic program requirements essential for advancement of Air Force personnel at higher echelons in this complex age.

No one who has visited the Air University auditorium is likely to forget the huge air map of the world showing the vast preponderance of land occupied by or controlled by the Soviet Union and Red China as compared to the United States, and the proximity of Soviet bases to the large cities of our country. One of the first things we did after returning from the Air University was to have a similar map devised for our own use. It is now in place at the electronics room of our state education building.

More important than all other experiences was a 1958 visit, along with other educators from across the country, at the Dallas, Tex., Air Force Association Convention and Aerospace Panorama. The displays at the Panorama, symbolic of the great present and potential advances in aerospace technology, were among the most exciting I had ever seen under one roof.

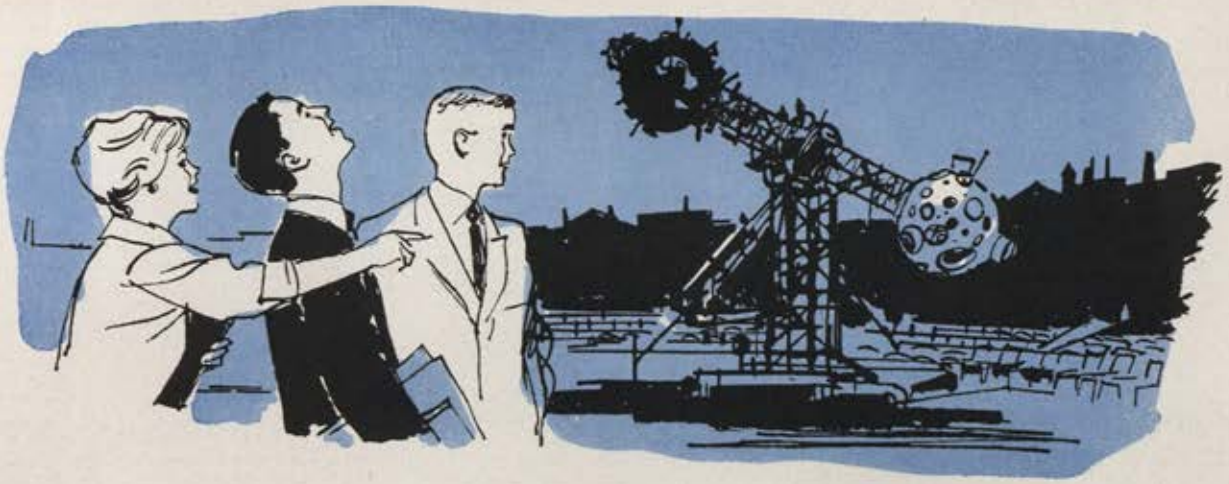
The Panorama was a preview of the kind of world in which today's youth would live the greatest period of their lives. Why not introduce them to this new world? Why not develop a space-oriented science course for Pennsylvania?

In Dallas, I reviewed current science grade allocations. I expected that for the most part what was now taught in seventh-, eighth- and ninth-grade science would later be taught in the elementary grades, that the ninth-grade course of study could very easily be replaced. It was natural then to recommend that a new space-age-oriented course be created in the ninth grade as a replacement for the obsolete ninth-grade general-science course.

When I returned to Pennsylvania, my curriculum staff was assembled to discuss the possibility of introducing such a new science course for the ninth grade. It was agreed that there was a real opportunity to upgrade and modernize science by introducing geology, astronomy, meteorology, and related physics, chemistry, and biology in the ninth grade. We also agreed to use a new designation for the course: Earth and Space Sciences.

We knew that there might be an acceptance problem with the word "space" among teachers, but we anticipated that the new course, with its relevance to the new age, would appeal very strongly to youth.

We organized a state committee composed of college and university scientists, including geologists, astronomers, meteorologists, oceanographers, and others, as well as specialists from the Space Administration, private planetariums, and



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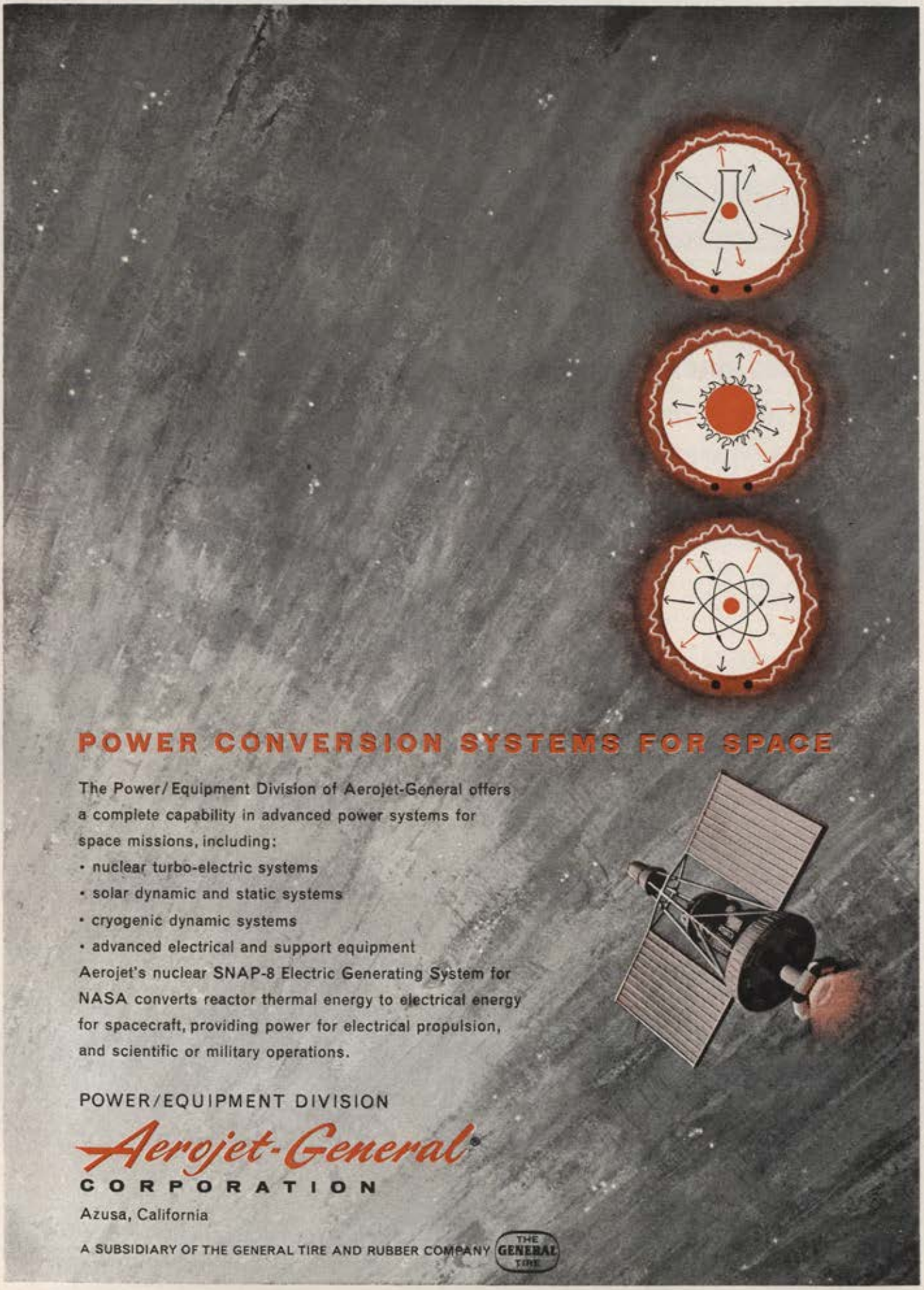
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from secondary schools. This committee developed the draft of the first Earth and Space Science Course under Dr. John Moss, a geologist from Franklin and Marshall College.

No course of study in Pennsylvania ever attracted so much attention. Stories appeared in magazines and newspapers. In response to requests, copies of the course program were sent not only to all states, but also to many teachers abroad. As a result of one story in a Boston newspaper, our Department of Education received more than 200 inquiries. The popularity of the course, since its inception, has been demonstrated by its rapid growth. We had ten classes the first year, 183 the second year, and 700 the third year.

Very helpful in this effort has been the National Defense Education Act, which has helped us to purchase instructional equipment. The Department suggests that $1,500 be invested for the ninth-grade course to get it off to a good start. To date, $500,000 of state and NDEA funds have been expended. We are now concentrating on equipment packs for elementary schools. In 1959, for example, Pennsylvania became the first state to require a planetarium, or an observatory, or an Earth and Space Laboratory, in new high schools.

But we wanted to build up teacher quality too; any thorough approach to curriculum development involves teacher education. Under the Defense Education Act, Pennsylvania became the first state (and for a year and a half the only state) to promote general science education for all *elementary* teachers, with a lecture course covering geology, astronomy, meteorology, physics, and chemistry. More than 6,000 elementary school teachers already have attended these sessions. This was a gigantic undertaking and was done at no cost to local authorities. This program is still under way. We have never had such a generous endorsement from teachers for any similar teacher education program.

On the college front, so that Pennsylvania's fourteen state colleges will keep up with advancements and newer programs in our high schools, we have developed a six-year program in which larger planetariums will be located at each of the state colleges. Thus, in a few years, all new teachers will have obtained at the state colleges a richer background in space sciences. In March 1961, we approved the first two planetariums and observatories for State College.

And another enrichment-of-curriculum breakthrough: In March 1961, I received the first copy of Pennsylvania's *Earth and Space Science Guide*

for the *elementary* grades. Also, in some schools, there is now a space science course offered as an elective in eleventh and twelfth grades.

To give credit where it is due, had it not been for the stimulation of the public information programs of the Air Force and the Air Force Association, Pennsylvania would not today have such Earth and Space Science course programs.

In addition to the programs I have described, honors courses for students with special abilities are spreading in Pennsylvania. Also we have a program whereby our more able students will complete twelve years of schooling in eleven years and then complete their first year of college while at high school, and through the college advanced placement examinations be admitted to the sophomore class at college. Also, Pennsylvania is now organizing a Great Books course for outstanding students in English and social studies in senior high school.

Not long ago I spent some time in Roanoke, Va., and studied the progress being made there with "programed instruction" using electronic teaching machines. I was delighted with the individualized progress of hundreds of high school stu-

dents in programed mathematics studies. With such electronic equipment, we are, I believe, on the verge of an introduction of a new educational approach which may well become as significant in the twentieth century as textbooks were in the nineteenth.

I predict a broad advance in the use of electronics in the school. The armed forces have led the way already. The electronic laboratory is here to stay; the educational film to which we have given lip service for decades, and which we use so little, will come into its own too. Educational television will become a more generally used supplementary instrument. These changes will give our colleges, our industries, our military services, our professions, increasingly better prepared youth.

Certainly we need more technicians, and scientists. We need more and better qualified people in all the professions. But also we need a greater appreciation for the cultures of all peoples with whom the generations that follow must live together in peace on this planet.

If President Kennedy's proposals before Congress for federal aid to schools are eventually enacted, Pennsylvania will move, of course, largely to subsidize teachers' salaries. A very significant provision generally overlooked in those proposals would permit ten percent of the funds to be used in solving some of the individual state's unique problems. Our unique problems generally relate to the educational cultural lag among students in poor neighborhoods, including both white and Negro groups. A forthright attack on this problem will be required if equality is to be our goal. Such underprivileged youth will have to be exposed to culturally enriched programs at least a year before kindergarten and perhaps one or more additional months longer than the yearly term, so that they will not lag behind middle-class youth.

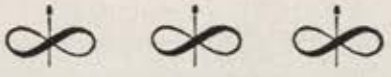
Our chronically economically depressed areas, particularly in the hard- and soft-coal regions, will require technical schools, and our schools will generally require a new emphasis on English usage and reading.

As I noted in the beginning of this article, we must be prepared nationally to revamp our educational methods. That the youth of the country are ready for such improvements is demonstrated by such evidence as the results of a poll taken recently by sixty-four of the nation's leading electrical utility companies. The companies had gathered some 231 of the nation's young scientists-to-be at a conference in Chicago. At the conference a research agency submitted a questionnaire to the students asking them a variety of questions. In general we can be proud of their answers. Here are some of the results:

- Forty percent said they became interested in science before entering junior high school. The greatest influences on their continued interest in science were attributed to their science teachers and to science books.
- Sixty-one percent believed that their high schools did not challenge their abilities to the fullest.
- Eighty percent wanted advanced courses which were not available, in this order: (1) more science, (2) more mathematics, (3) more foreign languages, in the following order: Russian, German, French.
- Ninety percent said that if there were an after-school and week-end study facility laboratory in their communities, they would use it from five to ten hours a week.
- Most believed that the most important problems facing us are the maintenance of peace, the ensuring of freedom, and the raising of the world's living standards.

We are in a very critical period of our history. when all we are and all we hope to be is identified with survival. Since education is one of the arenas in which the world struggle proceeds, nothing but a complete and supreme dedication to the best programs, public and private, at all levels, is demanded.

In Pennsylvania, we believe that this requires a thorough appraisal of the educational programs, leading to a new curriculum built for the next quarter-century. Let us not waste our efforts on sporadic programs or gimmicks such as essay contests. Instead, let us bring home to the public the seriousness of the times. Let us continue to support inquiring minds among our youth and the leaders of our society, minds with courage to innovate. In this way, God willing, we will ensure the survival of our heritage into the space age.—END



Dr. Boehm, Commissioner of Public Instruction, Commonwealth of Pennsylvania, is a member of both the Aerospace Education Foundation Board of Trustees and the Aerospace Education Council. Above is based on his address to the Aerospace Education Seminar in Pittsburgh, cosponsored by the Foundation on March 4, 1961.

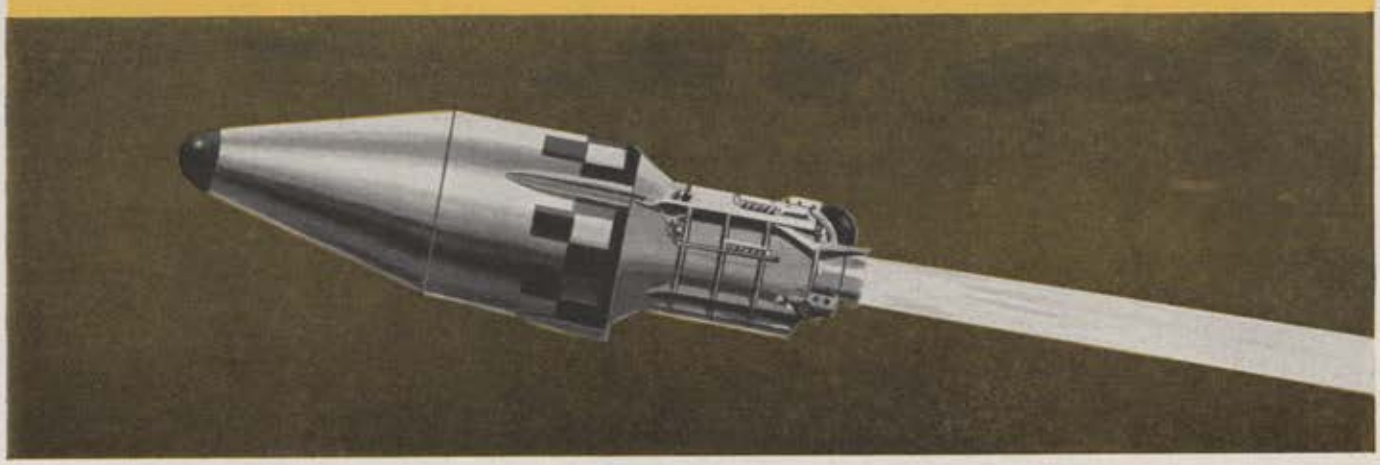
Action at a distance!

by ABLESTAR and AGENA-B

with DIMAZINE®

(unsymmetrical dimethylhydrazine, UDMH)

the storable high-performance fuel!



There are no launching crews or support equipment miles above the earth's surface where AbleStar and Agena-B begin their crucial missions. Yet out of a combined total of 52 opportunities to perform, from initial flight tests through 12 July 1961, these advanced upper stages and their earlier configurations have racked up at least 44 unqualified successes with only 4 known failures involving their propulsion systems.

These powerful, versatile liquid-fuel vehicles, mated with rugged Thor and Atlas boosters, have led the race for space with an impressive array of firsts. An AbleStar was the first rocket engine to be successfully restarted in space and a predecessor Able helped send the first re-entry vehicle over full intercontinental distance. The Agena vehicles were the first to put U.S. orbital payloads into the thousand-pound class and the first to send capsules back to earth from orbit. Together, they have helped orbit no less than 39 of the 48 U.S. satellites!

Both are reliable, restartable and applicable to a variety of space missions. Both use Dimazine in their bi-propellant main propulsion systems.

Dimazine provides a near-ideal combination of physical and chemical properties for rocket applications. It is remarkably stable to heat, contamination (catalytic decomposition) and shock. Its non-corrosiveness, low freezing point, storability and ease of handling minimize the complexities of pre-firing operations. It has excellent characteristics of ignition, combustion, fluid-flow and cooling. Density, liquid range and vapor pressure are also favorable.

Dimazine can be used with a variety of storable and higher-energy cryogenic oxidants. Fast expandability of production, to meet new and larger requirements with increasingly favorable supply economics, has been repeatedly demonstrated.

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CHLOR-ALKALI DIVISION

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SPACE RENDEZVOUS

New PAT-C Applications Demonstrate Marquardt's Capability in Precision Controls

Typical of Marquardt's Control Systems capable of meeting the sophisticated requirements of today's weapon and scientific vehicles is the Corporation's Position-Attitude-Trajectory Control System.

Already selected for one satellite project, the Marquardt PAT-C System provides the exacting control required for space vehicle rendezvous. Whether it's an intercept, observation, maintenance, rescue, or destruction mission, PAT-C makes possible the accurate positioning of heavier payloads in space.

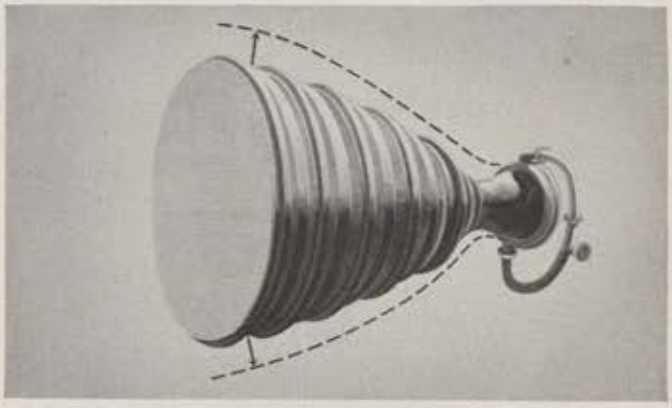
PAT-C is a highly responsive jet reaction system which controls the Position, Attitude and Trajectory of space vehicles as a result of inputs from the vehicle guidance system or ground control signals. The system provides the extremely precise corrective action based on simple position and velocity error signals, or will respond to the demand of guidance computers in the system. Tests demonstrating the flexibility of the PAT-C system range from multiple restarts up to 200 times per second to 46 minutes of continuous operation on a radiation cooled thrust chamber and nozzle.

Marquardt's sixteen years of research and development has produced state-of-the-art advancements over a wide range of electronic, electro-mechanical, pneumatic, hydraulic and nuclear controls and accessories.

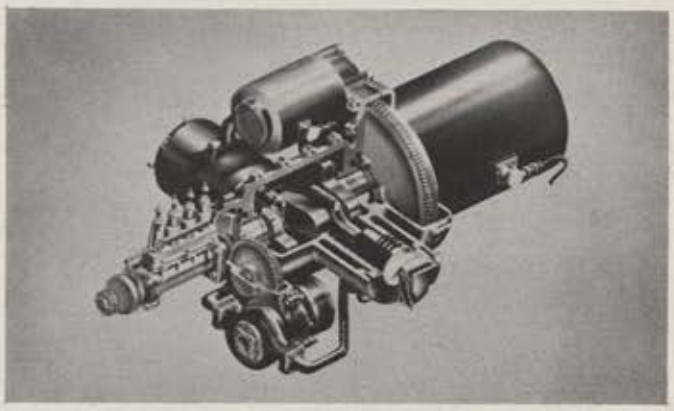
For example, products demonstrating the company's diversified capability include: gas operated servo systems for thrust vector control of an advanced ballistic missile; inlet controls for the McDonnell F4H-1 and the North American Hound Dog (GAM 77); a radically new space power unit; and control systems for the Bomarc ramjet engine and the Project Pluto nuclear ramjet engine.

For additional information concerning the PAT-C system or controls capabilities contact Dick Oblinger, Chief Application Engineer.

Engineers and scientists experienced in these or related fields will find it rewarding to discuss their career futures with Marquardt, an equal opportunity employer.



THRUST VECTOR CONTROL rotary actuators have been tested up to 1600 degrees F. and up to 42 hours.



SPACE POWER UNIT—a new Marquardt chemically fueled fixed displacement unit provides power with minimum weight for 1-15 day missions.

CONTROL PACKAGES utilizing ram air for all actuation and control functions are service-proven in operational weapons systems.

THE Marquardt CORPORATION

CORPORATE OFFICES: VAN NUYS, CALIFORNIA

ASTRO ◆ OGDEN DIVISION
◆ POMONA DIVISION
◆ POWER SYSTEMS DIVISION

The stockholders of Chance Vought Corporation and Ling-Temco Electronics, Inc., on June 30, 1961, approved plans for combining these two companies into a vast new company — Ling-Temco-Vought, Inc., effective August 31, 1961.

Combination of these dynamic, experienced organizations links depth of capabilities with depth of management to meet the advanced challenges of electronics, space, communications, aircraft, and missiles.

Ling-Temco-Vought employs more than 20,000 people in the development and production of: AEROSPACE SYSTEMS . . . ELECTRONICS . . . COMMUNICATIONS . . . SOUND SYSTEMS . . . AERO SYSTEMS . . . INFORMATION HANDLING SYSTEMS.

This is . . . Ling-Temco-Vought, Inc. . . . a new industrial leader to serve America's future through science.

from left
James J. Ling
Chairman of the executive committee

Robert McCulloch
Chairman of the Board

Gifford K. Johnson
President

Clyde Skeen
Executive Vice-President

LING-TEMCO-VOUGHT, INC.

LTV

DEPTH MANAGEMENT FOR PROGRESS IN AEROSPACE ELECTRONICS AND COMMUNICATIONS

Motivation is vital for youngsters starting science courses. Here's the letter Springfield, Mass., students get before they start their junior high science course. With persuasive charm, it tells youngsters why they can look forward to . . .

STEPPING UP WITH SCIENCE

M. MARCUS KILEY

How do you motivate youngsters toward an interest in science? You define for them what an understanding of scientific principles and method will do for them personally. This is the philosophy of school authorities in Springfield, Mass., which has been a leader in New England in "throwing the stuffed birds" out of instruction.

As Springfield pupils enter the seventh grade, where they begin a three-year exposure to a broad spectrum of scientific principles that prepares them for more intensive courses in the various scientific disciplines in the senior high school, they receive a copy of the message printed below, called "Stepping Up with Science."

Its thesis is that science provides extensions of man's senses, that these extensions allow man to control more energy, and lead a better and more satisfying intellectual and material life, that understanding science will help the pupil to extend his senses, and to receive the benefits that go with such extensions of his senses.

Through the courtesy of M. Marcus Kiley, Deputy Superintendent of Schools, Springfield, author of the message to students, a leading exponent of updating science instruction in the public schools of his city, and a participant in the February 1961 AFA-sponsored Aerospace Education Seminar at Boston, the message to pupils is published below.

—THE EDITORS

YOU COULD live better if you had keener senses and more energy. Anyone can make his senses keener and control more and more energy. Your science teacher can help you do both.

In some ways everyone is partly blind and deaf, but some of your older friends have learned to see better than you can see even if you have very good eyesight. They also hear better and can send messages faster and farther than you do. They use instruments to see germs you

probably have never seen, to feel rays you have never felt, to pick up sounds you cannot hear, and to use light that does not shine for your eyes. They also measure almost everything better than you do.

People who want to sharpen their senses find that the instruments they need were invented by scientists and made by mechanics who had knowledge of the ways energy does its work. This knowledge about energy has been arranged into a science called physics. Other knowledge, particularly about living things, has been gathered and sorted into a science called biology. Beginners are often introduced to these sciences by studying parts of each of them in a course called general science. Your teachers can introduce you to some important parts of general science so you can improve the use of your senses and have better control of energy too.

For example: Men who learned how to bend light with shaped pieces of glass made long, sharp eyes for themselves which they called microscopes. You can try one in your science class. Looking through these microscopes scientists saw small forms of life, never seen before, and found them eating and spoiling food that people were planning to eat at a future time. After the microscopic eaters ate the food it became unwanted by human beings.

Then it was found by watching these microscopic eaters, or germs, that they did not eat very much when they were cold. As a result almost everyone now saves food by putting it in a cold box or refrigerator. If people had not invented better eyes called microscopes they would not have learned how to save food from hungry small life that is always around and always ready to eat before we do, unless the food is kept cold.

Some harmful germs occasionally enter breaks in our skin or are taken in with our food and grow so fast with the warmth and nourishment inside our bodies that they prosper better than we do. They make us ill. Only people with aided eyes can find out how to defeat these germs, for we cannot see them without a microscope.

Another example: When Thomas Edison was trying to make lasting electric lights he found, by using instruments, that electricity he could not feel was boiling off the hot wire inside his light somewhat the way water

MISSILE AND SPACE VEHICLE DEPARTMENT, PHILADELPHIA, PA.

SKYBOLT is being developed to add a new dimension to America's growing missile might. Launched from an airborne B-52, it is being designed to arc through space toward targets more than 1000 miles away. The re-entry vehicles for this advanced USAF missile are being developed by General Electric's Missile and Space Vehicle Department under contract to Douglas Aircraft Company, prime contractor for Skybolt.

GENERAL ELECTRIC

boils out of a teakettle. Then other men found how to use the electricity boiling off the hot wire in the electric light to send messages and pictures over long distances. The electron tubes they invented can send out energy in waves. Our ears and eyes do not inform us that these radio or television waves are striking us in our homes every day. Only the instruments in our radio and television sets can feel and use these waves. We do not know about them until we hear and see the sound and light that the instruments make for us out of the energy that the waves bring in.

One more example: Some materials like radium are always sending out rays. No way has been found to make the rays from these materials come faster or slower or to make them stop. Every boy and girl who has ever lived has been struck by such rays but none has ever felt them. There are no people who can feel radioactivity. The people who can manage the rays from radioactive substances know how because they have learned to use sensitive instruments which can "feel" things a human being cannot feel.

There are many other examples to show that some people are getting far ahead of others by learning to use more of these instruments. People can be separated into two big groups: One group goes through life using only ordinary senses they were born with; the other group learns to have sharper senses by studying science. The second group is already in charge of all our radio, television, radar, all the power we will get from atomic energy, and most of our new knowledge about germs and diseases. They are practically in charge of the rest of us. The rocket and missile men are in this group too. There is no way for us to deal with waves we cannot feel or things too small for us to see, or changes too feeble for our notice except to use scientific instruments to aid us.

Everyone needs energy and most people buy some every day. Few people ever have enough although there is energy everywhere. Food and coal and gasoline and electric current are bought by people seeking more energy to give strength or warmth or light and to turn wheels or kill germs or do all sorts of work. People who know how can change one kind of energy into another. Electricity can become heat, light, sound, or motion. This process also works in reverse. Some have learned to measure quantities of energy so small that few of us ever realize what they do to us. A person who can measure very small amounts of energy can become a very important investigator. A person who can control large amounts of energy has no limits to his importance. He can get so much work done that he can have a high salary for his services. The men who control the most energy can possibly preserve peace or win war.

You can gain by learning to use instruments to find out information and control energy. However, some study is required of the behavior of energy and the materials upon which it shows its effects. Clear statements about this behavior are called scientific principles. They save beginners from fumbling because they have been proved and reproven and each statement is the explanation for a number of similar happenings. This is the kind of knowledge you can think from as you work out good explanations for what you see happening in the modern world. The principles are economical to learn and with good instruction a large number of them can become familiar to you in junior high school.

Your science teachers in Springfield can help you to have keener senses and make you a good controller of energy. Your young friends will be trying these experiences with you. Tell your teacher of your plans and ask his help. You will be favoring your future.—END

M. Marcus Kiley, Deputy Superintendent of Schools, Springfield, Mass., is a veteran advocate of curriculum modernization. Mr. Kiley, who participated in the February 1961 Boston Aerospace Education Seminar cosponsored by Aerospace Education Foundation, will be a panelist at AFA's 1961 Philadelphia Convention.

THE BIGGEST PLASTIC ROCKET NOZZLES ARE FROM HITCO

Coming... rockets that will dwarf—in size and thrust—every preceding launching. The plastic components that will gird them for flight will be manufactured to standards only recently considered impractical.

The Dumont Division of HITCO has advanced the art of molded plastics to this capability in the brief period of four years. Now, under HITCO, a combined team of engineers and technicians has made technological breakthroughs in both insulative and ablative plastics. New tooling techniques have been developed; the Dumont hydroclave can put pressure of up to 6500 psi uniformly on the surface of a reinforced plastic part. Dumont and HITCO are currently molding rocket engine components at pressures up to 30,000 psi.

Though giant rockets are still in the planning stage, the *giant plastic capabilities are here today.* HITCO is ready *now* to fit the biggest rockets with the biggest plastic nozzles.

HITCO-developed ablative materials and fabrication techniques are also providing Atlas and Titan nose cone heat shields. These materials enabled the first ICBM nose cone recovery.

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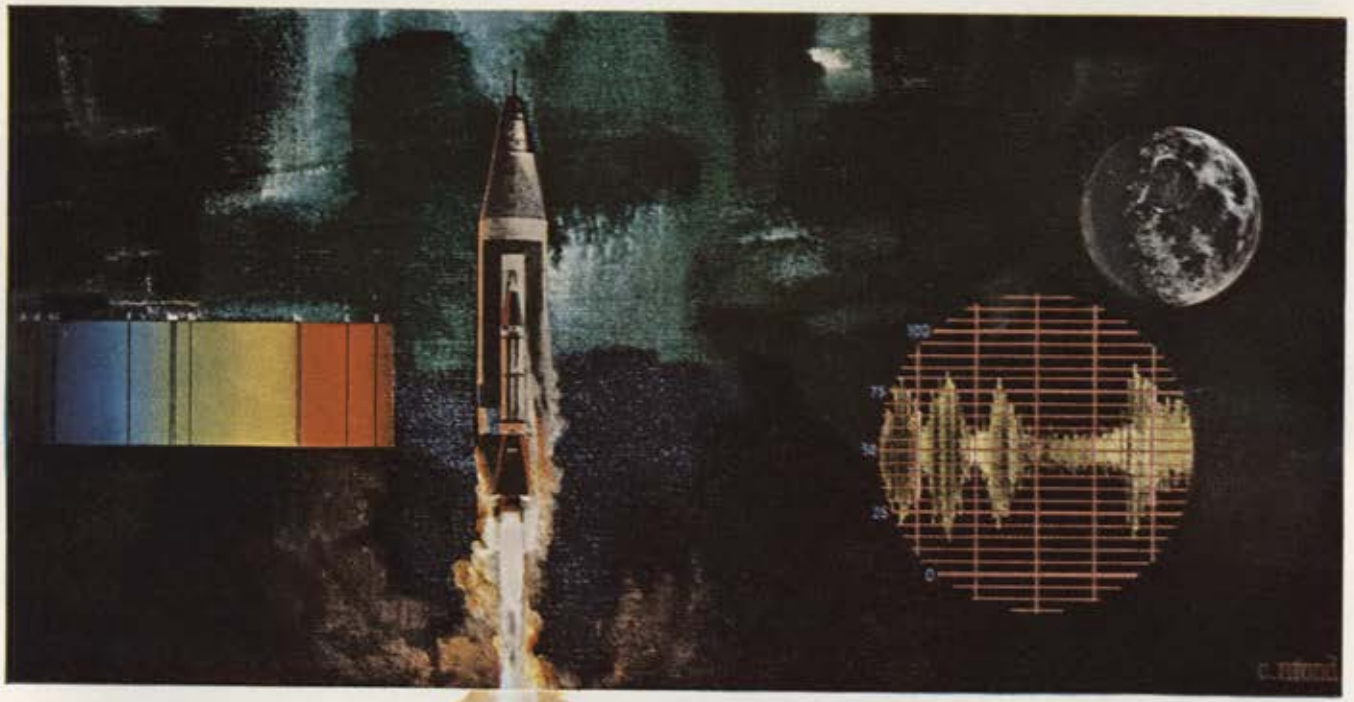
WRITE OR CALL YOUR NEAREST HITCO FIELD ENGINEER. EASTERN: Tom Kimberly, 38 Crescent Circle, Cheshire, Conn., BR 2-6544. Fred W. Muhlenfeld, 6659 Loch Hill Rd., Baltimore 12, Md., VA 5-3135. MIDWEST AND SOUTH: Burnie Weddle, 5650 Colton Dr. N.E., Atlanta 5, Ga., Phone 255-7804. SOUTHWEST: Marshall Morris, 2850A W. Berry, Rm. 7, Fort Worth, Tex., WA 4-8679 SAN DIEGO: John Veil, 9048 Haveteur Way, BR 8-5350. SACRAMENTO: Raymond Cutler, 4411 Surita St., IV 3-7743. CANADIAN PLANT: THE H. I. THOMPSON CO. OF CANADA LTD., 60 Johnston St., Guelph, Ont., TA 2-6630.

ITT KELLOGG*

COMMUNICATIONS

Sine Qua Non

OF A MODERN WEAPONS SYSTEM



It is communications that ties together the many subsystems of a modern missile system into a single, integrated man-made machine. Administrative communications . . . operational communications . . . page and countdown . . . camera control . . . fire alarm . . . operational direct line . . . maintenance and checkout . . . voice recording . . . range safety . . . all these make up the communications system. This critical ground support . . . provided by Kellogg for the entire Air Force Atlas program as well as for Air Force's Atlas, Titan, Thor, Discoverer and Samos at Vandenberg Air Force Base . . . is a self-correcting system to overcome human error, giving technical commanders access to all areas regardless of momentary situations, affording alternate routing, priority classes of service, executive override, interception of unassigned numbers and redundant circuitry. Here is the flexibility and extreme reliability of performance vital to an operational missile system.

* **Communications Contractor for the Air Force's Atlas ICBM; also all missile and space programs at Vandenberg Air Force Base.**

ITT KELLOGG

A Division of International Telephone & Telegraph Corporation, Chicago 38, Ill.

Gen. Thomas S. Power, an active military flyer for more than thirty years, has been SAC Commander in Chief since mid-1957. Previously, he was SAC Vice Commander from 1948 to 1954 and ARDC Commander from 1954 to 1957. General Power flew B-24 and B-29 bombers in Europe, North Africa, and the Pacific during the second World War.

The free world's primary deterrent force—powerful, flexible, responsive—is our great shield against an aggressor's impulse to attack and an instrument of highest policy . . .

STRATEGIC AIR COMMAND

THE ominous days which loom immediately ahead could test the Strategic Air Command's deterrent posture as it has never been tested before. Fortunately for the free world, SAC, in its fifteenth anniversary year, has done its work well.

As the American diplomats face the challenge of the coming days, the Strategic Air Command will contribute appreciably to the force that will give authority to their words. SAC remains the free world's most potent military instrument and its best assurance of avoiding a nuclear war on honorable terms.

SAC, commanded by Gen. Thomas S. Power, is a stronger force than it was just one year ago. Significant and continued improvements have strengthened SAC, thus strengthening the free world's hand.

SAC is responsible for delivery of more than ninety percent of the free world's total striking power, measured in TNT equivalents, yet it conducts its worldwide operations on only about twenty percent of the annual US defense budget.

Today, the command is manned by about 265,000 persons, operating from more than eighty bases across the globe. Ninety-eight percent of these people directly operate or support the combat forces. The other two percent are assigned in supervisory and planning functions at Headquarters SAC and the major subordinate headquarters.

The bulk of SAC's strike potential rests with its force of about 1,500 jet bombers. The mainstay of this bomber force is the B-52 Stratofortress, which can fly faster than 650 miles per hour at altitudes above 50,000 feet. Various models of the Stratofortress have unrefueled ranges between 6,000 and 10,000 miles.

Gradually being phased out is the older B-47 Stratojet medium bomber, in the SAC inventory about ten years. Phase-out plans were largely frozen for an indefinite period in July in line with over-all plans to bolster US defenses as a new Berlin crisis loomed.

The B-58 Hustler, the free world's first supersonic jet bomber, is now operational.

SAC's propeller-driven KC-97 Stratotankers are yielding their role in the force to newer KC-135 Jet Stratotankers. The KC-135, which offloads more fuel with speeds and altitudes compatible to jet bombers, significantly extends bomber ranges and cuts the requirement for additional refueling on individual missions.

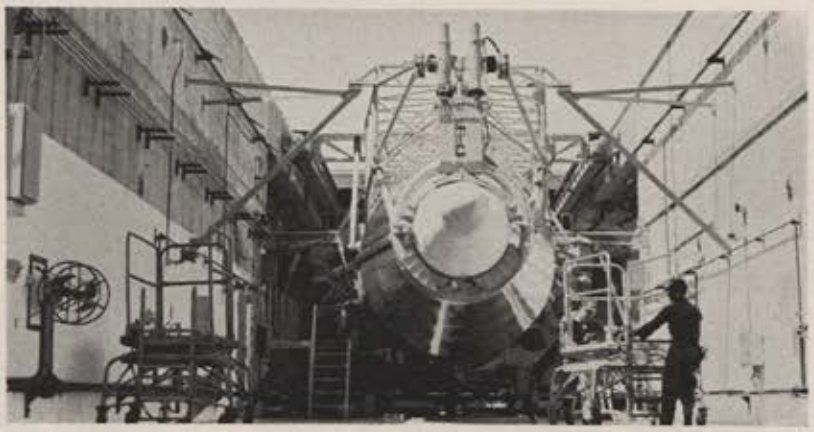
The command's missile force grew rapidly during the past twelve months. To date, more than 1,500 SAC officers and more than 8,600 airmen have completed formal missile training. Present trends indicate that by 1964 one in every four SAC officers and one in fifteen airmen will be involved in operation or direct support of missile activities.

The past year also saw giant strides in the missile base construction program. Atlas ICBMs are or will be located at Dyess AFB, Tex.; Fairchild AFB, Wash.; Forbes AFB, Kan.; Lincoln AFB, Neb.; Offutt AFB, Neb.; Plattsburgh AFB, N. Y.; Schilling AFB, Kan.; Vandenberg AFB, Calif.; Walker AFB, N. M.; and Warren AFB, Wyo.

Titan missiles are or will be located at Beale AFB, Calif.; Davis-Monthan AFB, Ariz.; Ellsworth AFB,

(Continued on following page)

Carswell AFB, Tex.: B-58 crew practice alert.



Warren AFB, Wyo.: Atlas ICBM in horizontal "coffin" launcher.

Men at work. This is a SAC KC-135 jet airborne command post.

of the French-awarded Bleriot Trophy by maintaining a speed greater than 2,000 kilometers per hour for more than twenty minutes over a closed course—the first plane ever to do so. Later the same month, a B-58 flew from New York to Paris in slightly over three hours, ten times faster than Lindbergh's 1927 flight and surpassing a record held by a commercial jet.

SAC established an all-time flying safety record last year when the combined major and minor accident rate was decreased to 2.2 accidents per 100,000 flying hours. SAC jet and conventional aircraft have flown more than 14,000,000 hours—well over 6,000,000 in jets—since the command's activation. At today's accelerated pace, SAC planes average well over a million hours per year.

Veteran crew members in SAC have seen many changes in techniques and procedures as well as evolution in aircraft. They have worked to adapt these changes. As more and more officers and airmen in SAC are phased into the missile program, it is predicable they, too, will demonstrate the same flexibility in adapting to aerospace vehicles entering the inventory.

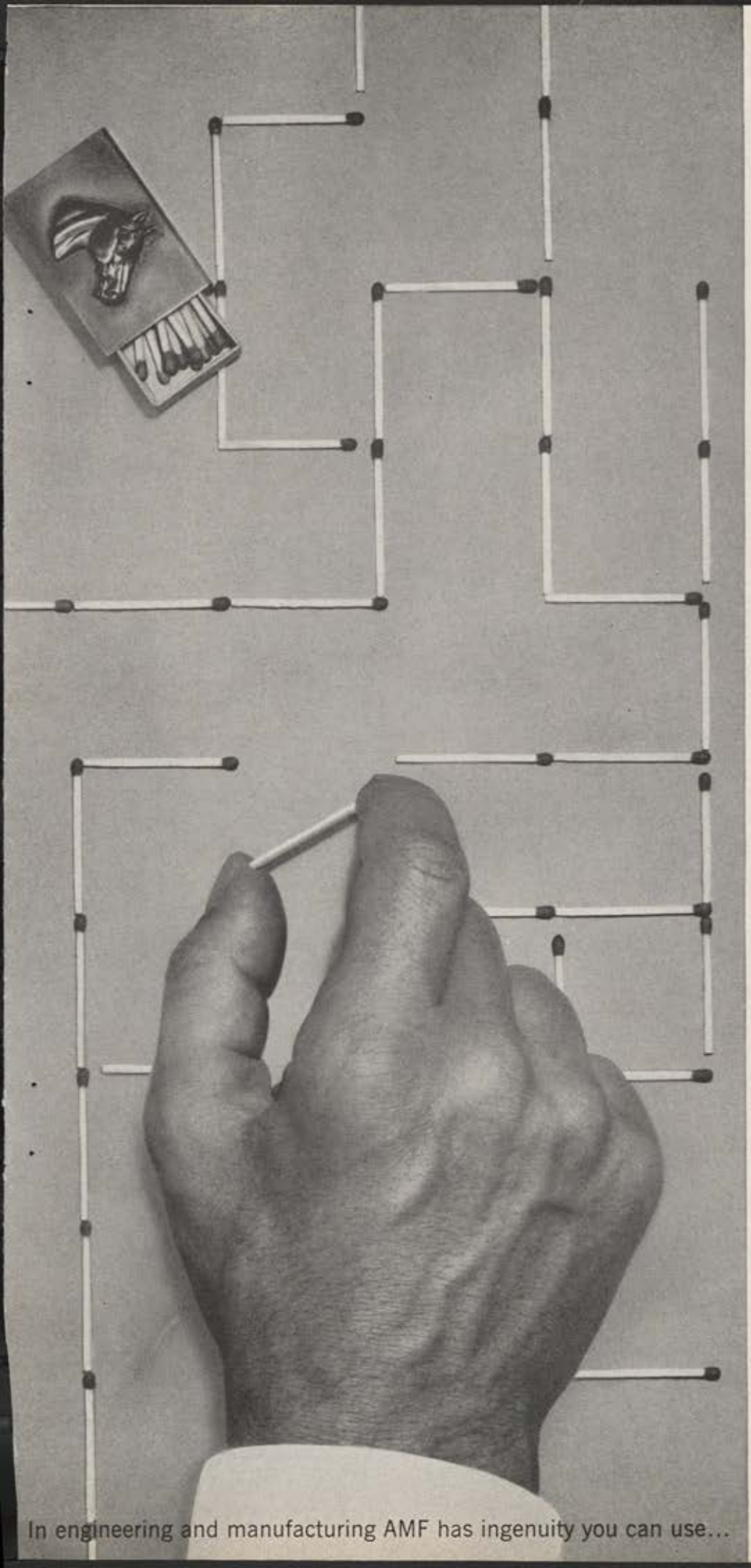
Just as changes in weapon development demand new techniques in operations so also do changes in national policy require shifts in doctrine, some more subtle than others. In this SAC is no exception to the process of evolution. Call it growth, maturity, whatever you will, it was well stated by General Power in addressing the Los Angeles World Affairs Council last June.

"Since the threat to our survival has assumed many faces, superior military strength, by itself, is no longer sufficient to cope with all of them and must be complemented by equally superior political strength, economic strength, technological strength, and spiritual strength. Consequently, the basically simply strategy of countering the threat of military aggression with the threat of massive retaliation had to yield to a more sophisticated approach, designed to meet all other aspects of the threat, individually and collectively. From this requirement gradually evolved our present national policy of deterrence."

General Power continued, "It is interesting to note that this evolution has not changed the basic mission of SAC. It has changed merely the manner in which SAC must carry out that mission and has added to its role as a military tool the even more demanding role as a diplomatic tool for our statesmen. In this latter role, SAC shares the responsibility with the nation's other strike forces, both nuclear and conventional, to ensure that the military aspects of the nation's deterrent posture are adequate to meet any conditions that may arise, now and in the future."

It is the flexibility of SAC's professionally conditioned force, armed with the most powerful weapons in history and delivery systems fully capable of penetrating any known defenses, that still shields the free world from an aggressor's impulse to attack.

As an instrument of highest policy, SAC is ready. The force is confident that, today and tomorrow as yesterday, it can execute any assignment demanded of it.—End



He designed a new interchange for radio traffic

This AMF engineer, part of an AMF-U.S. Army team, solved the problem of traffic delays and personal danger in manual re-connection of jumpers when interchanging R.F. transmitters and antennas.

His solution is a push-button-operated, coaxial crossbar switching system, using vacuum switches for circuit selection. A typical system consists of 4 transmitter inputs, 7 antenna outputs plus a dummy load, in a 4 x 8 matrix that can be mounted in a 19" rack. It can be controlled locally or remotely over any type of communication network having a bandwidth of at least 200 cycles.

AMF's coaxial crossbar switching system provides 100% flexibility in circuit path selection and accommodates power levels as high as 500,000 watts and frequencies up to 30 megacycles. It allows 100% utilization of all transmitting equipment. Stubs are automatically eliminated.

To insure fail-safe operation, power is required for the vacuum switches *only* during change of condition. Selection rate: 1 per second. Operating transmitters are safety-interlocked to insure a load. There are no hazards from open wires or inadvertent application of power to dead-lined antennas.

Single Command Concept

AMF's imagination and skills are organized in a *single operational unit* offering a wide range of engineering and production capabilities. Its purpose: to accept assignments at any stage from concept through development, production, and service training...and to complete them faster...in

- *Ground Support Equipment*
- *Weapon Systems*
- *Undersea Warfare*
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- *Range Instrumentation*
- *Space Environment Equipment*
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In engineering and manufacturing AMF has ingenuity you can use...

Gen. Frank F. Everest, TAC Commander since August 1959, was Commander in Chief, USAFE, from 1957 to 1959, DCS/Operations at Hq. USAF 1954 to 1957. General Everest saw extensive service in the Pacific during WW II, commanded the FEAF Fifth Air Force in Korea. He retires September 30. Gen. Walter C. Sweeney, Commander, SAC's Eighth AF, succeeds him.

Instant operational deployments around the globe marked a year of increased readiness for the combat-ready, fast-reacting, highly mobile . . .

TACTICAL AIR COMMAND

DURING the past twelve months, as in previous years, the Tactical Air Command proved to be a most effective instrument of national policy. In addition to playing a significant role in countering the threat of limited conflicts as well as general war, TAC carried out many important humanitarian airlift operations.

The command's basic responsibilities are to provide combat-ready, fast-reacting, highly mobile tactical air units for almost any contingency and to develop parallel policies, doctrines, operational requirements, tactics, procedures, and joint doctrine. Sizable TAC forces were frequently deployed to overseas theaters under the most realistic conditions possible during the past year. In the process, aircrews became better acquainted with terrain and weather in overseas areas and with routes to and from the areas. Moreover, these practice deployments resulted in the refinement of operational techniques and support procedures.

TAC provides regular commitments of fighter and troop carrier aircraft in overseas areas on a rotational basis. It also maintains a ready and potent backup force in the continental United States for either general or limited war. A unique organizational unit maintained within TAC is the Composite Air Strike Force or CASF. The CASF includes tactical fighter, reconnaissance, tanker, and transport aircraft. The strike force also has its own airborne command headquarters and a communications and support element.

The trademark of the TAC CASF is speed and versatility. It is capable of deploying, with the assistance of a certain amount of MATS airlift, to the most remote areas of the world where runways are available and operating on a self-sustaining basis for at least thirty days. The effectiveness of CASF deployment procedures has been proven time and again. Single-engine, single-place jet fighters are crossing the Atlantic nonstop and the Pacific with only two stops so often that these flights are now considered routine. During the period June 1, 1960, to April 30, 1961, there were more than 1,100 ocean-spanning jet-fighter flights involving approximately 2,500 air-to-air refuelings.

One of the year's most notable CASF deployments was to the Far East during Exercise Long Pass, a joint Air Force-Army maneuver last February. As in the case of similar exercises, the objectives of Long Pass were to test combat readiness, deployment, and employment procedures and, in addition, to gain as much operational experience as possible in the Far East area. Long Pass was completed as scheduled and furnished additional proof that a TAC CASF can move rapidly from the US to the Far East and be highly effective upon arrival.

Other noteworthy overwater deployments during the year, excluding the normal squadron rotational moves, included Junex Blue V in September, Jack High in December, Solidarity in February, and Home Run in April. Junex Blue V, Jack High, and Home Run aircraft deployed nonstop across the Atlantic to European bases. Aircraft participating in Solidarity flew nonstop from the ZI to bases in the Caribbean theater of operations, where they operated in conjunction with forces of the other services.

Historically, tactical forces have worked closely with ground forces. Two of the three traditional tasks of tactical airpower, interdiction and close support, are of utmost importance to immediate Army operations. The third, air superiority, is the most vital since the successful conduct of a surface campaign is critically dependent upon freedom from enemy air attack. During FY '61, TAC forces continually tested their readiness in exercises with the Army which included—

in addition to Long Pass and Solidarity—Bright Star/Pine Cone III in August 1960, Southwind in November, Thunderbolt in April, and Lava Plains and Mohawk Arrow in May.

The assignment of training and inspection supervisory responsibilities for certain Air Reserve Forces to TAC was one of the most important single events of FY '61. This move was welcomed as a realistic and logical step forward in good management principles. In the event of mobilization, TAC would assume command and operational control of approximately seventy percent of all organized Air Reserve Forces, or more than 54,000 personnel and 1,400 aircraft. Although this new management concept created an additional workload for the command, it has not necessitated any major change in over-all organization. Since these Reserve Forces would be employed along with regular forces in the event of mobilization, TAC has aligned its responsibilities to the Air Reserve and Air National Guard units in the same functional manner as its regular forces.

All of the Air Force Reserve and Air National Guard troop carrier and reconnaissance units assigned to TAC have been placed under the jurisdiction of TAC's Ninth Air Force, which is primarily responsible for these activities in the regular establishment. Likewise, all of the Air National Guard tactical fighter elements are assigned to Twelfth Air Force, TAC's tactical fighter Air Force.

A continuing effort is being made to bring the Reserve components into closer contact with assigned missions of TAC. Bright Star/Pine Cone III, conducted in August 1960, and the recently completed Swift Strike are good examples of how Air Reserve and Air Guard units are effectively integrated into the over-all TAC training program. In Pine Cone III, more than 500 Air Force Reserve troop carrier aircraft and more than 100 Air Guard fighters and reconnaissance aircraft established a near record for in-commission rates and effective missions flown. In Swift Strike, as in Bright Star/Pine Cone III, Air Force Reserve troop carrier units supported by regular TAC forces airlifted crack US Army paratroopers from widely dispersed staging areas into a simulated combat zone. By the same token, Air National Guard jet fighter, reconnaissance, and tactical control elements augmented by TAC regular units planned and carried out the necessary air support for the Army forces. Approximately 300 Air Force Reserve and Air Guard aircraft participated in Exercise Swift Strike.

As far as TAC is concerned, there is no such thing as a second team in the aerospace age. The Reserves are part of the single combat-ready TAC team.

During the past year, TAC's fighter inventory was strengthened through increased deliveries of the F-105 Thunderchief, which will replace the F-100 as the backbone of USAF tactical fighter forces worldwide. An F-105D training squadron was activated at Nellis AFB, Nev., and is currently familiarizing both US-based and overseas theater pilots in that aircraft.

When fully operational, the F-105D will provide the US Air Force with a potent and versatile fighter weapon system—the first such system designed for efficient capabilities for all tactical tasks. Its all-weather navigational capability will enable its pilot to seek out and destroy targets in adverse weather over almost any terrain. The F-105D can be girded with the full

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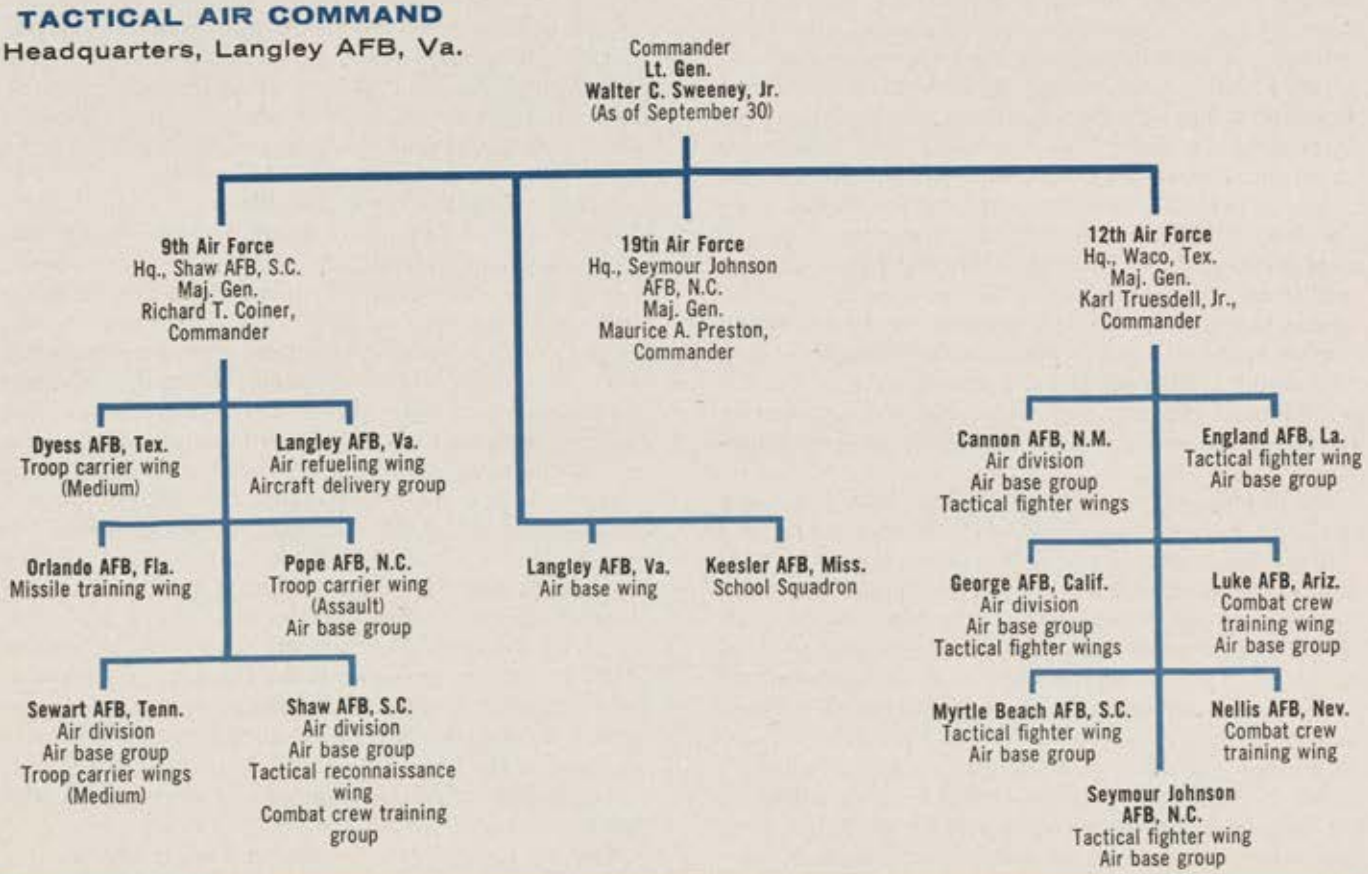
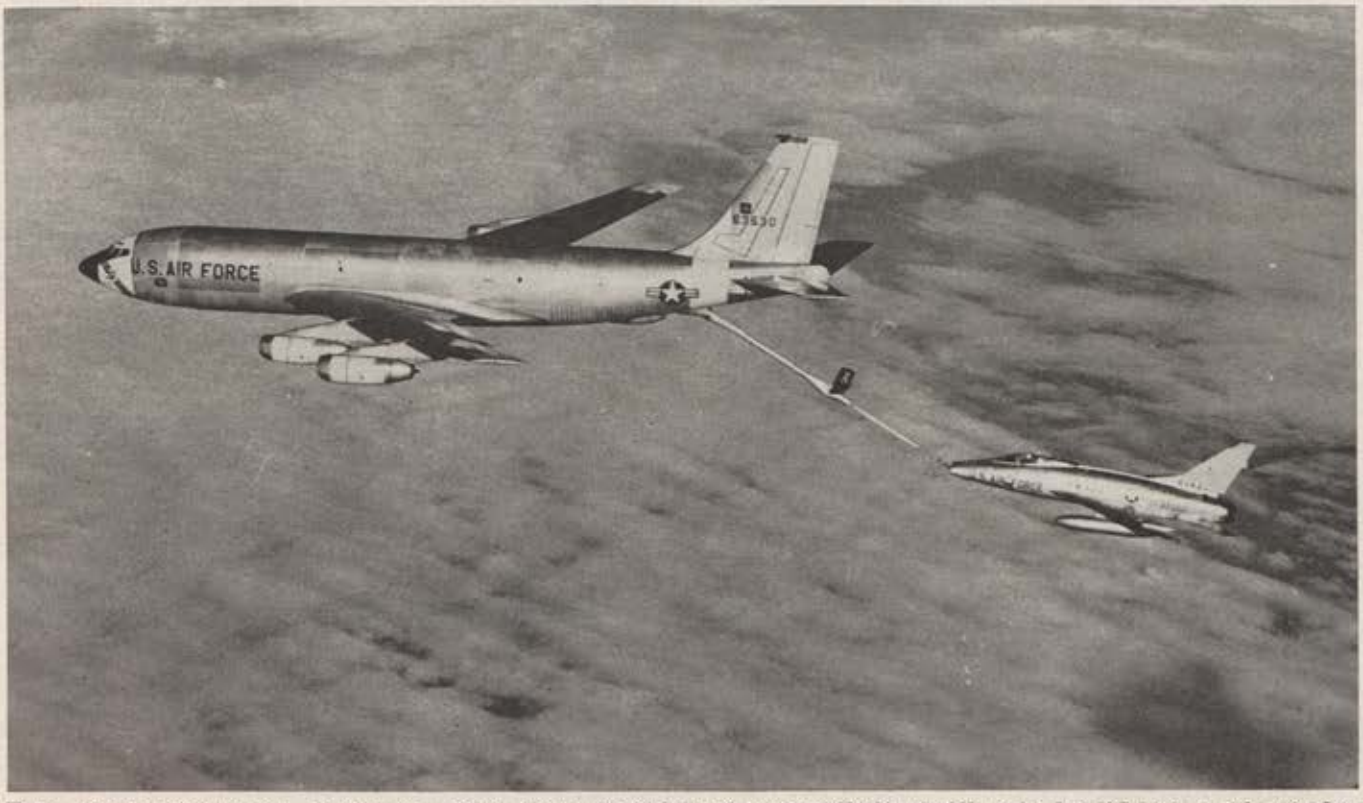
TACTICAL AIR COMMAND

Headquarters, Langley AFB, Va.





Tests and actual overseas deployments have shown feasibility of mating TAC's CASF with the KC-135 aerial refueler.

spectrum of the conventional weapons inventory. It is capable of carrying nuclear weapons in its internal bomb bay. The Thunderchief can loiter for up to three hours within close proximity of a battle area, and it possesses the high performance necessary to survive and operate against sophisticated enemy opposition.

The C-130 propjet troop carrier/transport aircraft is, perhaps, one of the most valuable and versatile assets presently included in the Tactical Air Command inventory. The C-130 Hercules is utilized for a wide variety of missions, ranging from support of US Army training and development, which is assigned almost sixty percent of all allocated C-130 flying time, to supporting such activities as DEW Line construction on the Greenland Ice Cap, resupply of Ice Island Bravo in the Far North, and aid to disaster areas. In March 1961, eight C-130s deployed to the European theater to inaugurate a continuous squadron rotation program to assist in supporting USAFE theater airlift requirements.

The advanced Mace-B tactical missile has been placed in full operational use in a further refinement of TAC weapon systems. This new weapon will augment the Mace-A and will completely replace the older Matador missile in conjunction with Mace-B. Through its increased range and advanced guidance system, the Mace-A and -B represent a major advance toward modernization of tactical missile units based in overseas theaters.

On May 25, 1961, a TAC pilot, Capt. Walter C. McMeen, Luke AFB, Ariz., established an unofficial E-1 helicopter world altitude record of 25,814 feet, carrying 2,204 pounds to that altitude in a Kaman H-43B Huskie.

In July 1960, the USAF Air Ground Operations School, a part of Tactical Air Command, initiated a new forward air controller course called the Combat Operations Specialist Course. The course is designed for all qualified officers below the rank of colonel. Located at Keesler AFB, Miss., AGOS plays a key role in ensuring that officers of all branches of the US armed forces are abreast of the latest developments in weapons and doctrine and their employment in joint air, ground, and naval operations.

TAC's responsibility involving the successfully completed Project Talking Bird greatly contributed toward increasing worldwide effectiveness of tactical air forces. A project conceived by Headquarters USAF, Talking Bird involved a test-bed C-97 aircraft carrying various refined communications equipment on a communications test around the world during the period December through February. The objectives were to evaluate the capability and feasibility of the equipment for use on a command communications aircraft for contingency/emergency deployments anywhere in the world. One by-product of this successful experiment was the modification and assignment of a KC-135 to TAC's Nineteenth Air Force for use as a CASF command element aircraft to travel with the CASF wherever it might be directed. This aircraft, positioned anywhere in the world, can maintain two-way radio contact with the Command Post in the Pentagon, with CASF units on a strike mission, or with almost any selected headquarters. This addition will greatly assist the CASF Commander in maintaining effective control under any condition or emergency.

Another important milestone in TAC modernization

(Continued on page 103)

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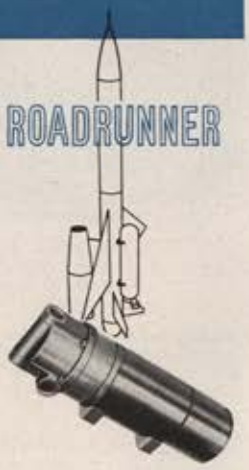

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C-130 Hercules, shown on ice operation, is one of TAC's most versatile craft.

Six TAC F-105s in lethal formation.

took place at the Air Proving Ground test facilities at Eglin AFB, Fla., in January 1961. A complete CASF was deployed to one of the remote airfields there in a move designed to test new and experimental equipment. Collapsible and easily transportable fuel cells, new and modified mission supply kits, plus other advances and innovations in mobility equipment were exposed to use under conditions which might normally be experienced in any CASF deployment. These tests proved to be highly successful.

In yet another step forward, a complete CASF was deployed overseas during early December utilizing a fleet of all-jet KC-135 aerial tankers. Results gained from this exercise plus experience gained from other similar experimental operations conducted in the ZI has proven the KC-135 to be compatible with tactical fighters and reconnaissance aircraft. Although the older KB-50J aerial tanker fleet still comprises the backbone of the TAC tanker force, the ready availability of the KC-135 may appreciably reduce the CASF reaction time. The faster, all-jet tanker is capable of accompanying TAC fighter and reconnaissance aircraft to any objective area, thereby eliminating the need for rendezvous time allowances, reducing speeds, or descending to low altitudes for refueling purposes.

Indicative of TAC's efforts to provide the most realistic training possible not only to ZI-based forces but to those of the overseas air commands, was the biennial World Wide Tactical Fighter Weapons Meet at Nellis AFB in October. William Tell 1960 was a weapons meet unique and wholly different from any ever held to date among tactical fighter aircraft. Isolated areas in the Southwest were selected as target areas instead of old, familiar gunnery ranges at Nellis or at Luke AFB, Ariz. Every person involved in the different missions was graded on every possible aspect from the time aircraft preflighted until pilots had expended their ordnance. The training gained from such realistically planned events is inestimable.

TAC's 4440th Aircraft Delivery Group, an organization charged with the responsibility of moving aircraft to and from overseas bases for reclamation, major overhaul, etc., has given the overseas humanitarian airlift program considerable support during FY '61. Beginning with a herd of twenty purebred calves airlifted to an orphanage in Seoul, Korea, C-130 transports returning to the Far East carried a variety of good-will gifts, on a space-available basis, in support of the international good-will program.

United States prestige in the Far East was enhanced in August 1960 when a TAC C-130 was dispatched to carry desperately needed iron lungs and chest respirators to Hokkaido, Japan, to help combat the worst outbreak of polio ever experienced in this northern and remote island of Japan.

In FY '61, through the dedicated leadership of Gen. Frank F. Everest, TAC's Commander, officers, airmen, and civilian employees of Tactical Air Command achieved an enviable record in favorably expediting the many difficult and complex tasks confronting them. On June 3 of this year, General Everest announced his retirement from active service effective this fall. His retirement will mark the culmination of over thirty-three years of successful and continuously exemplary service to his country. Through his foresight, courage, and ability, Gen. "Hank" Everest has contributed much to this country's defense posture. He has headed TAC for the past two years. Assuming command of TAC will be Gen. Walter C. Sweeney, now Commander of SAC's Eighth Air Force.—END

Gen. Emmett O'Donnell, Jr., has been Commander in Chief of PACAF since August of 1959. He served as DCS/Personnel at Hq. USAF from 1953 to 1959. At the start of the Korean War in 1950, he set up FEAF Bomber Command in Japan. General O'Donnell served with heavy bomb groups in the Pacific through much of World War II. He led the first B-29 raid on Tokyo.

In the troubled Pacific, where there has been no real peace for many long years, USAF airpower stands ready to meet Communist might when and where the need arises . . .

PACIFIC AIR FORCES

COMMUNIST might behind the Iron and Bamboo Curtains stands as a constant military threat to the nations of free Asia.

The task of turning or stopping the thrusts of communism into Asia has been difficult. Tensions are not likely to be reduced. The tentacles of communism continue to reach out from Russia, Red China, and North Vietnam into an area which runs from the North Pole to the equator. Communist airpower is especially menacing.

This aerial threat is composed of a complex of modern air bases and more than 2,500 tactical and tactical-support aircraft concentrated on the eastern borders of Red China and in North Korea. Even more modern equipment stands poised in Russian Siberia.

Opposing this threat are the air forces of the free nations that border communism's backyard. A coordinated defense posture has been created by the air forces of Korea, the Republic of China, the Philippines, the Republic of Vietnam, Thailand, Australia, New Zealand, and the US.

The Pacific Air Forces represent a vital and integral part of this defensive alignment. PACAF has the responsibility of maintaining quality combat-ready forces in the area. Their presence and capability to prevail in war is counted on to deter any would-be aggressor or deal him a death blow should he strike.

PACAF, under the command of Gen. Emmett O'Donnell, Jr., serves as the US air arm of the unified Pacific Command. PACAF stands as an operationally ready force possessing a complex of modern air bases, up-to-date weapon systems, professional personnel, and experienced leadership.

Highlighting PACAF's defensive arsenal is the newly integrated F-102. Within the past year, PACAF has completely equipped its interceptor units with the F-102, including the Hawaii Air National Guard, the heart of the Hawaiian Air Defense Division.

Air defense is further bolstered by the placement of the Army's Nike and Hawk missile batteries at strategic points.

Controlling the pulse beat of interceptor units is an effective integrated radar early-warning environment. This function of air defense is now being performed in part by allied air forces. They feed information into PACAF channels.

The air units of these nations fill a vital gap in the defensive setup. Most of their aircraft are committed to defense missions.

The F-100 and B-57 give PACAF an offensive punch. These aircraft and their crews are capable of delivering modern weapons. During the annual USAF Fighter Weapons Meet (William Tell) held last year at Nellis Air Force Base, Nev., the 18th Tactical Fighter Wing from Okinawa, flying F-100s, placed first among all USAF tactical units. This worldwide meet brought to Nellis representatives from TAC and the USAF overseas commands. Commenting on the performance by the 18th's team, General O'Donnell said, "Combat capability is our aim. You have superbly demonstrated this capability without incident or accident during this competition. The finest tactical wing in the Air Force is now in the Pacific."

PACAF's tactical missile role has been filled for the past few years by the Matador tactical missile. In the near future, the vastly increased range and accuracy of the Mace missile will give added punch to our airpower in the Pacific.

The PACAF concept of operations is based on cooperation and close coordination with our allies. With an area of concern encompassing over forty percent of the globe, PACAF could not do the air job alone.

PACAF F-100s receive preflight checks at Itazuke Air Base, Japan, before taking off for target-practice mission.

Our Asian allies, whose combined air forces are numerically larger than PACAF, play a key role in the aerial strategy of the Pacific.

Individually and collectively, the air forces of free Asia continue to increase their capabilities through stepped-up training, modernization of equipment, and improved communications facilities.

Only three jet minutes away from several of these nations, major Communist bases underscore the urgency and professional readiness required at freedom's frontier outposts.

Taking a major stride forward last year, units of the Air Force of the Republic of China on Taiwan were equipped with the supersonic F-104. With only a few miles of water separating Taiwan from the Communist-held mainland, every airborne mission by pilots of the Republic of China is a potential combat mission. No aircraft ventures forth without its full complement of defensive weapons against possible Chinese Communist attack.

Japan has steadily improved her defense posture and will soon be building the F-104 at a Mitsubishi plant for use by the Japan Air Self Defense Force.

Units of the Royal Thailand Air Force were equipped last year with the F-86, replacing the F-84. Republic of Korea air units are now equipped with the F-86. Vietnam is progressing in the development of its air organization.

To the south, the anchor of PACAF's defensive chain, the F-86-equipped Philippine Air Force, works closely with PACAF units stationed in the Philippines to provide a capable defense posture.

To maintain the combat capability of these national air forces, skilled manpower is required. Recognizing this need, PACAF arranges for training of foreign airmen at USAF schools or through field training courses. Graduates of these programs become instructors within their own units. All aspects of air force operation are included in the training programs and the benefits to PACAF are numerous. First, by upgrading a student to instructor status, we greatly ease the PACAF and USAF training requirement. PACAF instruction in the use of US equipment lays the basis for standardization of both equipment and procedures and assures mutual compatibility—an important step

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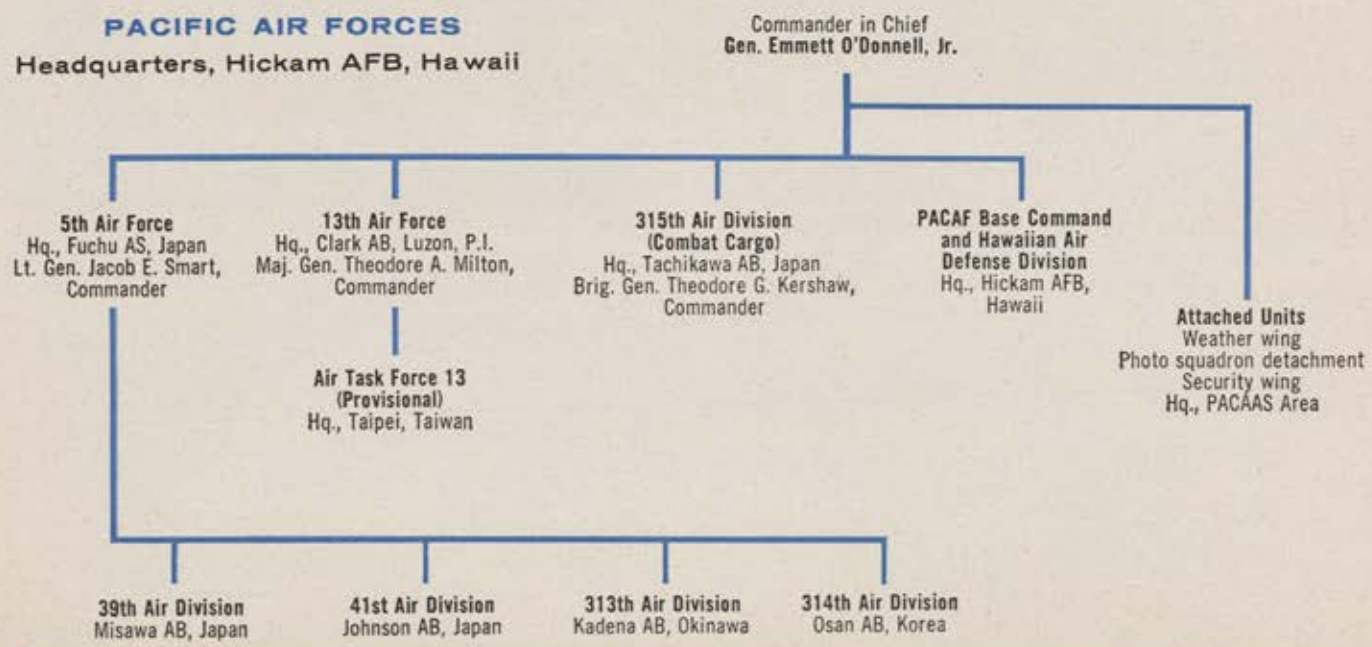

toward successful integration of forces during combined actions.

Frequent joint training exercises provide the opportunity to test the effectiveness of combined action. Twice in the early months of this year, PACAF joined with free Asian air units in exercises designed to test operational concepts of an international force and to determine their flexibility.

Air Bull, a joint US, Thailand, Australian, and French exercise, was held in Thailand in early March. It was a full air defense exercise using a complex of airfields for launching, probing, and intercept missions. All "A" staff functions, the command operations center, radar posts, control towers, and most other support jobs were jointly manned.

Following Air Bull, the third consecutive US-Asian Fighter Weapons Conference was held at Clark Air Base in the Philippines. Once again aptly named Flying Brothers, the event was attended by flying teams from PACAF, the Philippines, Thailand, Republic of Korea, Republic of China, and the US Navy. On observer status and participating in seminars and academic classes were representatives from Cambodia, Japan, Indonesia, Republic of Vietnam, and the British Commonwealth.

In this noncompetitive exercise, teams from participating nations exercised their skills on the aerial bombing and gunnery ranges and broadened their knowledge in extended classroom sessions.

PACAF emphasizes training as a prime factor in maintaining a combat-ready air arm. But PACAF cannot rely on this element alone. Weapon systems must be updated frequently within the command to keep pace with technological advances. This triggers the modernization of airstrips, expansion of high-speed communications facilities to handle the ever-increasing speed of airborne units, and the installation of advanced navigational aids. More voice channels are constantly required to open the vast stretches of the Pacific that link PACAF units. And above all, there must be the continuous emphasis on flying safety so as to protect and conserve PACAF's highly skilled airmen and their valuable equipment.

When General O'Donnell became Commander in Chief of PACAF in August 1959, he ordered a vigorous safety program. Units with poorer records received first attention from a team of headquarters specialists. Corrective action reports were required and analyzed. Follow-up inspections required commanders to report directly to the commander in chief. These diligent efforts paid off this year when PACAF received both the Daedalian Trophy for the finest major command flying safety program and the ground safety Award of Honor signifying the highest recognition by the National Safety Council.

In communications, PACAF has been a trailblazer of advanced management principles. PACAF was out ahead on the now USAF-wide concept of uniting all communications functions under a single manager. Hickam as well as Clark were pilot bases for the project. After six months of operation, the program was expanded to include the entire command. PACAF now has a highly effective command communications system at fixed-site locations.

But, to adequately support a mobile air operation in this vast area, mobile communications teams had to be developed. These units, presently in operation, undergo almost continuous training in direct support of all operational exercises.

PACAF, as an effective combat force, must be able to cope with all possible contingencies. Available equipment and personnel must be able to handle their part of the job in brush-fire warfare as well as in global conflicts. Conventional weapons and nuclear employment must be geared to PACAF operational concepts. As requirements arise, new methods of operation are devised, tested, and continually checked to assure their effectiveness.

Operation Long Pass was one such test. This joint Air Force-Army exercise held in the Philippines early this year tested several PACAF concepts. Long Pass was the largest peacetime exercise staged in the Pacific, involving nearly 7,000 personnel. Army units and equipment were transported from points throughout the US and Pacific areas, testing troop movement capabilities. Supplies delivered by airdrop to these units from PACAF's C-130 combat cargo fleet from the 315th Air Division tested PACAF's ability to support front-line ground troops. The movement of a Tactical Air Command Composite Air Strike Force along with the troop movement tested in-flight refueling capabilities in the Pacific and provided this excellent TAC unit the opportunity to exercise close ground-support and interdiction-type missions.

To ensure prompt reaction to flare-ups in those areas of Southeast Asia, where the US has military commitments, a specialized tactical air element known as Mobile Strike Force has been developed within PACAF. This unit is self-sustaining, geared to rapid deployment, and capable of operating in remote areas. Prepacked supplies allow rapid loading and discharge of support cargo from aircraft.

Other equipment in PACAF is committed to immediate response—fully armed, fueled, and ready at all times to strike back in the event of attack.

Directing and leading the combat-ready air elements in the Pacific are many experienced flyers and leaders, including a veteran group of World War II and Korean War fighter aces. Aces include Col. Francis S. Gabreski, America's top living ace who now commands the 18th Tactical Fighter Wing on Okinawa; Lt. Cols. Harold E. Comstock and Robinson Risner, who perform operations assignments in the unified Pacific Command Headquarters; Lt. Col. William H. Lewis, the Deputy Director of PACAF Combat Operations; Maj. Franklin Rose, Jr., Intelligence Staff Officer with PACAF; Col. Maurice Long, head of Fifth Air Force's Tactical Evaluation Team; Col. Chesley G. Peterson, Chief of Staff, Fifth Air Force; and Col. George Ceuleers, who has recently taken the reins as Deputy Commander, 326th Air Division.

The command's leadership also claims long experience in the Pacific. General O'Donnell was in the

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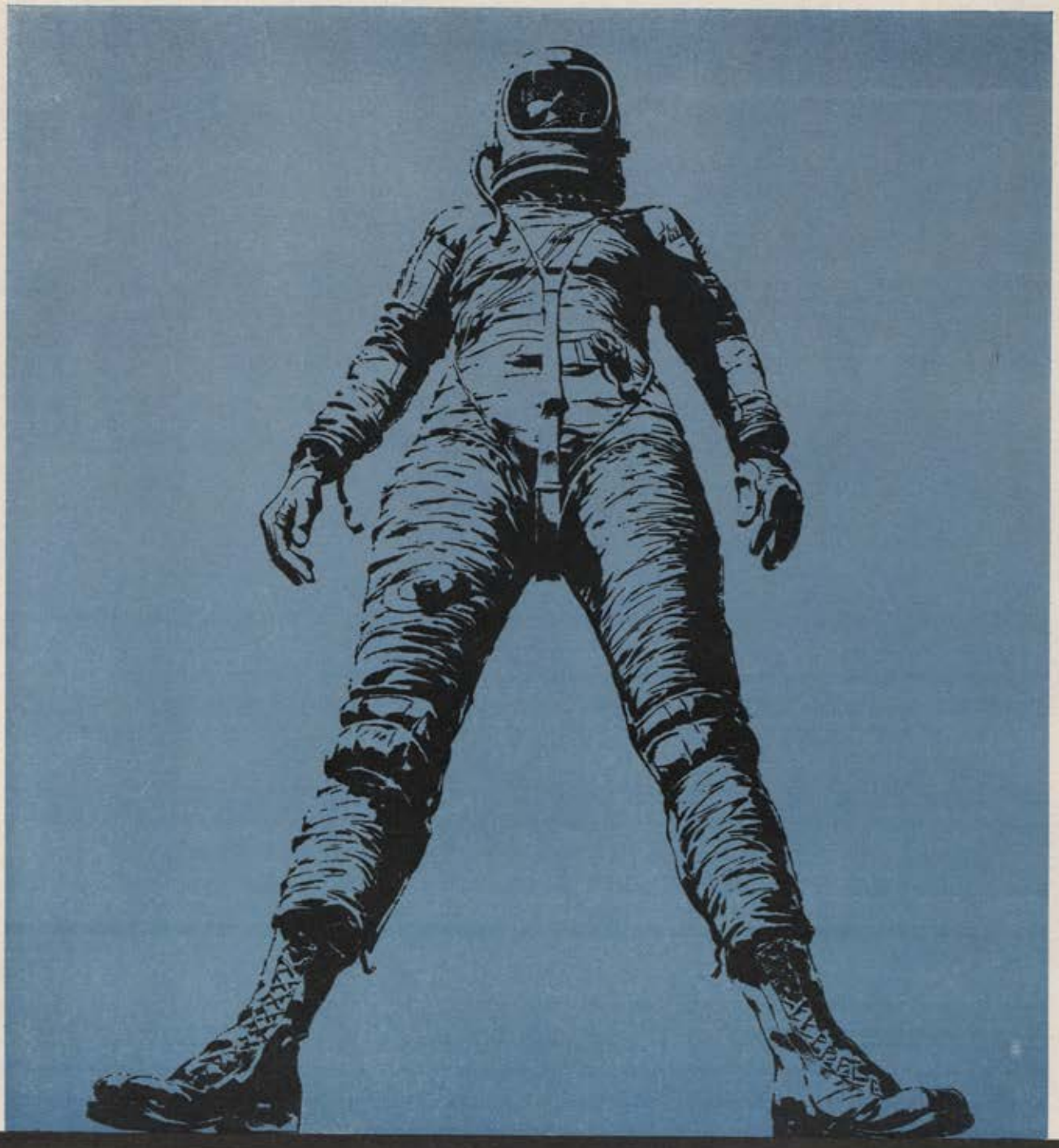

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Rescue effort in a Philippine flood.

USAF officer provides last-minute briefing for Thai pilot in joint exercise.

Philippines at the outset of World War II after leading the first mass flight of land-based planes—B-17s—across the Pacific. He commanded the first B-29 wing to be committed to the Pacific, and he returned again during the Korean conflict to establish the Far East Bomber Command. Maj. Gen. Gordon A. Blake, his Chief of Staff until August of this year, was at Hickam Field, Hawaii, during the Pearl Harbor attack and remained for nearly four years as head of Pacific AACS communications. Maj. Gen. Thomas S. Moorman, Jr., who has now replaced General Blake, brought with him a wealth of knowledge gained as Commander of the Thirteenth Air Force in the Philippines for the past three years. Likewise, Brig. Gen. Travis M. Hetherington, new DCS/Plans and Operations for PACAF, just completed a tour as Commander of the 39th Air Division in Japan. At Fifth Air Force in Japan, Lt. Gen. Jacob E. Smart, former Deputy Commander of TAC and past Deputy for Operations in Far East Air Forces, recently assumed command. At the helm of the Thirteenth Air Force is now Maj. Gen. Theodore R. Milton, fresh from two years as Commander of the Japan-based 41st Air Division.

PACAF recognizes that military measures alone cannot fill the needs of free Asian nations. The command also places emphasis on cooperation and friendship with the area's peoples. PACAF is ready with a helping hand when the need arises.

A year ago, Japan was hit by a severe polio epidemic on the northern island of Hokkaido. More than 900 persons were stricken. Sixty-two deaths were reported in the first few weeks. USAF was asked to assist in the transport of iron lungs from the US. Twelve lungs and a like number of chest respirators reached Hokkaido within a few days.

In the Philippines, three central provinces on the island of Luzon were struck by one of the worst tropical storms in history. Air Force rescue units evacuated more than 4,500 stranded persons to high ground, sent in needed food, medical supplies, and clothing, and airlifted three large water purifiers from Delaware to avoid outbreaks of disease from contaminated water.

Invaluable personal contributions are constantly being made by PACAF personnel who use their military pay to help support orphanages, establish scholarship funds, provide assistance to the blind, build recreation camps for needy children.

Medicine provides a common meeting ground. Founded by PACAF, an international medical conference was again held in 1960 in Tokyo with doctors attending from Australia, Burma, Hong Kong, Japan, Korea, Pakistan, Philippines, Singapore, Taiwan, and Thailand. Additionally, PACAF offers internships and specialized training to foreign doctors at Clark and Tachikawa Air Base, Japan, hospitals.

The last two wars in which our country fought had their geneses in the Pacific, at Pearl Harbor, and in Korea. Hale Makai, the battle-scarred building housing PACAF Headquarters at Hickam, is in itself a vivid reminder of the cost of unpreparedness.

PACAF is meeting its first obligation—maintaining a ready, mobile, and versatile force. The existence of this force, its known capability to meet a broad range of military threats, and its demonstrated capacity to move at once wherever needed are important factors. Its physical presence on the front lines is visible and tangible evidence to our friends and Allies of US preparedness and of our intention to honor mutual defense agreements should the Communists unwisely go on the march.—END

Gen. Truman H. Landon became Commander in Chief of USAFE in July 1961. He succeeded Gen. Frederic H. Smith, Jr., who was named USAF's Vice Chief of Staff. A bomber commander in the Pacific in World War II, General Landon was previously DCS/Personnel, Commander of the Caribbean Air Command, and prior to that was the USAF Inspector General.

The giant Congo Airlift was the major single effort of the year for the command charged with the responsibility for US interests from Britain to Pakistan . . .

UNITED STATES AIR FORCES IN EUROPE

MEN and aircraft of the United States Air Forces in Europe drew international attention during the past year. The vast command carried out missions for the world's two greatest organizations for peace and freedom—the United Nations and the North Atlantic Treaty Organization.

The giant task for the United Nations was the Congo Airlift.

For NATO, it was a further strengthening of free-world airpower in Europe through the introduction of F-105 Thunderchief all-weather tactical fighters and consolidation of control of USAFE's major tactical strike forces under a single numbered Air Force, the Seventeenth at Ramstein AB, Germany.

Meanwhile the command—which has responsibility for US interests in thirteen nations stretching from the British Isles to Pakistan—pursued its day-by-day missions of maintaining combat readiness, providing logistic support to forces in the European Command, carrying out Air Force responsibilities of the Military Assistance Program in the European area, providing command-wide aeromedical service, and operating air search and rescue missions from the North Atlantic to the Indian Ocean.

The Congo Airlift was mounted July 15, 1960, at the request of the United Nations in support of efforts to establish order from chaos in the newly formed African republic. To do the job, the 322d Air Division of USAFE was given operational control of the mission. By the first anniversary of the lift, July 1961, MATS-provided C-124 Globemasters and USAFE C-130 Hercules transports had completed 1,106 sorties, hauling more than 12,000,000 pounds of cargo and 42,483 passengers, including almost 38,000 United Nations' security troops from seventeen nations to or from the Congo. The Europe-Congo round-trip airlift distance for C-130s is 7,112 nautical miles. The lift is expected to continue on a support basis as long as UN personnel are required in the Congo.

As the tensions of the cold war increased in the European area in the wake of Russian demands for a separate East German peace treaty, USAFE continued its ten-year-old major mission of keeping men and aircraft in combat readiness, alert to any requirements levied by the US in support of its NATO allies.

As the largest national air arm committed in time of war to the North Atlantic Treaty Organization, USAFE has the equivalent of fourteen combat and transport wings dispersed among its more than 500 installations.

Combat capability of the command was increased in May 1961 when USAFE's first wing of F-100 Supersabres began conversion to the Mach 2 all-weather F-105. Additional wings are scheduled for conversion during the next twelve months. At almost the same time, the command declared the eighteen-month conversion of its fighter-interceptor units from F-86D Sabrejets to F-102 Delta Daggers complete when the 32d Fighter-Interceptor Squadron in the Netherlands and squadrons of the 65th Air Division in Spain were equipped with the supersonic craft.

Meantime, on July 1, 1961, USAFE simplified command channels for the majority of its tactical forces when it transferred command control of its five tactical wings in the United Kingdom from Headquarters, Third Air Force at South Ruislip, England, to Headquarters, Seventeenth Air Force at Ramstein. The move now allows the Commander of Seventeenth Air Force to have direct authority to operate not only his own NATO-committed squadrons in Germany, France, and Italy, but those in England as well.

This is of great importance to the US NATO air

mission since the majority of the Seventeenth Air Force aircraft would fight a NATO war as members of the Fourth Allied Tactical Air Force, a major air arm of Allied Forces Central Europe.

Fourth Allied Tactical Air Force is composed of US, Canadian, French, and German air units. Under the NATO command structure, the Commander in Chief of the United States Air Forces in Europe is also Commander of the Fourth Allied Tactical Air Force.

Headquarters of the United States Air Forces in Europe are located at Lindsey Air Station, Wiesbaden, Germany, a mere eight minutes of flying time from the Iron Curtain. Gen. Truman H. Landon is Commander in Chief. A West Point graduate with the Class of 1928, he succeeded Gen. Frederic H. Smith, Jr., on July 2, 1961, when General Smith was transferred to Washington as USAF Vice Chief of Staff.

In addition to the Third and Seventeenth Air Forces, USAFE's major subordinate commands include the 322d Air Division, headquartered at Evreux/Fauville Air Base, France; the United States Logistic Group (TUSLOG) at Ankara, Turkey; the 2d Air Division at Dhahran, Saudi Arabia; and the 65th Air Division in Spain.

As evidenced by its Congo Airlift record, the 322d is a versatile transport force with airborne assault, air resupply, air evacuation, and logistic capability. In addition to its regular military transport assignments, the division has participated in nearly a score of international disaster-relief missions since its activation seven years ago.

TUSLOG is responsible for sustaining and maintaining all US forces and activities in Turkey and has additional responsibilities in Greece.

The 2d Air Division maintains the Saudi Arabian airfield at Dhahran and supports the US Military Training Mission working with the Saudi Arabian armed forces. The 2d Air Division is scheduled for inactivation early in 1962 following expiration of the Dhahran Airport agreement, as a result of a Saudi decision this year against renewal. Withdrawal from Dhahran will have no military effect on the command. No USAFE combat forces are stationed at Dhahran.

The main training for USAFE's NATO-committed, Europe-based tactical forces is furnished by the 7272d Air Base Wing at Wheelus Air Base, near Tripoli, Libya. There, with wide open spaces, year-round good flying weather, and well instrumented ranges, USAFE's tactical forces deploy throughout the year to maintain proficiency in bombing, gunnery, and rocketry.

USAFE's tactical units are trained to participate in joint maneuvers conducted by SHAPE, the Supreme Headquarters Allied Powers Europe, or its subordinate commands. They are also subjected to surprise alerts several times each year at which time they are given simulated wartime missions and their performance is evaluated.

In addition to the F-105 Thunderchief and the F-102 Delta Dagger, the USAFE arsenal of tactical aircraft includes the F-100 Supersabre and the 1,200-mile-per-hour Voodoo, introduced to the theater during 1958. An F-101 Voodoo wing is stationed in England, and RF-101 reconnaissance versions of the lightning-fast aircraft are in France. The newest USAF fighter-interceptor in Europe is the F-104 Starfighter on rotational duty from the Tactical Air Command and assigned to USAFE's 65th Air Division in Spain. The F-104 can fly at speeds of 1,400 miles an hour at altitudes of more than 90,000 feet.

All-weather B-66 tactical bombers and their reconnaissance twin, the RB-66, are both stationed with units in England.

In Germany, the 38th Tactical Missile Wing is converting its all-weather TM-61 Matador missile groups to the newer TM-76 Mace. TM-61s, which carry tremendous striking power in their pointed warheads, entered service with USAFE in Germany in 1954 and for a time were the only operational guided missiles in the Air Force inventory. Placed in alert posture on a twenty-four-hour watch, the missiles are dispersed throughout central Germany and could be fired at any time regardless of season, hour, or weather conditions.

Other aircraft in the USAFE arsenal are: T-29 and T-33 trainers; transports ranging from the four-engine C-130 and C-124 Globemaster to two-engine C-130s and the famed C-47. There are also H-19 helicopters and SA-16 amphibians used in rescue work. C-131A Samaritan transports are available for aeromedical evacuation of patients to hospitals in the USAFE area.

In addition to its defense role, USAFE must pro-

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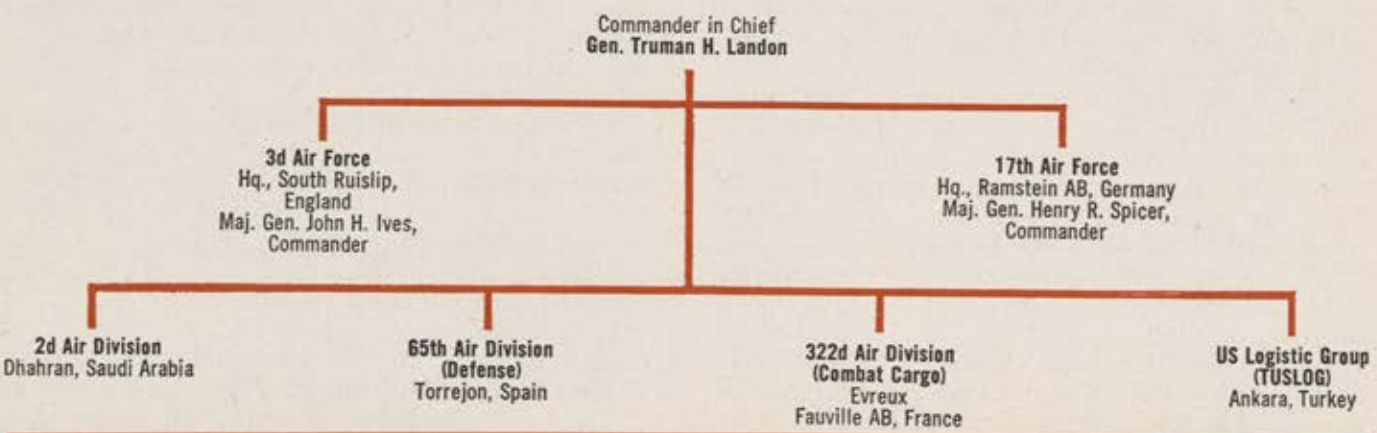
UNITED STATES AIR FORCES IN EUROPE
Headquarters, Lindsey AS, Wiesbaden, Germany



View of F-105 at Bitburg, Germany.

Congo Airlift, utilizing USAFE and MATS planes, was year's major USAFE operation.

vide logistical support for approximately 230,000 people. This includes an assigned military strength of more than 65,000 personnel plus an additional 50,000 assigned to other major air command units serving in Europe, including Strategic Air Command, Military Air Transport Service, Air Force Logistics Command, Tactical Air Command, the Air Force Communications Service, and others. There are also more than 1,800 US civilian employees and some 11,500 foreign civilians.

USAFE's area of interest sweeps in a giant arc over an estimated 17,500,000 square miles from the British Isles and Scandinavia through Western Europe to North Africa, the Mediterranean, the Middle East, Saudi Arabia, and east to Ceylon and Pakistan. In some areas, the command is responsible only for support of US air attachés. Its greatest responsibility is in the more populous and strategic regions of Europe, North Africa, and the Near East.

Missions for the USAFE command are directed by the US Air Force Chief of Staff from Washington in matters of Air Force policy and command over assigned units. However, as a component unit of the US European Command, which is made up of the US Army, Navy, and Air Force in the European area, USAFE is also under authority of the Commander in Chief, US European Command (CINCEUR), with headquarters at Camp des Loges, near Paris, France. Finally, as the US air arm committed to the powers of the North Atlantic Treaty Organization in time of war, USAFE NATO missions would be directed by the Supreme Headquarters Allied Powers Europe (SHAPE) near Paris.

US Air Force Gen. Lauris Norstad is both CINCEUR and Supreme Allied Commander. During peacetime, US CINCEUR handles joint planning and policy for all three US services. SHAPE is the wartime command set up under the North Atlantic Treaty Organization, which includes the armed forces of all fifteen NATO nations.

The Air Force has long recognized that military training and weapons alone are not enough to build and sustain maximum effectiveness of operation. It is a modern military truism that any unit must have the acceptance and cooperation of the people of the country and community in which it is stationed.

Conscious of the paramount necessity of promoting good will between Air Force personnel and local nationals, USAFE has given great attention to the development of a realistic, command-wide community relations program.

USAFE units in host countries maintain positive and varied programs promoting good relations between US personnel and the local community. Sometimes these contacts are established out of mutual interest in the health and safety of Air Force people and their neighbors. Often they are social or sporting events or simply informal get-togethers.

Each USAFE base supports an active community council to enable the base commander and his staff to meet regularly with key local civic leaders such as

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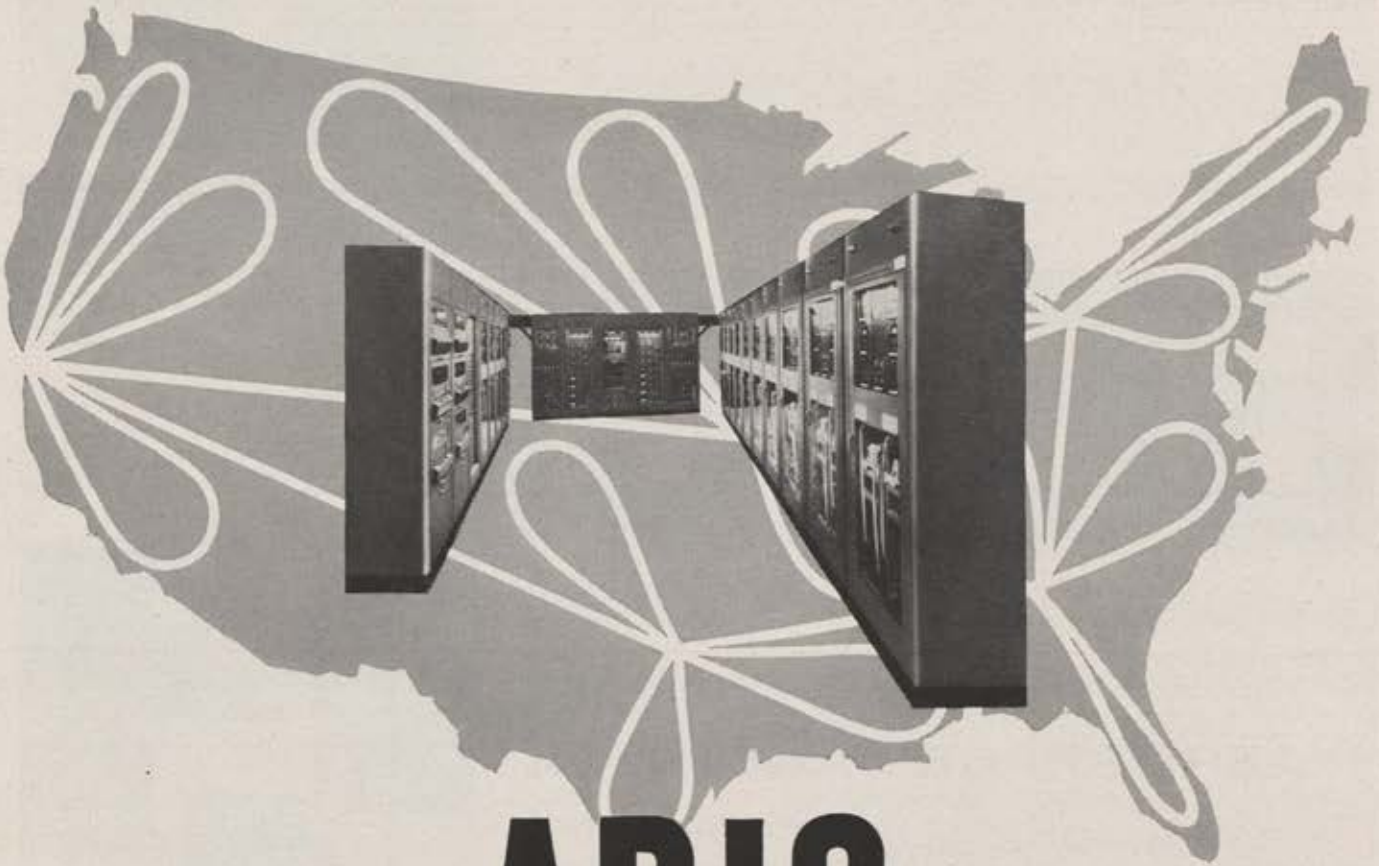

ADIS

Communications breakthrough

New Teletype Automatic Data Interchange System (ADIS) now enables the Federal Aviation Agency to interchange aviation weather data coast-to-coast ten times faster than ever before.

With this new electronic message switching system, the FAA effects a major advance in the speed, scope and flexibility of its weather communication service—which supports all civil and extensive military aviation in the United States.

Nucleus of the system is a series of five Interchange Centers, located in Kansas City, Cleveland, Atlanta, Fort Worth and San Francisco. Each of these acts as a clearing house for a number of area circuits, or outlying "loops," collecting data from observation points on these loops and providing the area circuits with data from other parts of the country.

Teletype electronic communications equipment at the Interchange Centers carries out an automatic program of sequentially calling data-originating stations, classifying messages by priority, selecting only those weather items wanted at regional stations, and delivering them to the area circuits—while maintaining the ability to handle emergency traffic when required.

Ultra-fast communication between Interchange Centers is provided by Teletype punched tape equipment operating at 850 words per minute, utilizing the DataPhone concept. Stations on outlying loops are equipped with Teletype Model 28 page printer and punched tape units. Speed-conversion equipment permits automatic interoperation between the national circuit and the local loops. Thus the new system, which serves some 2,400 locations, can report weather conditions from any part of the country in a matter of minutes.

The FAA, through the years, has followed a program of continually upgrading its facilities to meet the needs of the nation's growing air traffic. Teletype Corporation is proud of its part in providing communications equipment for this vital service.

See systems applications of Teletype equipment at the AFA Show, booths 818-820

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THE Bendix CORPORATION

the mayor, chief of police, fire chief, health authorities, and traffic experts. The councils have a high score of success in anticipating or correcting situations which might have led to local friction.

Base and foreign community traffic experts cooperate on safety programs designed to cut down traffic accidents—a grave problem area for Americans unaccustomed to European driving habits. Local health authorities meet with Air Force doctors to combat problems touching their area of interest.

Equally important in creating and maintaining friendship between USAFE personnel and local population are the numerous events and occasions which bring them together. Local community friends are introduced to American holidays. The Fourth of July is sometimes celebrated by inviting members of communities to special programs on USAFE bases. Halloween and Thanksgiving provide opportunites to entertain local orphans in the tradition of these two holidays. Armed Forces Day and base open houses draw crowds of up to 60,000 people to European bases.

Christmas finds almost every USAFE unit organizing special parties for the needy or handicapped.

Children, with their special talent for making friends, often outdo their parents when it comes to getting to know their neighbors. Host nation and American Boy and Girl Scouts often participate in joint activities. Still more of the youngsters are brought together in programs sponsored by schools and American Youth Activities.

Whenever possible, USAFE honors requests for Air Force bands to play at local community events. Occasionally, there are requests involving the use of USAFE equipment not otherwise available to the small communities.

The good-will gestures have not all been generated by only the American side. One of the best examples of a host country's desire to cooperate with their American allies is furnished by German-American Friendship Week. During this week in May, jointly sponsored events such as religious get-togethers, sports events, concerts, dances, and entertainment are offered.

Among the events staged during a recent Friendship Week was a sports carnival in which athletes from Wiesbaden Air Base and surrounding communities met at Wiesbaden's Sportshalle for events that included fencing, badminton, and weight lifting. In addition, a thousand people were on hand at Wiesbaden Air Base to see a combined Air Force-Army soccer team defeat the Wiesbaden police team—a feat seldom seen in soccer-happy Germany.

Also during the Friendship Week, 220 French, German, and American musicians participated in the International Music Festival which raised a large sum of money for SOS-Kinderdorf, the orphans' village at Eisenberg, Pfalz, Germany.

Immense changes in both weapons and mission have occurred in USAFE since its activation on August 7, 1945, as the successor to the wartime US Strategic Air Forces in Europe.

By the end of February 1946, 180,000 Air Force personnel had been redeployed to the United States. Disarmament of the defeated Luftwaffe was completed in the spring of the same year. Huge stocks of surplus Air Force property located in half a dozen countries were inventoried for disposition and the job was finally completed at Erding Air Depot, Germany, in 1947.

As USAFE settled down to its peaceful postwar duties, Soviet forces in eastern Europe were giving indications of anything but a peaceful intent.

It was the fall of Czechoslovakia in early 1948 that shocked the free world into a full realization of the dangers of international communism. Then, on June 23, 1948, the Soviets proclaimed Berlin a part of the Soviet Zone of Occupation and blockaded the city.

The West answered with the most dramatic sustained action in the history of siege warfare, the Berlin Airlift. During the next fifteen months, nearly two and a half million tons of supplies were flown into Berlin in almost 300,000 flights. This gigantic task was carried out by the joint and combined Airlift Task Force, made up of men and aircraft from USAFE, MATS, Britain's RAF, and the US Navy air arm, while French military forces provided essential operational support.

Soviet authorities capitulated on May 12, 1949, by lifting the blockade. But it was soon clear that USAFE's international responsibilities had not ended with the airlift.

In April 1949, the North Atlantic Treaty Organization (NATO) was formed to pool the resources of North American and European nations determined to protect their freedom.

The NATO members had some fourteen divisions and less than a thousand aircraft on the continent of Europe when the alliance was formed. These were confronted by approximately twenty-five Red divisions stationed outside the Soviet Union, supported by nearly 6,000 aircraft available for immediate attack.

Representatives of the NATO countries requested President Truman to designate Gen. Dwight D. Eisenhower to serve as Commander of the NATO forces.

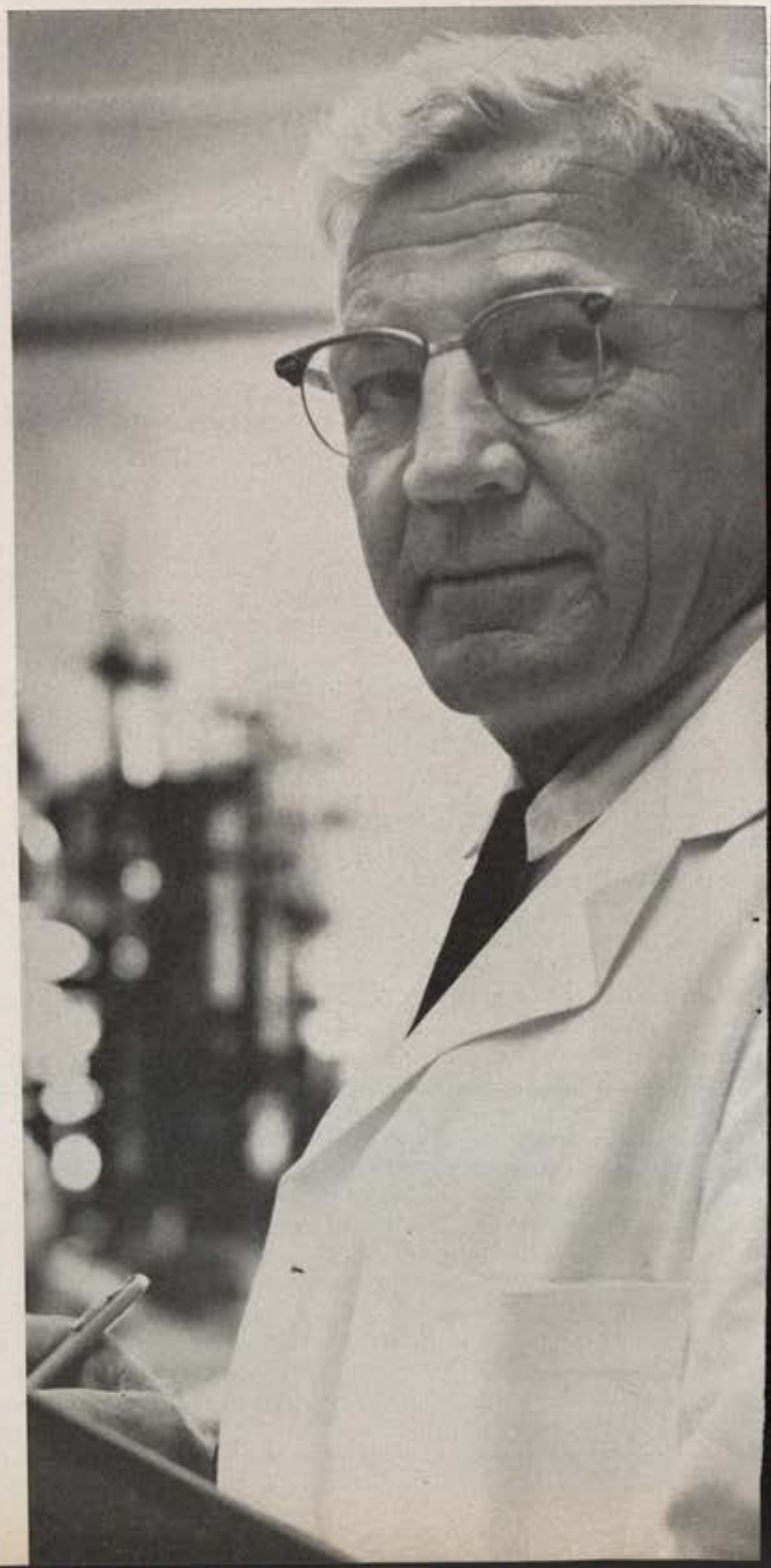
Within months General Eisenhower established a unified command, unprecedented in time of peace, which had authority to ensure that the national forces allocated by NATO countries to Supreme Headquarters Allied Powers Europe (SHAPE) were properly trained and could be assembled into an effective, integrated defense force.

Soon afterwards, additional Air Force units began to arrive from the US to bolster NATO forces. USAFE's buildup was rapid in the years to follow, as tactical units arrived or were activated within the command to meet NATO requirements.

Today, not only are USAFE's combat wings NATO-committed, but all Air Force units within the command are designed to support NATO's wartime capability.

It is USAFE policy that every plan, operation, mission, or major action reflect the command's clear intent to support the Supreme Allied Commander in defense of the Atlantic Alliance.—END

Almost all global strategists are enthused about



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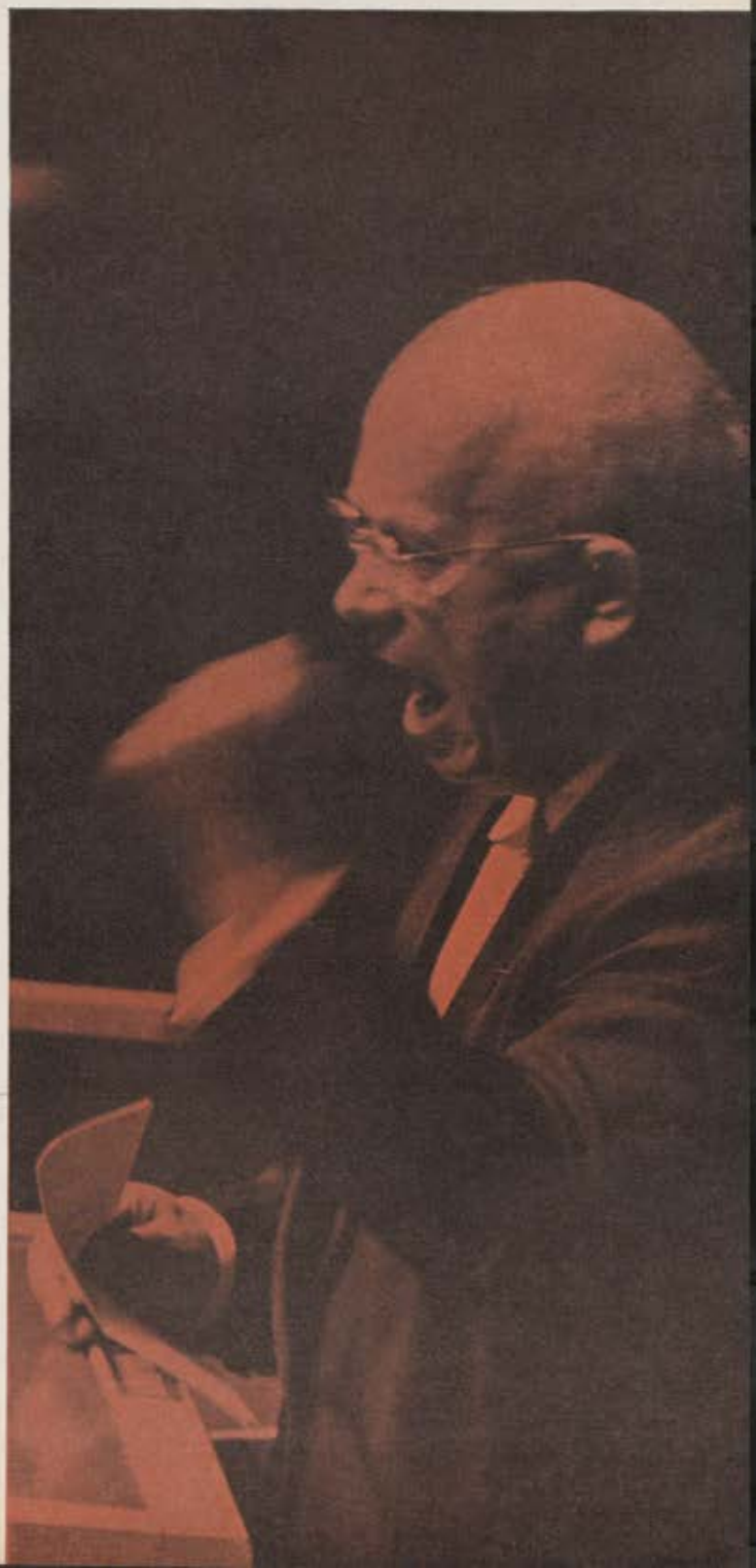

Lt. Gen. Robert M. Lee assumed command of the Air Defense Command in March 1961. Previous Commander was Lt. Gen. Joseph H. Atkinson. General Lee, ADC Vice Commander since 1959, had been Chief of Staff of the UN/US Command in Korea and commanded the Fourth Allied Tactical Air Force in Europe. He served in the ETO in the second World War.

"A long step forward in the aerospace defense of North America" highlighted the past twelve months for the highly trained, impressively equipped, problem-beset . . .

AIR DEFENSE COMMAND

THE most significant development in the Air Defense Command during the last year was that ADC entered the space field. It thus became truly an *aerospace* defense force, combining traditional defense responsibilities with new and far-out tasks undreamed of a few short years ago.

In March 1961, Lt. Gen. Robert M. Lee, ADC Commander, activated the first Aerospace Surveillance and Control Squadron at Ent AFB, Colorado Springs, home of ADC Headquarters. The new squadron is being manned, trained, and equipped by the Air Defense Command. It will serve under the operational control of the North American Air Defense Command (NORAD), whose Commander in Chief, Air Force Gen. Laurence S. Kuter, describes the squadron as providing "a long step forward in the aerospace defense of North America."

Scientists predict that within ten years some 8,000 objects will be orbiting the earth. These will include not only satellites but burned-out booster engines and other objects classified generally as space trash. These objects must be watched so that new or suspected hostile objects can be readily detected. This is the task that the Space Detection and Tracking System (SPADATS) is designed to perform. The new ADC squadron mans and technically operates the data-processing and computing center of this system for NORAD.

To expand its space capability further, ADC in July 1961 activated the 9th Aerospace Defense Division, to take over global responsibility for the command and technical operation of all ADC space surveillance systems. This includes the new surveillance and control squadron and the Ballistic Missile Early Warning System (BMEWS), two sites of which are already operational and providing data to the NORAD Combat Operations Center. A third site is under construction. When satellites of the Midas missile-detection type are operational, these, too, will be a responsibility of the 9th. Thus all necessary machinery is now in existence and plans and operations are going rapidly forward to assure the efficient discharge of ADC's new responsibilities in space.

Speaking of the SPADATS system, General Kuter said recently, "This data, along with important information from a variety of other sources, forms the basis of judgment and aerospace defense action by NORAD."

As the Commander of ADC, General Lee has a dual responsibility. He reports to the Chief of Staff, USAF, as a major air commander, and he reports to CINCNORAD as a component commander of the NORAD integrated Canada-US command. The Commander in Chief, NORAD, is responsible for the operational employment of all forces assigned to aerospace defense by the Army, Navy, Air Force, and Royal Canadian Air Force.

As the commander of all USAF component aerospace forces in NORAD, General Lee is responsible for discharging USAF responsibilities for aerospace defense, including organizing, equipping, and training all USAF forces so that they will be responsive to the operational needs of CINCNORAD.

The resources contributed by USAF to aerospace defense through ADC are impressive, comprising more than 110,000 people and a total capital investment of nearly $7 billion, including early-warning systems and weapons extending from the Arctic to the Rio Grande and for hundreds of miles to sea off both ocean coasts.

ADC's ground radars may be found almost anywhere from the top of the continent to the Mexican

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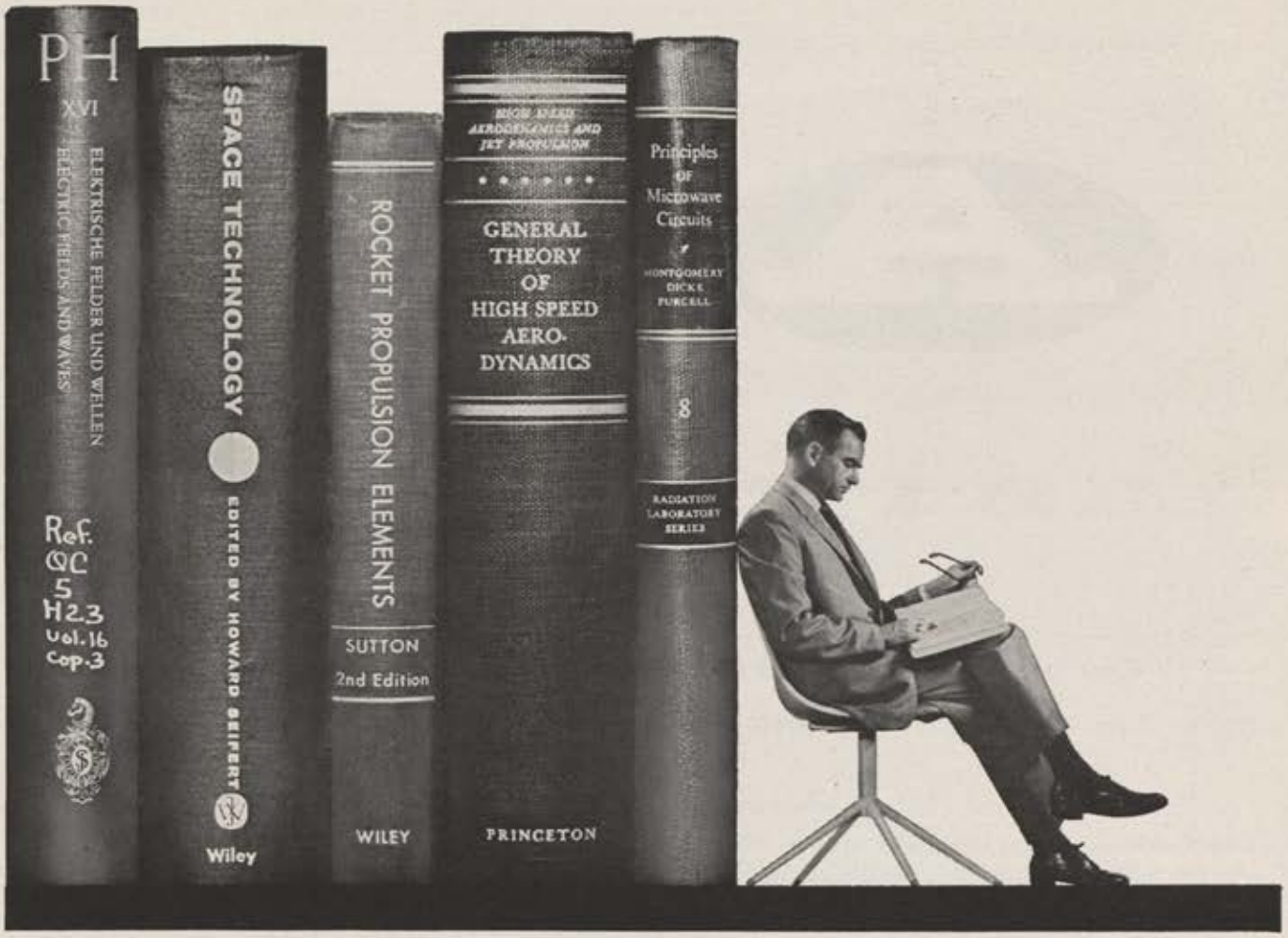

scientists and engineers in a unique leadership role

The frontiers of space science and technology are being expanded at Aerospace Corporation. The scientists and engineers of this leadership organization are the critical civilian link uniting government and the scientific-industrial team developing space systems and advanced ballistic missiles. In providing broad scientific and technical leadership to every element of this team, they are engaged in a balanced program of activities spanning the spectrum from basic research and forward planning through general systems engineering. Included in the latter are technical supervision, integration and review of the engineering, development and test operations of industry to the extent necessary to assure achievement of system concept and objectives in an economical and timely manner. These people are privileged to view both the state-of-the-art and system development in their totality. Now more men of superior ability are needed: highly motivated scientists and engineers with demonstrated achievement, maturity, and judgment, beyond the norm. Such men are urged to contact Aerospace Corporation, Room 107, P. O. Box 95081, Los Angeles 45, California.

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border. Northernmost of the lateral bands of radar stations are the Distant Early Warning (DEW) Line and BMEWS. The DEW Line extends from the Aleutians to Greenland and is capable of detecting any manned bomber choosing the polar route.

To the south of the DEW-BMEWS lines is the joint Canadian-American built and financed Pinetree System stretching across the continent from British Columbia toward an extensive concentration of radars in eastern Canada. The radar coverage provided by the Pinetree System merges into that emanating from radars in the US, thus providing contiguous radar coverage hundreds of miles north of the joint border.

The bulk of ADC's radar resources lies within the United States. Here several hundred radars ranging from multimegawatt giants to small unattended "gap-fillers" dot the map. The stations occupy a wide variety of geographical sites, from well populated communities to isolated mountaintops.

As this vast radar and communications network grew, it became obvious that human reaction time was too slow to handle it. To supply the speed and accuracy needed, the Semi-Automatic Ground Environment, or SAGE, system was developed.

Today the USAF SAGE system is almost complete. In more than twenty locations in the United States great blockhouses stand, containing incredibly intricate electronic digital computers designed to receive, analyze, store, transmit, and display aerospace defense data of all kinds, minimizing the human element in the handling of combat data.

The very heart of the entire aerospace defense system is the NORAD Combat Operations Center at Ent AFB. This hemispheric nerve center is now above ground. First steps were taken by USAF in the summer of 1961 to construct an impregnable underground shelter for it under Cheyenne Mountain in the Rockies near Colorado Springs. When this underground Combat Operations Center is completed, the data-processing and display elements of SPADATS and other aerospace systems will be moved to this safer location.

The most conspicuous change in the category of weapons in the past year has been the introduction of Bomarc air defense missiles in appreciable numbers into the ADC inventory. The first operational Bomarc

Airman at radarscope: Working symbol of ADC vigilance.

IM-99A squadron joined the defense system in 1959. Today, there are six more Bomarc units, two armed with the better-performing IM-99B version of the missile. The ability of Bomarc to do the job for which it was designed has been amply proven in numerous test firings.

Among manned interceptors, the past year has seen continued progress in streamlining the inventory toward newer, faster, and deadlier aircraft—the F-106A, the F-101B, and the F-102A. Replacement of older planes has been accompanied by modification of newer types aimed at better performance in flight, control, and firepower. Modification has been followed by rigorous testing at ADC's Weapons Center at Tyndall

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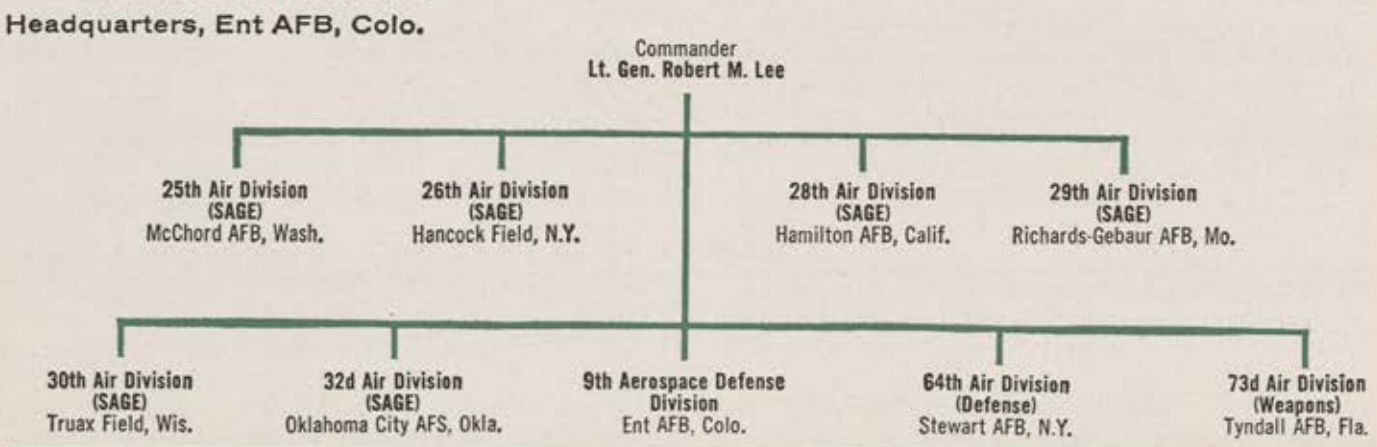

Scramble! For ADC's at-the-ready crews, that race to the cockpit means into the air, ready for combat, in minutes.

AFB, Fla., where manned interceptors and pilots are put through their arduous paces.

The extent to which planned modernization of the fighter force has been completed was indicated in July 1961, when General Lee accepted the last of the presently planned F-106As at the General Dynamics plant in San Diego.

In addition to its regular units, ADC trains twenty-five squadrons of Air National Guard fighters. These forces are maintained at a high state of operational readiness. At this writing, they are on twenty-four-hour alert. ADC considers its ANG units as a vital element in its total air defense capability.

The relationships among ADC, NORAD, Strategic Air Command, and the Office of Civil and Defense Mobilization (OCDM) are particularly close and continuing. In the event of attack SAC would be alerted by NORAD's military warning net, and NORAD fighters and missiles would be directed against an enemy who would undoubtedly be heading for SAC bases. Simultaneously, the civil defense people who sit in the NORAD Combat Operations Center would be flashing the warning over their own network to the civilian population. In fact, as well as in theory, offense and defense thus constitute a single team to provide deterrence or, if need be, survival.

The threat which this nation faces—and which our air defenses must counter—is a dual threat, consisting of manned bombers *and* ballistic missiles. It has been the consistent endeavor of the Air Force, ADC, and NORAD to build defenses against both aspects of the threat. Maintaining defenses against manned bombers while concurrently building defenses against missiles is unquestionably an expensive endeavor. But the manned bomber, while it may become a secondary threat, is still a fatal threat against which adequate defenses are mandatory.

The wisdom of this position was demonstrated early in July 1961, when the USSR showed publicly at Moscow an array of new aircraft for the Soviet Air Force, including a bomber of the Mach 2-plus variety.

The other part of the threat—the ballistic missile portion—is still a matter of deep concern to everyone in the air defense business. Half of ADC's four basic functions—detection and identification—are on the way to being satisfied in the space age. The other half—interception and destruction of ballistic missiles—is still a matter of urgent priority. An adequate area-type defense against missiles is a must.

Though the past year has witnessed many changes in fact and theory in aerospace defense, ADC has never lost sight of its primary objective: to provide CINCNORAD with an aerospace defense force fully abreast of the latest technological know-how and geared to react instantly and effectively to any threat against the North American continent.—END

NAVIGATION OF TACTICAL AIRCRAFT

To reach the target — deliver the payload — and return home safely under all weather conditions are prime objectives of the tactical aircraft's mission. Required operating factors include speeds up to Mach 2, accurate navigation over land and water, from the deck to 70,000 feet, and greatest possible freedom from detection. Positive, low-level target identification and utmost accuracy of the weapon delivery maneuver are also essential.

LFE has developed Doppler Navigation Systems that are especially suited to tactical aircraft. They are operable within scramble time — function in winds up to hurricane velocity — are unaffected by cloud and rain back-scattering — have low power outputs — are virtually impossible to detect, jam or decoy — measure ground track velocity to better than 0.2% — and are completely compatible with nav-bomb and fire control computers.

These operational characteristics combined with lightest weight, minimum cubage, lowest power consumption, smallest antenna aperture, and adaptability to wing or fuselage mounting, establish LFE's Doppler Navigation Equipments as the ideal navigation systems for tactical aircraft.

Details on the characteristics of LFE's self-contained Airborne Doppler Navigation Systems are available in a series of LFE Technical Notes. Please address inquiries to Dept. PI-24.

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Systems, Equipment & Components for Airborne Navigation • Radar & Surveillance • Ground Support • Hydraulic Control
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Maj. Gen. Wendell W. Bowman succeeded Maj. Gen. C. F. Necrason as Commander, Alaskan Air Command, in July 1961. He previously commanded the 33d Air Division (SAGE), served as USAF's Deputy Director of Communications, was instrumental in creation of the Air and Airways Communication Service, now part of the new AF Communications Service.

USAF's second BMEWS station went into operation in early 1961 at Clear, Alaska, heightening the strategic contribution of America's northernmost state . . .

ALASKAN AIR COMMAND

THE Alaskan Air Command, with its headquarters at Elmendorf AFB, Alaska, has a fourfold responsibility—early-warning, air defense of Alaska, support of SAC in Alaska, and support of special projects assigned by the Department of Defense.

The important warning aspect of the mission stems from Alaska's strategic position, a few miles of ocean and air away from the Soviet Union. Alaska is also, because of its Arctic climate, an excellent laboratory for cold-weather research projects and exercises.

The Alaskan Air Command is the air arm of the unified Alaskan Command, which also includes the US Army, Alaska, at Fort Richardson, and the Navy's Alaskan Sea Frontier at Kodiak. For air defense matters, the Commander of the Alaskan Command is also Commander of the Alaska NORAD Region. The region includes the entire state of Alaska. Operational control of this region is the responsibility of AAC.

• A significant development for the command during the past year was the completion of a Ballistic Missile Early Warning System (BMEWS) site at Clear, Alaska. BMEWS is the first major electronic system designed exclusively for the missile and space age. The Alaskan BMEWS site is linked with two others providing protection from attack over the polar regions—one in operation at Thule, Greenland, and the other under construction at Fylingdales Moor in England. Long in operation in Alaska have been Alaska's DEW Line and ground control radar sites. Information is relayed to Elmendorf's Combat Operations Center. Elmendorf is also the home base for Alaskan-based interceptor aircraft.

• In conjunction with the BMEWS site at Clear, a Rearward Communications System was installed during the year to ensure uninterrupted immediate electronic alarm direct to the North American Air Defense Command Headquarters at Colorado Springs, Colo.

• Another project of great significance in recent months was the establishment of a Midas missile-detection satellite-tracking station. Midas is, of course, in developmental status at present.

• Attracting considerable attention was the AAC-supported International Geophysical Year project at Ice Island Bravo located about eighty miles north of Point Barrow. This station continues to contribute weather and oceanographic data.

• There were major air defense changes during the year. The 11th Air Division at Ladd AFB was deactivated. The 5010th USAF Hospital and Arctic Aeromedical Laboratory at Ladd remained in operation. Ladd's aircraft control and warning sites and the 317th Fighter-Interceptor Squadron were placed under the operational control of the newly created 5070th Air Defense Wing at Elmendorf.

At Elmendorf, in a parallel move, the 10th Air Division was also deactivated. Two wings were created —the 5040th Air Base Wing and the 5070th ADW. The 5040th assumed the responsibility of supporting the 5070th.

• Strategic Air Command "Operation Reflex" elements provide USAF with vital offensive capabilities from Alaskan soil. AAC supports SAC in maintaining its guard around the clock.

• The importance of cold-weather testing and arctic operations is apparent when one notes the large portion of the earth which falls into subarctic and arctic climatic conditions. AAC's Arctic Aeromedical Laboratory seeks ways and means to better the living, working, and survival conditions of men in arctic climates. In addition, Cold Weather Flight Test facilities located at Eielson AFB, working in conjunction

(Continued on page 127)

revolutionary built-in rotor blade inspector

Opens the way to unlimited blade life...cuts 2-hour blade inspection to a mere 20 seconds

Now, the long sought goal of unlimited helicopter blade life is in sight. The exclusive Sikorsky development that makes this possible is called BIM—Blade Inspection Method. Here's how it works: all Sikorsky rotor blades will be filled at the factory with compressed air. Mounted on each blade—a gauge that keeps track of the blade's structural integrity round the clock by signaling any drop in air pressure. A glance at the pressure gauges tells you more about blade condition than you used to learn from two painstaking hours of conventional inspection. This new system, available on all new Sikorsky blades, can also be installed on Sikorsky blades now in use. For full information, write or call Sikorsky. **Sikorsky Aircraft**

Division of UNITED AIRCRAFT CORPORATION, Stratford, Connecticut

To pinpoint a NASA payload

on the moon... requires Motorola systems reliability

CALTECH'S JPL RANGER, to carry research instrument packages to the moon, will rely upon precision design, construction, testing and performance of Motorola electronic equipment. Comprehensive measurements of operational and navigational data aboard will be assembled for transmission by its Flight Data Encoder. An all solid state Transponder generates the telemetry carrier, receives ground commands, and translates carrier frequencies for two-way Doppler velocity measurements. ☆ In laboratories and at launch site, Payload Test Sets will check out the spacecraft RF communications system. At NASA's transmitter and receiver sites, Calibration Beacons will check command transmitter performance and radiate precise signals to test telemetry receivers. ☆ Motorola's participation in Ranger lunar probes demonstrates its space communications capabilities for frontier programs.

Military Electronics Division **MOTOROLA**

Qualified technical personnel are invited to apply

CHICAGO 51, Illinois, 1450 North Cicero Avenue
SCOTTSDALE, Arizona, 8201 East McDowell Road
RIVERSIDE, California, 8330 Indiana Avenue

C-123s bring welcome mail, supplies to remote AC&W sites.

Ten stories high, BMEWS antennas stand their vital vigil.

with the Air Force Systems Command tests aircraft and equipment under actual cold-weather conditions.

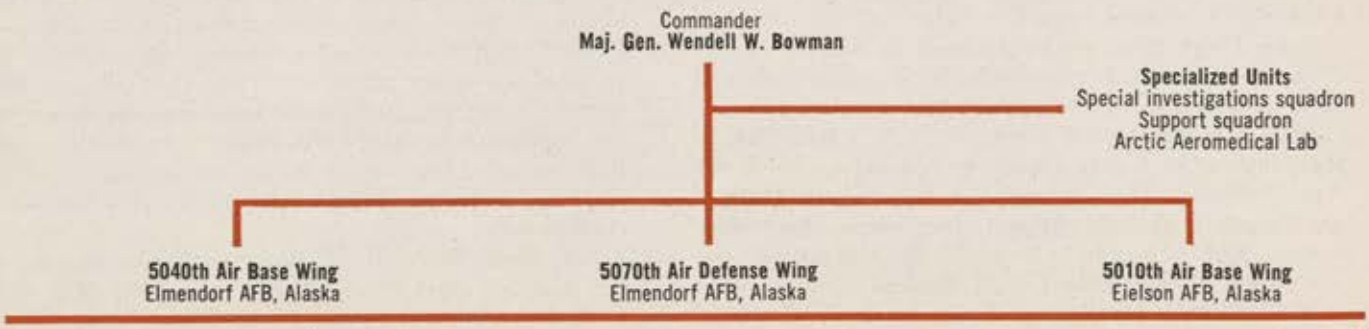
• Air support was given to the US Army Operation Willow Freeze which furthered the capability of our forces to operate in extreme cold. Air Reserve and Air National Guard units from the "South 48" were mobilized for this exercise. Landing at Elmendorf, these units established an operations section which, supported by AAC elements, carried out most of the flying requirements of the operation. The visiting units were the reserve portion of Tactical Air Command's striking force which took advantage of the valuable training for cold-weather operations in Alaska. AAC supported a wide variety of air mobility forces during the year.

• The vast communications systems within AAC were tied into the new organization of the Air Force Communications Service on July 1. Historically, communications in the Arctic and subarctic regions have been highly unreliable. Severe weather is a constant hazard to landlines and buried cables. Adverse atmospheric conditions have a serious effect on ordinary radio operations.

Circumventing these problems, AAC boasts a highly reliable communications system known as White Alice. White Alice is a radio relay system using over-the-horizon transmission known as "forward propagation tropospheric scatter." Ultra-high-frequency radio beams leap 200 miles in a single stride carrying

(Continued on following page)

ALASKAN AIR COMMAND
Headquarters, Elmendorf AFB, Alaska



Continuing mission: The air defense of the state of Alaska is the vital job of these F-102s, ready here for any action.

many voices and telegraph messages simultaneously, with the same audio quality as local telephone conversations.

- In advancing the public knowledge of the Air Force aerospace program, AAC supported the Civil Air Patrol's Aerospace Workshop held at Elmendorf. Dr. Roland H. Spaulding, Professor Emeritus of Education at New York University, and rocket pioneer Dr. Wernher von Braun spoke to a group of Alaskan educators who will spread a wider understanding of the Air Force program to students in Alaska. In addition to the workshop program both spoke to several civic groups and public gatherings.
- A decided interest by Alaskans was indicated in the all-time high attendance record set at the 1961 Armed Forces Day program at Elmendorf. With a great deal of aircraft support from many other commands, AAC was able to boast the biggest crowd ever assembled at one gathering in Alaskan history.
- Once each year, when the ice pack recedes from the Arctic Coast, AAC remote stations are stockpiled with nonperishable supplies. Called Project Mona Lisa, the massive civilian contract operation delivers materiel ranging from bulldozers to razor blades. As the big barges are towed through the Bering Straits and up the mighty Yukon, logistic planners are already preparing to marshal supplies for the next year's Operation Mona Lisa.

But Mona Lisa can never meet the full resupply needs of these remote stations. Storage facilities are limited, and there is a continuing requirement for perishables, spare parts, mail, etc. AAC flies a continuing airlift to meet the requirement. By this year, the whole supply matter was becoming virtually a routine matter. However, it might not appear so if we were to be starting from scratch under these northern conditions.

Maj. Gen. Wendell W. Bowman is Commander of the Alaskan Air Command. He succeeded Maj. Gen. C. F. Necrason during the year.—END

Beneath a field like this...

is a complex communications center

In minutes, an enemy attack could level some of our sprawling cities.

Because of this, the Bell System is now supplementing its great reaches of buried cable with a network of underground communications stations.

Under the protection of a thick earth and concrete cover, and away from major target areas, several Bell System communications centers are already in operation. Many more are to come.

The walls for these installations are huge, reinforced concrete slabs. Ventilation systems filter air so fine that even radioactive fallout cannot enter. Food and water are stockpiled. Living quarters are provided for all operating personnel.

These buildings are costly. Tough to build.

Yet, the Bell System recognizes that communications are the lifelines of our defense systems. And so we took the lead in establishing these underground centers with our own money.

There are many other ingenious projects in our "Survivability" program for America's communications. Many cannot be mentioned here.

Because of them, ambitious command, control and defense systems are feasible. And our vast existing network is available for further *tailor-made* defense communications.

BELL TELEPHONE SYSTEM

AMERICAN TEL. & TEL. CO. / WESTERN ELECTRIC CO. / BELL TELEPHONE LABORATORIES / 21 OPERATING COMPANIES

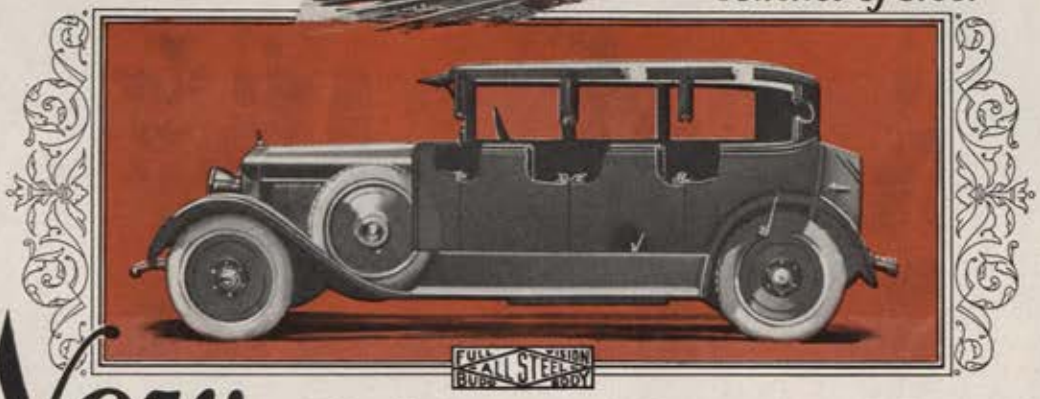
THE DE WITT CLINTON · 1831 · USED

Coaches of Wood

Progress!

THE BROADWAY LIMITED USES

Coaches of Steel



Now - *The Progress of Motoring is Marked by*

Motor Car Bodies Entirely of Steel

THE day of the *all-steel* motor car body is here—and here to stay—just as surely as this is the day of steel ships, steel trains, steel bridges, steel construction of all kinds. Steel gives motor car luxury real *backbone*. . .

1. SAFETY—You ride in luxury, *protected by steel armor*. Steel survives shocks that destroy wooden coachwork.
2. LONG LIFE—Steel outlives wood many times over—will not warp—is unaffected by weather.
3. FIREPROOF—On the road or in your garage, the all-steel body protects the car from risk of fire.
4. VISION—Steel eliminates bulky wooden corner posts that hide a complete car two seconds away.
5. BEAUTY—Steel can be shaped into beautiful body lines—and permits a high temperature, baked enamel finish.
6. ECONOMY—Steel saves wear and tear—lessens depreciation—cuts repair costs—and by saving weight, saves gasoline, oil and tires.

You will find Budd All-Steel Bodies standard equipment on some of the most popular motor cars in the world—and you will find a far more lasting satisfaction in owning one of these cars.

EDWARD G. BUDD MANUFACTURING COMPANY, PHILADELPHIA, PA.

BUDD

ALL-STEEL

MOTOR CAR BODIES

This advertisement appeared in The Saturday Evening Post on January 31, 1925, shortly after The Budd Company had researched, developed and built the world's first all-steel automobile bodies. Today, Budd's continuing tradition of leadership in creative research brings to the space age an unusual range and depth of capabilities in electronics, as well as in plastics and metals.

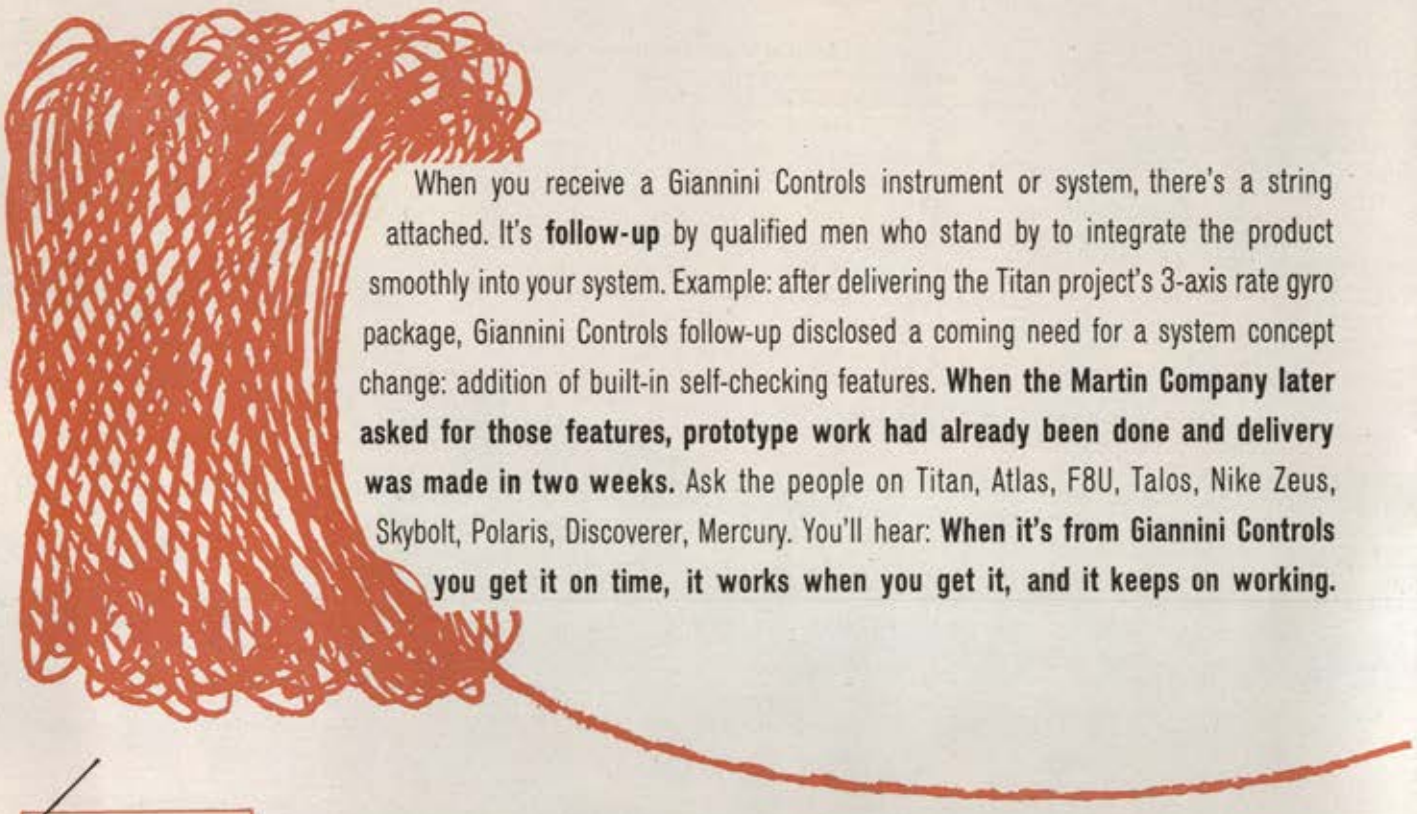
LEADERSHIP, 1961

SYSTEMS MANAGEMENT • DATA PROCESSING & DISPLAY • RF SYSTEMS
EARTH SCIENCES • ENVIRONMENTAL CONTROL SYSTEMS • PROPULSION
METALS TECHNOLOGY • MATERIALS RESEARCH • HUMAN ENGINEERING

See us at the Air Force Association Show in Philadelphia, September 21-25

Budd ELECTRONICS
A DIVISION OF THE BUDD COMPANY, INC.

FOLLOW-UP



When you receive a Giannini Controls instrument or system, there's a string attached. It's **follow-up** by qualified men who stand by to integrate the product smoothly into your system. Example: after delivering the Titan project's 3-axis rate gyro package, Giannini Controls follow-up disclosed a coming need for a system concept change: addition of built-in self-checking features. **When the Martin Company later asked for those features, prototype work had already been done and delivery was made in two weeks.** Ask the people on Titan, Atlas, F8U, Talos, Nike Zeus, Skybolt, Polaris, Discoverer, Mercury. You'll hear: **When it's from Giannini Controls you get it on time, it works when you get it, and it keeps on working.**

Giannini **Controls Corporation** 1600 South Mountain Avenue, Duarte, California

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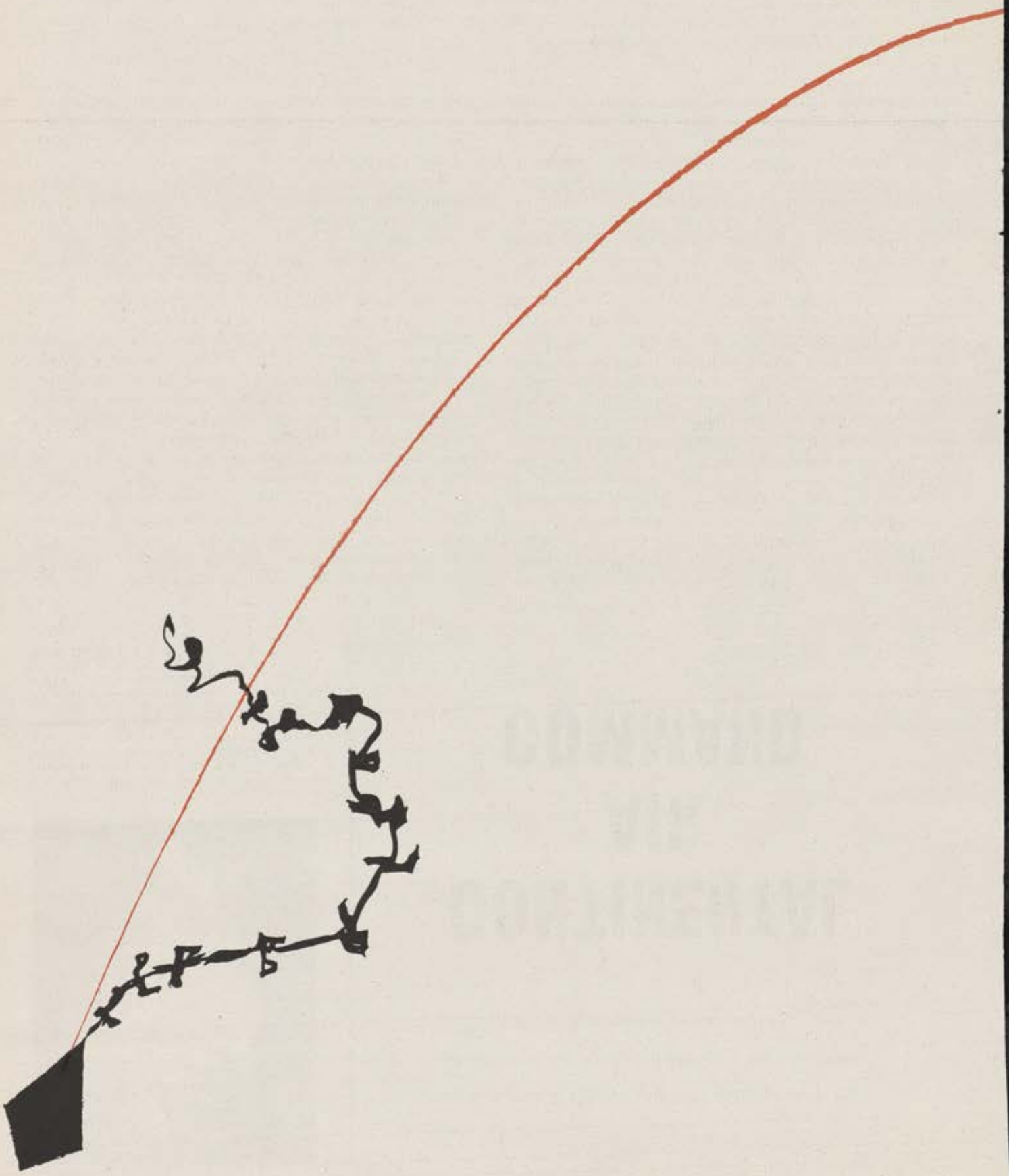
Plant locations: Duarte, Pasadena, Glendora and Glendale, California • Caldwell, New Jersey • Centerbrook, Connecticut • Berwyn, Pa. GCC 1-19



Lt. Gen. William E. Hall has commanded the Continental Air Command since 1957. He retires September 30. The new Commander will be Lt. Gen. Gordon A. Blake. General Hall served previously as USAF's Assistant Chief of Staff for Reserve Forces and as the service's Director of Legislative Liaison in 1950 and 1951. He saw duty in the ETO in World War II.

Under the "new Reserve concept" established in 1960, READY-NOW airlift and postattack recovery forces are the twin responsibilities of the . . .

CONTINENTAL AIR COMMAND

A streamlined CONAC, operating under a streamlined management plan, moved into a new streamlined headquarters at Robins AFB, Ga., on April 16, 1961. The move from Mitchel AFB, N.Y., carried with it a realignment of CONAC missions.

CONAC today has two primary jobs. One is the command of fifteen Reserve troop carrier wings. This force, with an impressive troop carrier potential, is trained and inspected by the Tactical Air Command. It would serve in TAC in the event of callup to active duty. The airlift potential was recently enhanced by USAF directive to begin the transition of some Reserve wings to the giant Douglas C-124 Globemaster.

All crews and planes of the C-119, C-123, and C-124 wings are on a READY-NOW basis. In one demonstration of readiness last year, Air Force Reserve crews flew twenty-one C-119 Flying Boxcars from Langley AFB, Va., to Agra, India. In another mass flight, Air Force Reserve crews flew more than forty C-119s from Dreux, France, to bases in the United States.

Developments in the latter months of 1961 underlined the vital mission these units have in peace or war. Two C-124 wings and five C-124 squadrons were named as "priority units for possible recall to active duty" in the new Berlin crisis. They were the 435th Troop Carrier Wing of Homestead AFB, Fla., commanded by Col. Forrest R. Harsh; the 77th Troop Carrier Squadron of Donaldson AFB, S. C., commanded by Col. Ben J. Mangina; the 78th Troop Carrier Squadron of Barksdale AFB, La., commanded by Lt. Col. William A. Payne; the 442d Troop Carrier Wing of Richards-Gebaur AFB, Mo., commanded by Col. C. D. Daily; the 305th Troop Carrier Squadron of Tinker AFB, Okla., commanded by Lt. Col. Ed J. Angelo, Jr.; the 303d Troop Carrier Squadron, Richards-Gebaur, commanded by Maj. John E. Lacy; the 304th Troop Carrier Squadron, Richards-Gebaur, commanded by Maj. Neal W. Grubaugh.

A new and vital mission for CONAC was added by a directive from the Secretary of the Air Force on February 2, 1960. The directive created a READY-NOW recovery force from classroom Reservists assigned to the Individual Training Program. A bona fide support mission replaces the old concept of "post-M-Day" mobilization buildup for these Reserves. In effect, Air Force Reservists in the Individual Training Program of the past fifteen years were taken out of the bullpen and onto the playing field. They became part of a defense in depth—with a mission of extreme importance to over-all USAF capabilities.

The new mission thus added by the Secretary's directive was recovery, reconstruction, and reconstitution. It is based on the concept that to survive and to prevail after an initial nuclear exchange, we must be able to recover quickly. This mission would include facilities and installations and reconstitution of units to regain combat capability. CONAC's new Air Force Reserve recovery units, now in process of organization, will be supplying a separate, central force, organized, equipped, trained, and in being. Eighty-two recovery groups and 200 recovery squadrons were activated July 1, 1961.

Here's how the recovery mission will be accomplished: At widely dispersed, predetermined airstrip locations, Reserve recovery units will stand ready to give combat aircraft a choice of alternate landing fields if their home bases are knocked out. Recovery units will prepare these alternate airfields, guide aircraft to these safe havens, get them airborne again quickly. The recovery mission is past the concept stage. A "shakedown" run of seven recovery groups

and seven recovery squadrons has been going on since September 1960. It works. Air Force Reserve recovery units will be able to provide refueling, communications, crash and rescue, medical, food, billeting, and security services at dispersed nonmilitary airfields for which the units are responsible.

Backing up the recovery units are on-base Reserve support groups, with a "D-Day" augmentation of regular Air Force bases and postattack recovery capability. These units are patterned after a normal Air Force base group and perform functions to the specific requirements of a particular base as determined by the base commander and CONAC. These Reserve recovery units train on the base of assignment. There are twenty-five in being, six have been proved out as pilot units, and by the end of fiscal year '62 there will be approximately 100 of them.

The new Air Force Reserve recovery program provides realistic pre-D-Day preparation of Reservists on predesignated military and nonmilitary facilities, capable of being operationally ready with minimum effort and with a command-controlled, reliable, communications system.

Last year's "new Reserve concept" transferred training and inspection duties for many Reserve units and the entire Air National Guard to commands that would utilize the Reservists in wartime. Continuing responsibilities for CONAC—unaffected by the new Reserve concept—are still many:

Responsibility continues for formulating plans for coordination of Air Force efforts in cooperation with the Army for providing military assistance in domestic and civil defense emergencies.

CONAC represents the Air Force on national regional boards of the Office of Civil and Defense Mobilization. CONAC has supervisory responsibility for Civil Air Patrol and supervises operation of the Air Explorer program.

CONAC is responsible for the formulation of plans

Army paratrooper prepares to board a Reserve C-119.

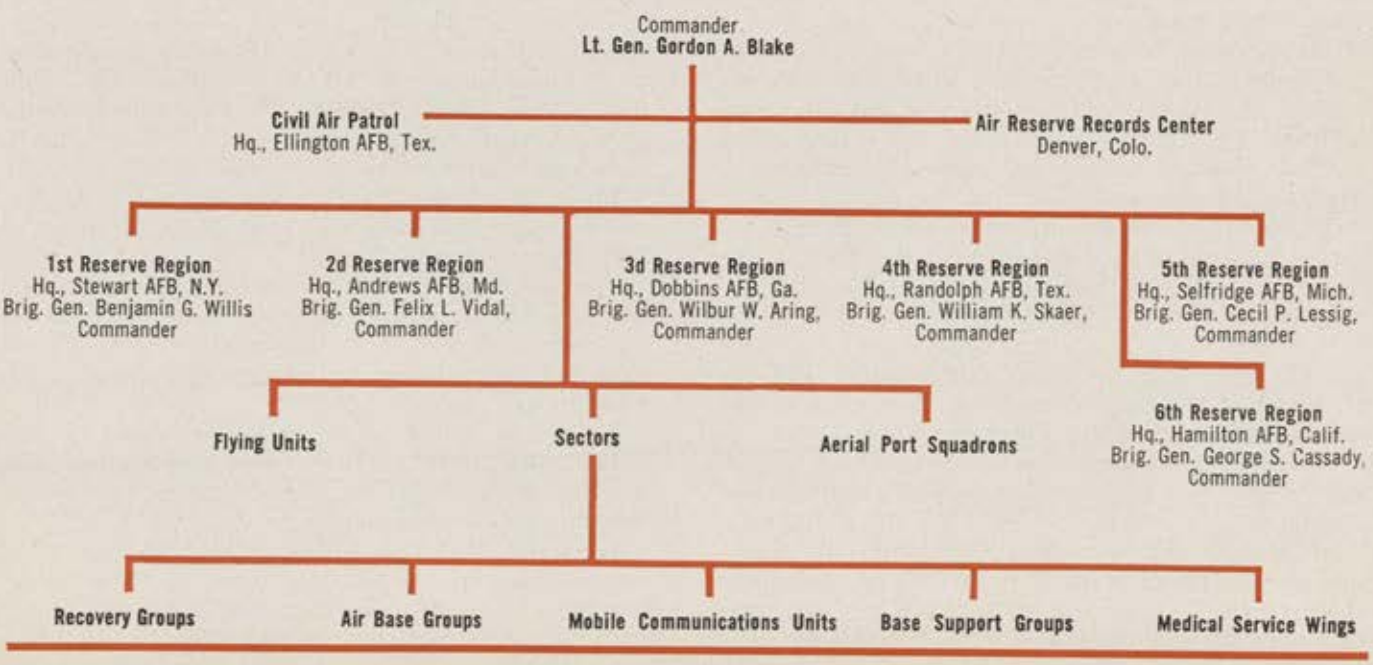
to ensure internal military protection of all national defense facilities under Air Force cognizance; CONAC provides a single Air Force contact for cooperation with local Army and Navy commands in carrying out the Air Force responsibilities laid down in the basic plan for defense other than air defense of the United States.

Organizationally, CONAC is divided into six numbered Air Reserve Regions, geographically corresponding with numbered Army areas.

Lt. Gen. William E. Hall, Commander, CONAC, retires September 30 of this year after thirty-three years of active duty since graduation from West Point. The last four years he served at CONAC. The new CONAC Commander is Maj. Gen. Gordon A. Blake, who will soon add a third star. He comes to CONAC from the Pacific Air Forces.—END

CONTINENTAL AIR COMMAND

Headquarters, Robins AFB, Ga.



Maj. Gen. Winston P. Wilson is Air National Guard Deputy to the Assistant Chief of Staff for Reserve Forces, Deputy Chief of the Pentagon's Guard Bureau, Chief of its Air Division. He joined the Arkansas Guard in 1929 as a mechanic, won a CAA pilot's license in 1936, saw ASW duty on the East Coast, photographic duty in the Pacific in World War II.

For the third time in a generation, the minutemen of the modern world stand ready to answer the nation's call for more combat strength in time of need . . .

AIR NATIONAL GUARD

THE Air National Guard is ready to respond, for the third time in a generation, to the nation's call for added combat strength in time of need.

More than 25,000 officers and airmen in eleven wings *(see list on page 139)* are prepared to bolster the US Air Force's tactical and airlift capability.

The past year has been particularly significant in the history of the Air National Guard. On July 1, 1960, responsibility for supervising training of Air Guard units was assumed by those major Air Force commands which would gain the units upon mobilization. Top official of the Air Guard nationwide is Maj. Gen. Winston P. Wilson, Air National Guard Deputy to the Assistant Chief of Staff for Reserve Forces, Deputy Chief of the Pentagon's Guard Bureau, and Chief of its Air Division.

Thanks to the close attention which has been devoted to Air Guard units as a result of this action, the addition of the eleven wings to the Air Force's active combat structure could be accomplished with a minimum of difficulty.

The Guard's tactical units have been performing exercises and operational missions for the Tactical Air Command, relieving TAC's active units for other priority tasks.

Similarly, Air Guard transport squadrons have gained experience traversing the Atlantic and the Pacific on MATS cargo runs, doing the same jobs they would perform on active duty.

Assigning operational control of Air Guard squadrons to gaining commands has proved important psychologically as well as operationally. Air Force commanders now look upon their Air Guard units as elements of the forces available to them in accomplishing their missions, and devote to the Air Guard the same degree of attention they give to their active forces.

"The members of the Air Reserve Forces no longer are a 'reservoir' of manpower, held in abeyance ready to be called to fill needs which might arise in an emergency," Secretary of the Air Force Eugene Zuckert has declared. "They are a truly ready, immediately available, currently contributing part of our first-line capability."

The workings of this new concept have provided both Guardsmen and Air Force personnel a much better appreciation than in previous Air Guard mobilizations of what they can expect.

And, for the first time, Air Guard commanders have been assured that their units would be employed relatively intact.

This was not the case with the Guard's observation squadrons before World War II, which disappeared upon mobilization. In the Korean War, ANG unit designations remained during the twenty-one months of the Guard's mobilization, but individual Guardsmen were shifted wholesale to other Air Force units.

There have been concrete improvements in Air National Guard readiness in recent years—in terms of both units and individuals.

The first is reflected in the operational readiness inspection ratings assessed by teams from USAF's gaining commands, and in the performance of Air Guard units in cargo missions, tactical operations, and air defense alerts.

The second is a result of constant screening of individual Guardsmen to keep down the number who may be released before a mobilization because of hardship or essential civilian occupations.

Inevitably, some Guardsmen would be discharged for these reasons. In addition, there are some vacancies in Guard units which have been limited to ninety

(Continued on page 139)

XLR99

Most powerful rocket engine ever built to the strict reliability specifications needed for manned flight...and now powering the X-15 on its record-breaking missions to the fringes of space... the pilot safe, pilot controlled XLR99 is adaptable to many aerospace programs planned for the future.

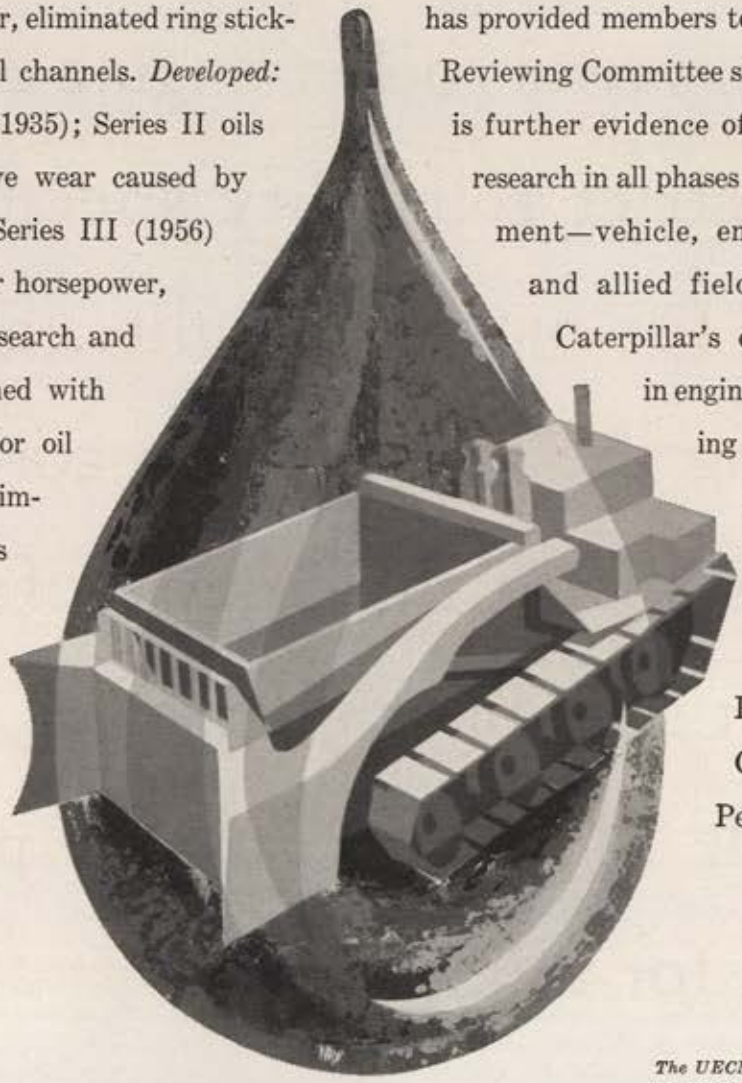
THIOKOL

Thiokol. CHEMICAL CORPORATION, BRISTOL, PENNSYLVANIA

Rocket Operations Center: Ogden, Utah. Reaction Motors Division built XLR99

CAPABILITY IN POWER AND MOBILITY *for defense*

Problem: carbon, lacquer and gum deposits on working parts of diesel engines. *Needed:* diesel lubricating oils that minimized deposits, resisted scratching and parts wear, eliminated ring sticking and assured open oil channels. *Developed:* "Superior Lubricants" (1935); Series II oils (1948) to fight excessive wear caused by high sulfur fuels; and Series III (1956) for use in today's higher horsepower, higher speed engine. Research and testing were accomplished with the cooperation of major oil companies. To speed oil improvement, Caterpillar's single-cylinder test engine is now used in 67 laboratories throughout the world. Among other accomplishments, Caterpillar helped develop the first military oil specifications and has contributed heavily in developing current revisions. In addition, Caterpillar has provided members to Ordnance Engine Oil Reviewing Committee since its beginning. This is further evidence of Caterpillar's intense research in all phases of equipment improvement—vehicle, engine and component and allied fields. Besides research, Caterpillar's experience and talent in engineering and manufacturing are available to meet your requirements. For more details, write for Bulletin No. 40-20265, Defense Products Department, Caterpillar Tractor Co., Peoria, Illinois.



The UECM, currently under development, is representative of the ability of Caterpillar research in all phases of vehicle development.

CATERPILLAR

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WASHINGTON, D. C. PEORIA, ILLINOIS

RESEARCH • DEVELOPMENT • MANUFACTURING FOR DEFENSE

percent of authorized strength because of drill pay ceilings. But last month units on priority lists for active duty were authorized to accept prior-service men to build up to full strength. Judging from past experience, they would reach that goal by the time they went on active duty by adding former Air Guardsmen and Air Force veterans who can't picture themselves out of uniform when an emergency beckons.

The recent attention focused on tactical and airlift elements of the Air National Guard does not diminish the vital role of other Air Guard squadrons and units in the nation's defense structure.

In addition to the six air transport squadrons named as priority units, five more are converting to C-97 missions under MATS control. Also under MATS are nine aeromedical evacuation squadrons equipped with C-119s, some of which are scheduled to acquire four-engine C-121s in the future.

TAC also has additional Air Guard resources, including three squadrons converting to KC-97 tanker roles, four special troop carrier squadrons equipped with SA-16s, four tactical reconnaissance squadrons employing the twin-jet RB-57, and three tactical fighter squadrons—two flying F-86Hs and the third converting to F-100s.

Since July 1, twenty-six Air Guard interceptor squadrons have provided a minimum of two aircrews on alert status under Air Defense Command control twenty-four hours a day. This marks a step-up in the Air Guard's alert program which since 1954 has contributed an average of twenty squadrons at a time to ADC, most of them operating fourteen hours a day.

Four ANG aircraft control and warning squadrons—two in Hawaii and two in the continental US—operate

(Continued on following page)

Guardsmen on summer training duty lay cable at air base.

AIR GUARD UNITS SELECTED FOR POSSIBLE ACTIVE DUTY

Tactical Fighter

102d Wing, Boston, Mass. (F-86H), Brig. Gen. Charles W. Sweeney. 101st Sqdn., Boston; 131st Sqdn., Westfield, Mass.; 138th Sqdn., Syracuse, N.Y.

108th Wing, McGuire AFB, N.J. (F-84F), Brig. Gen. Donald J. Strait. 119th Sqdn., Atlantic City, N.J.; 141st Sqdn., McGuire AFB, N.J.; 149th Sqdn., Richmond, Va.

113th Wing, Andrews AFB, D.C. (F-100), Brig. Gen. Willard W. Millikan. 120th Sqdn., Denver, Colo.; 121st Sqdn., Andrews AFB, Md.; 136th Sqdn., Niagara Falls, N.Y.

121st Wing Lockbourne AFB, Ohio (F-84F), Col. Dale E. Shafer, Jr. 162d Sqdn., Springfield, Ohio; 164th Sqdn., Mansfield, Ohio; 166th Squadron, Lockbourne AFB, Ohio.

122d Wing, Ft. Wayne, Ind. (F-84F), Brig. Gen. William R. Sefton. 112th Sqdn., Toledo, Ohio; 113th Sqdn., Terre Haute, Ind.; 163d Sqdn., Ft. Wayne, Ind.

131st Wing, St. Louis, Mo. (F-84F), Col. Glennon T. Moran. 110th Sqdn., St. Louis, Mo.; 169th Sqdn., Peoria, Ill.; 170th Sqdn., Springfield, Ill.

140th Wing, Denver, Colo. (F-104, air superiority), Col. Walter E. Williams, Jr. 151st Sqdn., Knoxville, Tenn.; 157th Sqdn., Columbia, S.C.; 197th Sqdn., Phoenix, Ariz.

Tactical Reconnaissance (RF-84F)

117th Wing, Birmingham, Ala., Brig. Gen. George R. Doster, Jr. 106th Sqdn., Birmingham, Ala.; 153d Sqdn., Meridian, Miss.; 160th Sqdn., Montgomery, Ala.; 184th Sqdn., Ft. Smith, Ark.

127th Wing, Detroit, Mich., Col. Erick W. Kyro. 107th Sqdn., Detroit, Mich.; 171st Sqdn., Detroit, Mich.; 174th Sqdn., Sioux City, Iowa; 180th Sqdn., St. Joseph, Mo.

Air Transport (C-97)

133d Wing, Minneapolis-St. Paul, Minn., Col. John R. Dolny. 109th Sqdn., Minneapolis-St. Paul, Minn.; 133d Sqdn., Manchester, N.H.; 139th Sqdn., Schenectady, N.Y.

146th Wing, Van Nuys, Calif., Col. Robert D. Campbell. 115th Sqdn., Van Nuys, Calif.; 125th Sqdn., Tulsa, Okla.; 195th Sqdn., Van Nuys, Calif.

Tactical Control

152d Group, Roslyn, N.Y., Col. Willard S. Magalhaes. 106th TC Sqdn., Roslyn, N.Y.; 102d ACW Sqdn., Providence, R. I.; 103d ACW Sqdn., Milford, Conn.; 104th ACW Sqdn., Cincinnati, Ohio; 101st ACW Flt., Worcester, Mass.; 108th ACW Flt., Syracuse, N.Y.; 112th ACW Flt., State College, Pa.

157th Group, St. Louis, Mo., Col. David W. Baugher. 131st TC Sqdn., St. Louis, Mo.; 115th ACW Sqdn., Dothan, Ala.; 128th ACW Sqdn., Milwaukee, Wis.; 129th ACW Sqdn., Marietta, Ga.; 117th ACW Flt., Savannah, Ga.; 119th ACW Flt., Knoxville, Tenn.; 133d ACW Flt., Fort Dodge, Iowa.

Ready to go. Flight line of Guard F-84Fs stretches into distance. ANG plays air defense role in many parts of US.

Touchdown. Arkansas Air Guardsman brings his RF-84F home after a routine proficiency hop.

Tennessee Air Guard KC-97 on Memphis strip after delivery early this summer from USAF.

around the clock as part of the ADC's radar network.

Other communications squadrons perform essential construction projects at USAF missile sites and bases, erecting radar antenna, laying cable, and installing TV and voice intercom circuits.

Hawaii presents an outstanding example of Air Guard service to the Air Force and the public. The 199th Fighter-Interceptor Squadron there provides the islands' primary airborne defense against air attack, supported by the 109th and 169th ACW squadrons, all on duty around the clock. They are integral units of the Pacific Air Forces.

In Alaska, the 144th Air Transport Squadron performs numerous airlift services for all of our armed forces. Their ski-equipped C-123s range the entire state, hauling equipment to DEW Line stations, resupplying scientific crews on floating ice islands, air-dropping paratroopers on Army maneuvers, and delivering cargo to military and naval bases throughout Alaska.

On active duty with the Air Force, in alert status with the Air Defense Command, or in numerous services for the Air Force and their home communities, the men of the Air National Guard strive always to live up to the "Ready-Now" slogan.

Together with their Air Force Reserve counterparts, they have been paid eloquent tribute in these words of Secretary Zuckert:

"They voluntarily incur the sacrifices and responsibilities of their homes and business, not just whenever their country needs them in emergency, but on a continuing basis. They give freely of their time today to assure their fitness to meet the requirements of real and immediate military capability."—END

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DEFENSE & SPACE DIVISION: General Office: Allentown, Pa. DISTRICT LOCATIONS: Dayton, Ohio; Washington, D. C.; Los Angeles, Calif.; Winter Park, Florida.

Lt. Gen. James E. Briggs has been Commander, ATC, since August 1959. He served prior to that as Superintendent of the Air Force Academy from 1956 to 1959. He was with the Eighth Air Force Bomber Command in the ETO and the Air Transport Command during the second World War, and commanded the Far East Air Forces Bomber Command in the Korean War.

As the years pass and aerospace technology marches on, the Air Force's requirement for capable, skilled personnel grows and grows . . .

AIR TRAINING COMMAND

ONE out of every seven men in the Air Force today was recruited by Air Training Command during fiscal year 1961.

In fact, ATC's recruiting service during the last seven years has signed up more than 800,000 recruits, almost equal to the USAF manpower ceiling of about 822,000 officers and airmen before the Berlin crisis increase.

Selective procurement of personnel for the nation's aerospace force again last year was one of the five separate but slightly overlapping mission areas of ATC. These include recruiting, military training, flying training, technical training, and aerospace medical training and research.

This is how each was accomplished during fiscal 1961:

Recruiting

To help meet the requirement for people in the last fiscal year, ATC selectively recruited 122,000; conducted technical training for more than 125,000 Air Force personnel; trained more than 2,300 pilots and 1,600 navigators; conducted global on-site training for more than 175,000 technical specialists through its field and mobile training detachments.

The recruiting goal for the twelve-month period was 122,000. The actual accomplishment was 122,028, of whom 112,153 had no prior service, 7,774 had prior service, and 2,101 were young women (WAF).

The procurement was the largest since the 105,475 recruited by the Recruiting Service in 1957. The 1961 goal was increased from 96,600 to 122,000 to help offset airman understrength resulting from greater losses than had been predicted in discharges and retirements.

The educational level of the nonprior-service recruits last year was higher. A total of 78,827 high school graduates were enlisted during fiscal year 1961, representing 70.3 percent of the 112,153 input. This was an increase of 18,024 over the 1957 high school input which was the previous high for the most recent five-year period.

Of the 112,153 nonprior-service recruits last year, more than 75,000 entered ATC technical training. In addition, advanced courses in various technical skills were offered more than 4,300 individuals recruited in previous years. All technical training offered by ATC was provided more than 300,000 individuals, some of them completing more than one course during the year. This included more than 30,000 personnel under special training.

Under command of Lt. Gen. James E. Briggs, ATC's domain during the first half of the fiscal year comprised twenty-six bases. This base total was reduced to twenty-one when ATC closed its civilian contract flying training schools early in the year.

Flying Training

A new era in Air Force student pilot training began in March 1961. The AF undergraduate pilot training program which was initiated that month included only jet aircraft. Simultaneously, the new Northrop T-38 Talon joined the all-jet training team as the Air Force's first supersonic trainer.

The T-38, capable of speeds in excess of Mach 1.2, will bridge the gap between the subsonic trainers and the supersonic combat types. Now undergoing tests and evaluations as a trainer at Randolph AFB, Tex., the new twin-jet plane is programed to become operational at all ATC undergraduate pilot training bases in March 1962.

When ATC launched its Undergraduate Pilot Training (UPT) program in March of this year, it used only the Cessna T-37 and Lockheed T-33 jets as trainers. With phase-in of the T-38 from March 17 on, the all-jet team was completed.

Thus, an era in pilot training for the Air Force came to an end. Propeller-driven trainers for Air Force student pilots were assigned to other functions. The T-28 was transferred for use as the trainer in the Military Assistance Program (MAP).

For a time, USAF students will learn to fly first in the T-37, cruising at 320 mph, then they will progress to either the 460-mph T-33 or to the T-38 to win their wings at Mach 1.2. Later, the T-33 will be retired, and AF students will step from the T-37 into the T-38, and from the supersonic Talon into advanced training in operational types.

Powered by two General Electric J85-5 engines, each weighing 525 pounds and producing 7.3 pounds of thrust for every pound of engine weight, the T-38 can maintain supersonic speed in level flight from sea level to 50,000 feet.

ATC now will be equipped to instruct student pilots in such techniques as high sink rates (rates of descent in landing attitude), high-altitude supersonic flight, high-altitude formation, and navigation problems—techniques that are peculiar to Century-series fighters and interceptors.

Preparing for the UPT program, ATC closed the civilian contract flying training schools that had existed at five bases. These were at Bainbridge AB, Ga.; Bartow AB, Fla.; Graham AB, Fla.; Moore AB, Tex.; and Spence AB, Ga.

Each student now receives all training and wins his wings at one of seven ATC bases under supervision of military instructors. Designated Undergraduate Pilot Training Bases are: Craig AFB, Ala.; Laredo AFB, Tex.; Moody AFB, Ga.; Reese AFB, Tex.; Vance AFB, Okla.; Webb AFB, Tex.; and Williams AFB, Ariz.

Previously, the student received his preflight at one base, his primary training at a contract school base, and then moved to a third base for basic phase.

The UPT concept was considered more efficient, providing a better product for the investment. The average student will win his wings in a fifty-five-week training period. Previously, three additional weeks were required for moves between bases by students and families, often resulting in readjustment problems.

Advanced pilot training is currently conducted by ATC at three bases: Stead AFB, Nev.; Randolph AFB, Tex.; and Perrin AFB, Tex.—courses ranging from interceptor pilot through aircrew survival training. Advanced students take Phase I interceptor training in T-33s and Phase II interceptor training in F-86s or F-102s at Perrin, the helicopter twenty-one-week course

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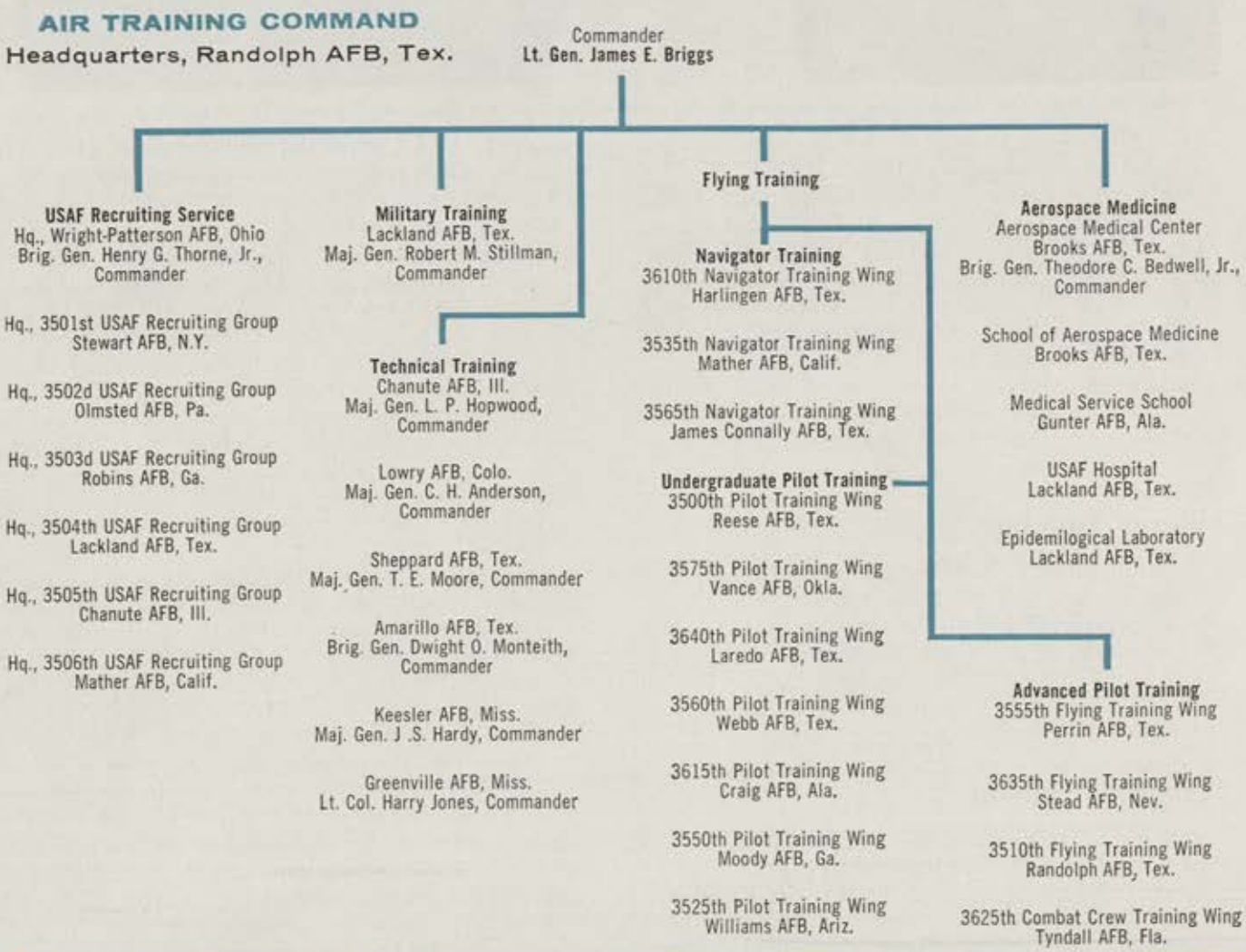

Selective recruiting of young men and women is the responsibility of Air Training Command's USAF Recruiting Service.

at Stead in the H-19 or H-21, a pilot-instructor ten-week course at Randolph in T-33s.

For navigator training, students enter undergraduate courses at either James Connally AFB or Harlingen AFB, Tex. The course includes considerable flying training in the T-29. Consolidation of training similar to that of pilot training was accomplished this year, eliminating time loss in the move from preflight school to the flying training base.

Advanced navigator training is given at Mather AFB, Calif., a radar intercept officer course at James Connally, and an electronic warfare officer course at Keesler AFB, Miss.

Military Training

In addition to its military training responsibilities for new recruits, officer candidates, and student officers, Lackland AFB technical training courses included: marksmanship, air police, personnel, and cryptography. It also operated the USAF Language School for foreign students. The center's training load averaged from 15,000 to 22,000 students.

Technical Training

One out of every three men in the Air Force last year was given technical training by ATC.

In other words, more than 300,000 Air Force personnel completed courses in technical training during the twelve-month period. These individuals included 30,000 from other commands who received special training under AFR-50-9, more than 145,000 who were provided with on-site technical training by mobile and field units of ATC, and 125,000 assigned to ATC for technical training during the year.

In the technical area, ATC during the last fiscal year stressed increases in training in the ballistic missile systems. More than 150 courses in direct support of missile systems were conducted, compared to 133 such courses offered during the previous year.

Unique training programs were developed and established to qualify both maintenance and operator personnel in new skills required in the ballistic missiles areas, such as maintenance and operation of generating plants for liquid oxygen and liquid nitrogen at Chanute AFB, Ill.

This was in addition to other technical training available at ATC's six technical training bases: Amarillo AFB, Tex.; Chanute AFB, Ill.; Greenville AFB, Miss.; Keesler AFB, Miss.; Lowry AFB, Colo.; and Sheppard AFB, Tex., plus certain courses at Lackland AFB, Tex.

Monthly training loads at these six bases during fiscal year 1961 ranged from 26,700 to 45,000 enrollees.

Greater emphasis was given during the last year to ATC's training responsibilities in the space era. This again applied to the development of ATC training programs while new weapon systems as well as space and support systems were on the drawing boards.

Each ATC training center was "prime" for specified

(Continued on page 147)

SAC

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The men of SAC literally keep a roof over all our heads . . . their presence providing continuous protection. This deterrent to aggression is no simple task; yet it is the mission of the men and planes of the Strategic Air Command. ■ As individuals or as industries, we all contribute to maintaining and improving this vast defense force. AC Spark Plug Division is presently contributing by developing and producing a new all-weather Bombing Navigation System for SAC's first-line bomber, the B-52. This radar-oriented system will enable the B-52 to make high speed bombing runs at low levels, circumventing hazardous ground obstacles. ■ This new product by AC Spark Plug Division is helping SAC make the roof stronger.

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Inertial Guidance for Titan II, Thor and Mace. Bombing Navigation for B-52 and B-47.

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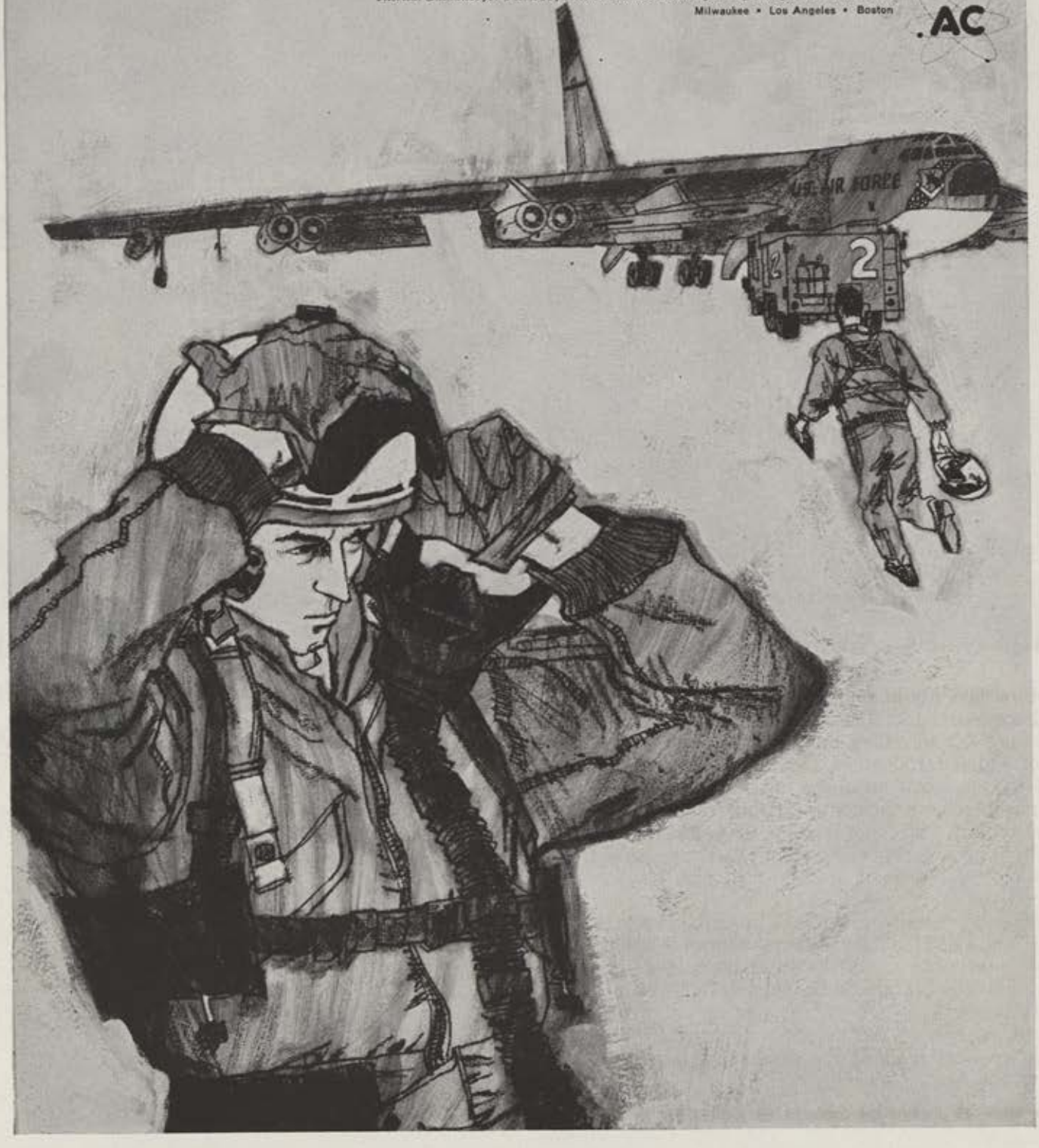

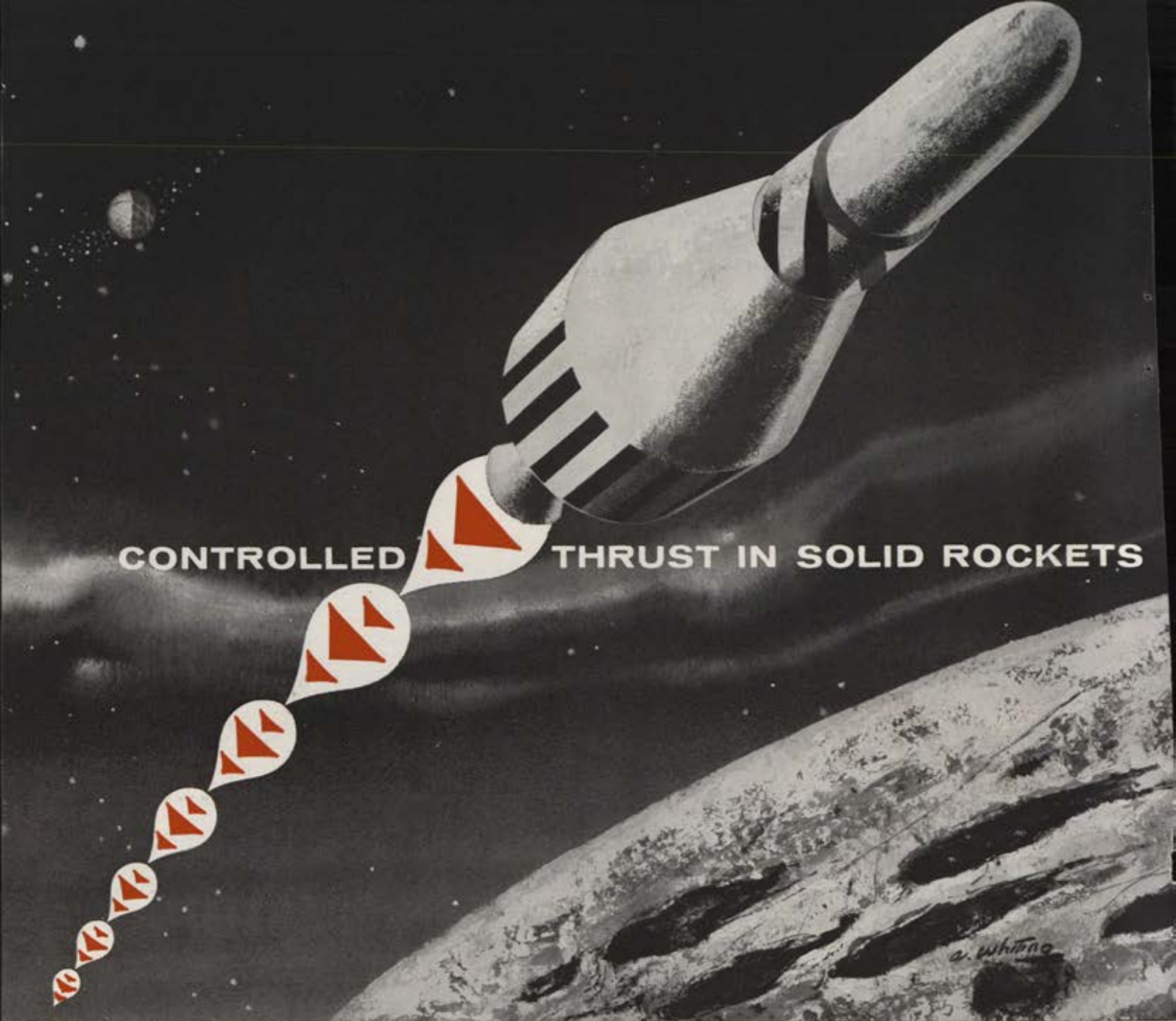

● **Is throttleability in solids a reality?** Its feasibility has been demonstrated in AMCEL tests. Tests already establishing 4:1 throttling ratio. Tests pointing to 40:1. Tests of thrust termination. Motor restart. ● **What does this AMCEL program mean for missiles? Spacecraft?** It enables precise orbit control. Space rendezvous maneuverability. Soft lunar landing. Re-entry control. And, in tactical missiles, it enables drag equalization trajectories. Boost-sustain-boost flight profiles. On-off-on power. ● **These and other capabilities . . . all with the inherent simplicity and reliability of the solid propellant rocket motor.** ● **How has AMCEL achieved thrust control in solids?** Through grain design . . . Propellant development . . . Creative engineering . . . demonstrating AMCEL's ability to marshal its assets — marked scientific capabilities and advanced engineering techniques — to provide swift, practical answers fulfilling the demanding requirements of the Space Age.

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At ATC School of Aerospace Medicine, Brooks AFB, Tex.

ATC instructor at Webb AFB, Tex., briefs students before hop.

AIR TRAINING COMMAND — CONTINUED

weapon systems while support responsibilities were allocated to other centers.

Amarillo Technical Training Center was prime for the Snark, Dyna-Soar, Quail, White Lance, fighter-type aircraft, drone target planes, and B-70, B-47, T-33, T-37, T-38, and other programs. In addition, this center trained personnel in aircraft engine and accessories maintenance, guided missile systems, supply and procurement, metalworking, and administrative career fields.

Chanute Technical Training Center was prime for the training on the Minuteman, Bomarc, Hound Dog, X-15, weather systems, B-52, B-58, KC-135, and VC-137A weapon systems. The center also provided career area training in guided missile systems, aircraft engine and accessories maintenance, electronic instruments, weather, machinist equipment maintenance, parachute rigging, fabric, leather and rubber products, personal equipment, automotive maintenance, production control, and metalwork.

Greenville Technical School trained in crash, fire-fighting, and personnel career areas. The school was organized at Greenville during the last fiscal year.

Keesler Technical Training Center, known as the "Electronics Center of the Air Force," was prime for the Midas weapon system, and for such ground environment electronics systems as: Air Weapons Control, Semi-Automatic Ground Environment (SAGE), Ballistic Missile Early Warning Systems (BMEWS), and others. Its career area training included: radio and radar systems, air traffic control and warning, communications operations, electronic countermeasures, and communications electronics.

Lowry Technical Training Center was prime for training on such weapon systems as the Mace, Matador, and guided air rockets (GAR). Training in the career areas included: armament, special weapons, munitions weapons, photography, guided missile systems, crash fire-fighting, and the maintenance of training devices.

Sheppard Technical Training Center was prime for the training on these weapon systems: Atlas, Titan, Thor, Jupiter missiles; propeller-type aircraft and helicopters; B-57 and B-66 jets, and for intelligence data-handling. This center provided training in career areas including: aircraft mechanics, engines, hydraulics, and electronics; helicopter mechanics; intelligence and photo interpretation; transportation; comptroller, ballistic missile systems; communications operations; wire maintenance; utilities; equipment cooling and power production.

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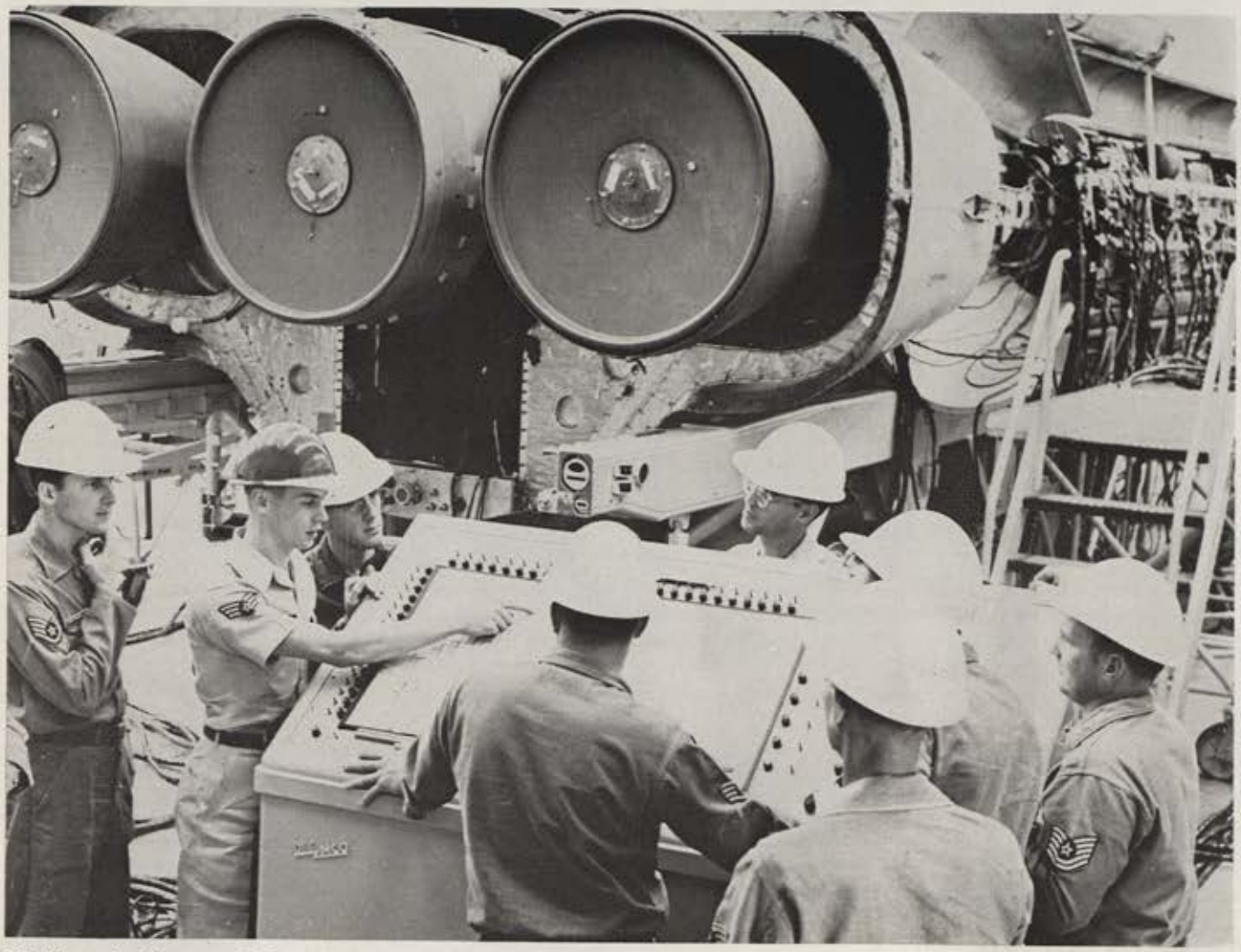


Missile technicians at Technical Training Center, Sheppard AFB, Tex., run down checklist in Atlas ICBM training.

Aerospace Medical and Research

In May 1961, the USAF Aerospace Medical Center (ATC) conducted its initial twenty-six-day course entitled "Medical Support for Space Flight." Offered for the first time by the center's School of Aerospace Medicine (SAM) at Brooks AFB, Tex., the course was designed to prepare US military physicians for duty in support of spaceflight. The course familiarizes students with the physical and chemical aspects of the upper atmosphere and space, and with the biological impact of these factors on men.

Students in this course, one of SAM's many space-oriented courses, also were instructed in research and development programs concerned with man and his environment during space operations. Lecture subjects included weightlessness, cosmic radiation, US space programs, the universe, the solar system and galaxy, spacecrew selection and training, and protection from natural space phenomena such as radiation and meteorites.

Components of the Aerospace Medical Center, with headquarters at Brooks AFB, were SAM; the Medical Service School, Gunter AFB, Ala.; USAF Hospital, Lackland AFB; and the Epidemiological Laboratory at Lackland.

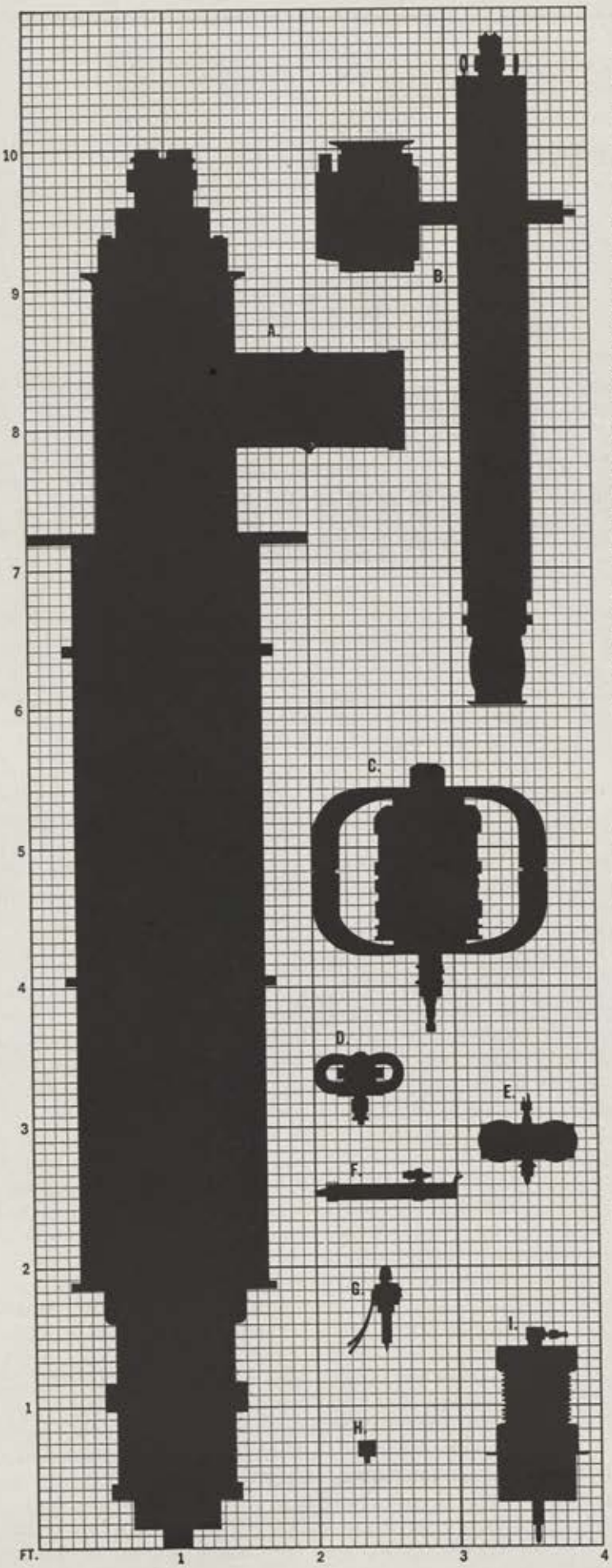
Other Activities

ATC last year stressed the quality of its instructor personnel. Most of the command's 14,000 instructors, each selected and trained in his respective teaching field, were in technical training areas.

Meanwhile, ATC was setting the pace for electronic data-processing in Air Force personnel administration, using the high-speed data-processing computer installed in 1959. Through adaptation of this equipment and using a specially engineered data system, it had placed in effect many aspects of an automated personnel system. For example, through one of its numerous uses, selections of most eligible officers and airmen for overseas assignments can be made in minutes. This and many other uses of the computer in personnel administration were being perfected or refined.

To expedite greater utilization of the ATC data-processing systems, the command established the directorate of Data Systems Development under the Comptroller, with the director of statistical services becoming the director of data-processing.

Thus, Air Training Command during the last fiscal year improved its techniques in various areas to "prepare the man" for the Air Force team in the aerospace age.—END



ONE METER TO FOUR MILLIMETERS

New Litton Tubes for Air and Ground Support

A. L-3403 KLYSTRON TUBE: One of our super power pulse klystrons for use in long range space radar detection and tracking.

B. L-3270 BROADBAND KLYSTRON: A 2 megawatt L-band klystron offering long life, high peak power, 8 percent bandwidth. Other broadband klystrons, using the exclusive Litton Skirtron techniques, are available with higher power in the L through S-band region with .002-.004 duty cycles.

C. L-3455 HIGH POWER MAGNETRON: A new magnetron delivering a minimum of 2 megawatts peak power at 406-450 mc. with a .002 duty cycle.

D. L-3458 HIGH TEMPERATURE PULSE MAGNETRON: Provides long life operation at ambient temperatures in excess of 662°F. Many hours of 900°F. operation have been achieved in X-band tests.

E. L-3629 FLOATING DRIFT TUBE KLYSTRON: High power, water-cooled klystron oscillator fixed tuned at 33,000-37,000 mc. Power output: 15 watts CW minimum. Other tubes available for immediate delivery from 12-4 mm. wavelength.

F. L-3472 TWT: PPM focused traveling wave tube offers higher CW power — 10 watts minimum — and wider bandwidth in a compact 3-lb. size. Operates in the range of 7,000-11,000 mc. One of a line of TWT's including a 1000-watt X-band pulse tube.

G. MICROTRON: The L-3189, one-kilowatt CW magnetron, is accompanied in package form by an electromagnet and filter assembly, high voltage and filament and isolation transformers. Only 6-second warm-up. Two year warranty for domestic microwave cooking.

H. L-3430 CUBE MINIATURE MAGNETRON: A one-kilowatt miniature magnetron, fixed tuned at 9300 ± 30 mc, weighing less than 9 ounces and no bigger than a normal X-band waveguide flange. Developments at other power levels and frequencies are planned.

I. L-3408 SWITCH TUBE: Provides switching at relatively low control voltage levels with an efficiency of 95 percent. Features high voltage holdoff, high current handling. Collector ratings: 150 Kv; 20 Amps; 10 KW dissipation.

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MICROWAVE TUBES AND DISPLAY DEVICES

Gen. William F. McKee succeeded Gen. Samuel E. Anderson as Commander, AFLC, on August 1. He had served as Vice Commander of the Air Materiel Command since 1953. He was previously Assistant Vice Chief of Staff of the US Air Force, commanded the Headquarters Command of USAFE, and the European Division of the World War II Air Transport Command.

Renamed and newly oriented this year in a significant USAF reorganization, the service's supply arm remains one of the world's biggest businesses . . .

AIR FORCE LOGISTICS COMMAND

THE old Air Materiel Command became the Air Force Logistics Command (AFLC) on April 1 of this year. USAF's reorganization at that time also gave birth to the Air Force Systems Command. AFSC was formerly the Air Research and Development Command.

Under the reorganization, designed to centralize direction of ballistic missile programs and other major defense systems, systems procurement and allied functions that had been performed by AMC were assigned to the Systems Command.

The Logistics Command, AMC's successor, retained procurement and management responsibility for spares and spare parts, initial and replenishment, in support of all weapon systems.

AFLC—with approximately 160,000 personnel, including 19,000 in uniform—operates a worldwide supply system equipped to furnish any of 2,000,000 different kinds of items to any Air Force activity in the world. The items range from small screws to airplane wings and missile engines.

The command's supply and maintenance responsibilities are accomplished through nine Air Materiel Areas (AMAs), and two other Air Force installations: Dayton Air Force Depot, Ohio, and the 2709th AF Vehicle Control Group at Memphis, Tenn.

Substantial procurement responsibilities are carried by the AMAs and the two other organizations. They awarded almost $2.75 billion worth of contracts in fiscal year 1960 and approximately $1.2 billion for the first six months of fiscal 1961.

AFLC support comes into the life of an airplane, missile, or space vehicle at an early stage.

San Bernardino Air Materiel Area, Calif., was named the logistics support manager for the Atlas, Titan, and Thor more than three years ago. In the intervening time, SBAMA has retooled both in equipment and ideas to handle this high-priority mission. The first overhauling of a rocket engine—a Thor—was accomplished last March. Overhaul of Atlas and Jupiter engines was scheduled to begin later in the year, with Titan engines slated for 1962.

Components of the operational Quail comprised the first missile hardware received at Oklahoma City Air Materiel Area for overhaul. Support for the Hound Dog and Dyna-Soar, the coming aerospace vehicle, has been in logistics planning stages at OCAMA.

In January of this year, primary responsibility for Skybolt was assigned to the Ogden Air Materiel Area, Utah. Tasks and facilities involving Minuteman grow daily at Ogden, which has provided active support for Bomarc and Snark for years.

One of the inventory items at Middletown Air Materiel Area, N. Y., plays a strategic role in the space program. The parachutes that decelerated capsules of the Discoverer series and were used in Capt. Joe Kittinger's record high-altitude jumps were fabricated there. MAAMA has supported the Falcon and Sidewinder for some time.

At Warner Robins AMA, Ga., Hercules C-130Bs are refitted for their Discoverer capsule-catching tasks. Hercules crews practice their tricky catches by zeroing in on dummy capsules fabricated in Sacramento AMA's shops.

SMAMA also handles other phases of support for the Discoverer program, plus logistics support management of Saint (Satellite Inspection System), the Midas space warning satellite, and SPADATS (Space Detection and Tracking System).

Mobile AMA, Ala., which has supported the Jupiter since 1958, provides photographic assistance on the Samos.

The Calibration Standards Facility at Heath, Ohio —an installation of the Dayton Air Force Depot—is under construction and when completed will provide the most sensitive facilities known to the western world for the repair and calibration of missile guidance components.

High priority was placed on developing the capability to provide base-level calibration to ballistic missile contractors and operational squadrons. A number of calibration laboratories were designed during the past year and are soon to be placed under construction.

AFLC also manages the Air Force materiel side of the Military Assistance Program, including both the grant aid portion and the Mutual Security Military Sales (MSMS). Grant aid involves about $500 million a year, of which over forty percent goes into new procurement. It is estimated that the MSMS program involves more than $100 million in annual sales by the Air Force to friendly foreign countries.

Several years ago AFLC assumed all depot materiel responsibilities for the Far East Air Forces and in Europe and North Africa. These are now handled through Air Materiel Force, Pacific Area, at Tachikawa Air Base, Japan, and Air Materiel Force, European Area, at Chateauroux Air Station in France.

In June, following the appointment of Gen. Curtis E. LeMay as Air Force Chief of Staff, President Kennedy announced command shifts affecting AFLC.

Gen. Samuel E. Anderson, AMC and AFLC Commander since March 1959, was assigned—effective August 1—as Air Deputy to the Supreme Allied Commander in Europe, Gen. Lauris Norstad.

Lt. Gen. William F. McKee, who had been Vice Commander since June 1953, was named new Commander of AFLC. At the same time, he was nominated to receive his fourth star.

Named Vice Commander was Maj. Gen. Kenneth B. Hobson (nominated for the rank of lieutenant general), who had been Commander of AFLC's Ogden Air Materiel Area.

Because of the particular nature of its mission, AFLC is one of the major users of electronic data-processing equipment (EDPE) in the country. Experience has given solid evidence that the direction is right and that EDPE is opening the way to faster, more flexible, and more economical logistics support of our combat air forces.

The command pioneered many developments in modern data processing and has made increasingly

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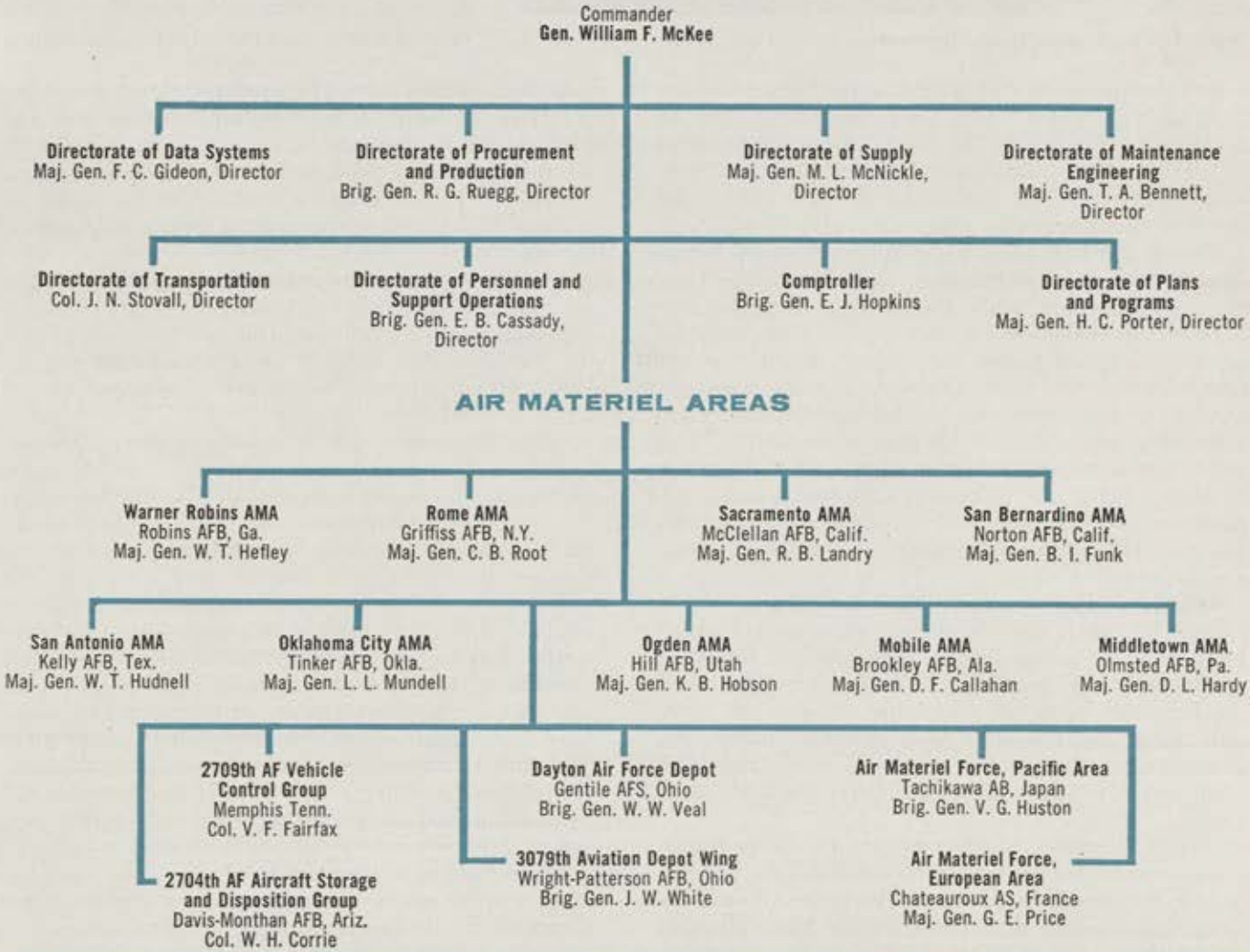
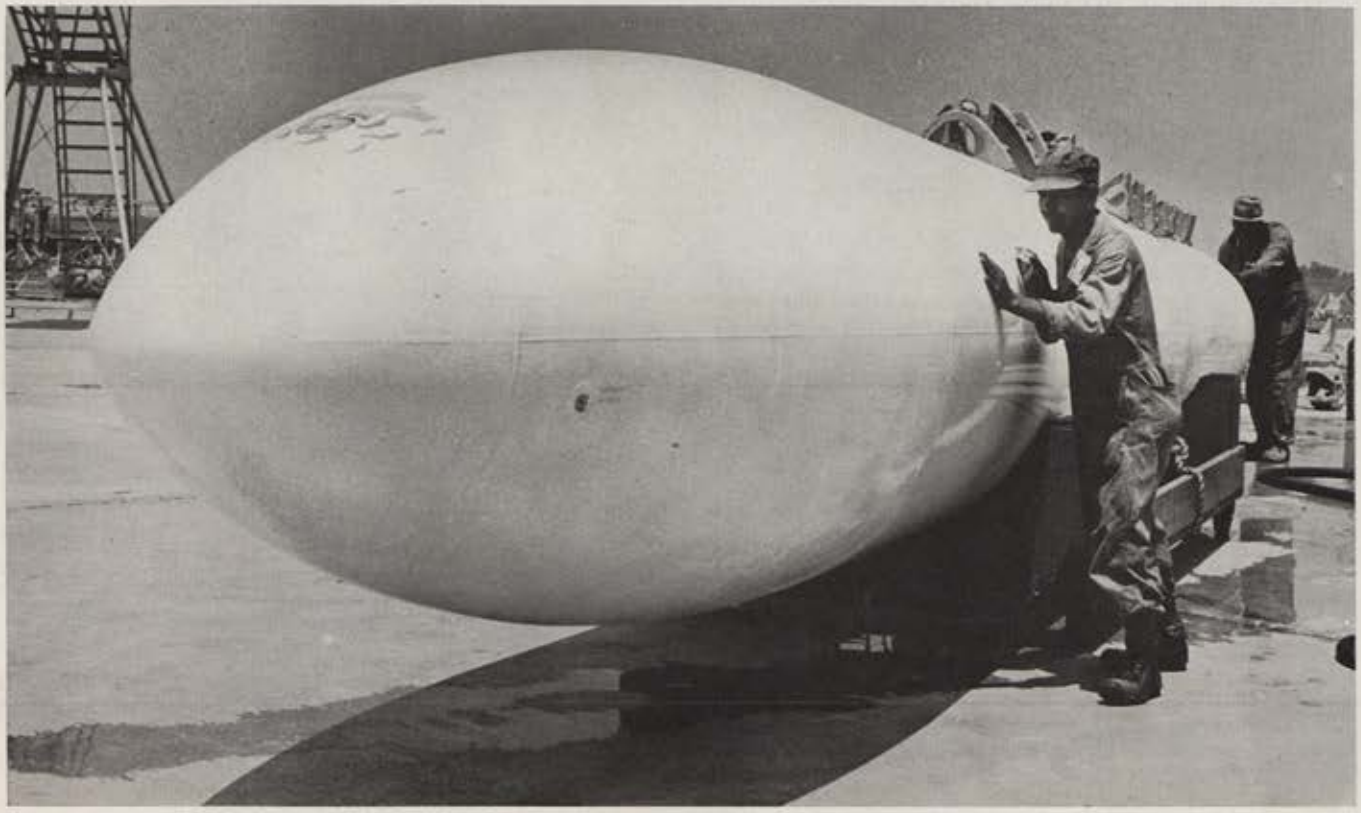
AIR FORCE LOGISTICS COMMAND

Headquarters, Wright-Patterson AFB, Ohio





Workmen push spare B-52 wing tank at Texas base. Tanks are among many thousands of items within AFLC responsibility.

extensive applications of EDPE to its logistics operations and processes during each successive year. In fiscal year 1960, the AFLC expenditures for rental of EDPE were $16 million and in fiscal year 1961 they were $23.1 million. Expenditures of $27.5 million are anticipated in fiscal year 1962.

During the past year, the number of AFLC large-capacity computers installed was increased from eighteen to twenty, while the medium capacity computers increased from fourteen to sixteen and the small-capacity computers from twenty-two to twenty-three. During this year, fifteen large-scale data systems were completed and implemented in the command to improve the management of the multibillion-dollar inventory and complex maintenance operation of AFLC. Plans are under way to modernize and replace present equipment with contemporary computers at such time as greater capacity is required or economy dictates.

AFLC has played a key pioneering role in Project Cobol, the important "Common Business Oriented Language" for computers. The purpose of this joint project of the Department of Defense and industry (makers and users of electronic computers) is to standardize and automate programing for computers. Great progress has been made in this long-range program and its results will benefit all present and future users of EDPE.

To provide swift and direct support to combat forces, a most responsive type of transportation system is required. An important element of this system, LOGAIR, which has been in service since 1954, was expanded and improved during the year.

In that period, LOGAIR provided daily service to eighty-seven bases. A total of 160,000 tons was airlifted at an average cost of 12.7¢ per ton mile, with an average transit time of less than two days. This established LOGAIR as the most responsive and economical high-speed transportation service available to the Air Force.

A modern turboprop-type aircraft capable of being nose and/or tail loaded at truck-bed height has been introduced into the system. This addition will permit the transportation of large items such as jet engines which formerly moved by surface or required special airlift from MATS.

LOGAIR service will now be provided to ten selected Army locations throughout the United States under an agreement consummated with the Army. Planning for the next fiscal year includes the replacement of the DC-4 with a DC-6A-type aircraft on the transcontinental or trunk routes.

A considerable reduction in transportation costs was realized during the year when eight Air Force bases were connected by pipelines for aviation fuel. This brought to twenty-nine the total number receiving this service; facilities for an additional seven bases have been approved and are now under construction. The added facilities, provided at no cost to the government, cut annual transportation costs approximately $4.9 million and eliminated the need for contract storage of 2,661,000 barrels of aviation fuels.

During the past year, steady progress was made on numerous programs aimed at increasing efficiency across the whole spectrum of the logistics system.

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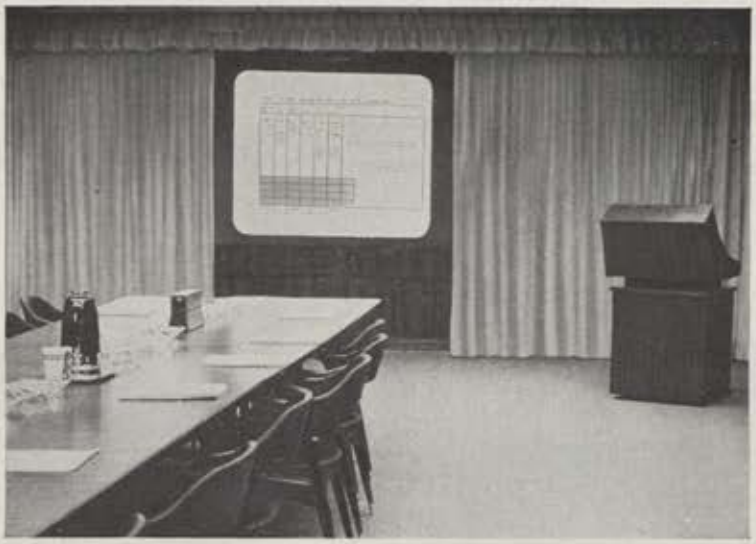
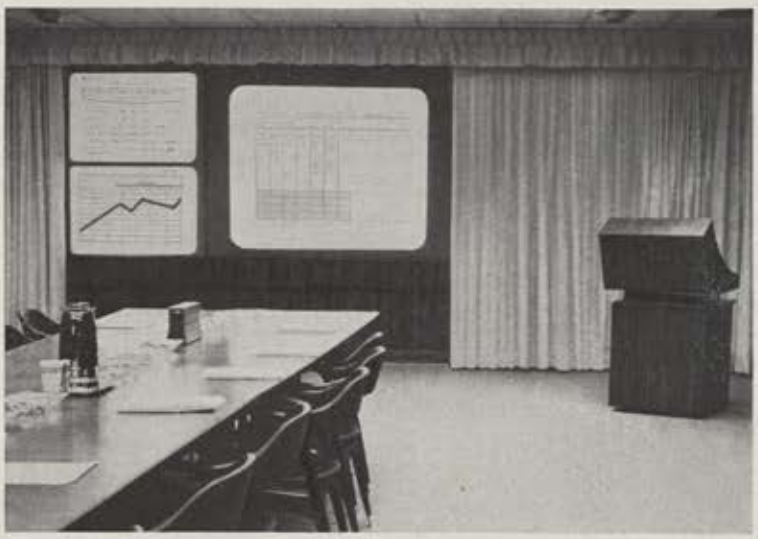
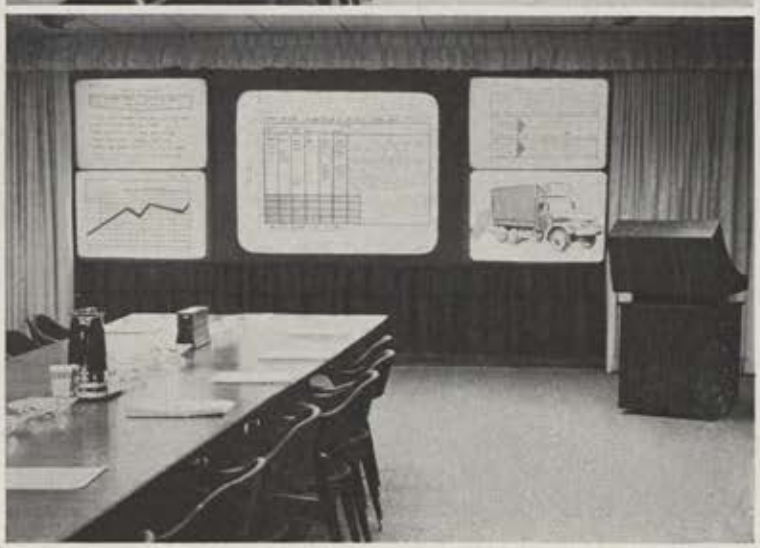


Automatic traveler curtain tailors presentation "wall" to fit the need in briefing installation by TelePrompTer Corporation

New Frontiers in Group Communications





Flexible, automated rear projection systems like this one, designed and installed by TelePrompTer Corporation, are blazing new trails in the rapid, effective presentation of Briefing, Training or Conference Room information.

Here are a few of the installations where TelePrompTer techniques and equipment are being applied:

- **Air Force Command Post, Pentagon**
- **Army Rocket and Guided Missile Agency, Redstone Arsenal**
- **Ordnance Guided Missile School, Redstone Arsenal**
- **Chief of Naval Operations Flag Plot Room, Pentagon**
- **University of Wisconsin**
- **University of Miami (Fla.)**
- **American Airlines, Board Room, New York City**
- **Kaiser Industries, Oakland, Cal.**

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357 N. LaBrea Ave., Los Angeles, WEbster 6-6195

COMMUNICATIONS SYSTEMS DIVISION

TELEPROMPTER CORPORATION

G.E.-powered Turbocopters Ordered for RCAF Service

MORTON, Penn.—Two Boeing-Vertol 107 turbocopters powered by twin General Electric T58-8 turbines have been ordered by the Royal Canadian Air Force for use as highly specialized search and rescue vehicles.

Designated CH-113's, the aircraft will have exceptional load-carrying capacities, permitting them to transport external payloads of up to 10,000 pounds using a special air-to-surface cargo hook.

With the aid of large capacity fuel tanks, the turbocopters will be able to carry a 2000-pound payload more than 650 miles.

The Boeing-Vertol 107 is one of several U.S.-built military and commercial turbocopters powered by the 1250-shp T58 turboshaft engine. As a commercial turbocopter it will enter service with New York Airways later this year, where it will carry 25 passengers at 155 mph, and is expected to help reduce seat-mile costs below those possible with present piston-powered helicopters.

Other military turbocopters powered by the General Electric T58 engine are the Kaman HU2K, to be used for Navy utility, search, and rescue missions; the Boeing-Vertol HRB-1, recently selected as assault transport by the U.S. Marine Corps; and the Sikorsky HSS-2, a USN anti-submarine turbocopter that recently established a new world helicopter speed record.

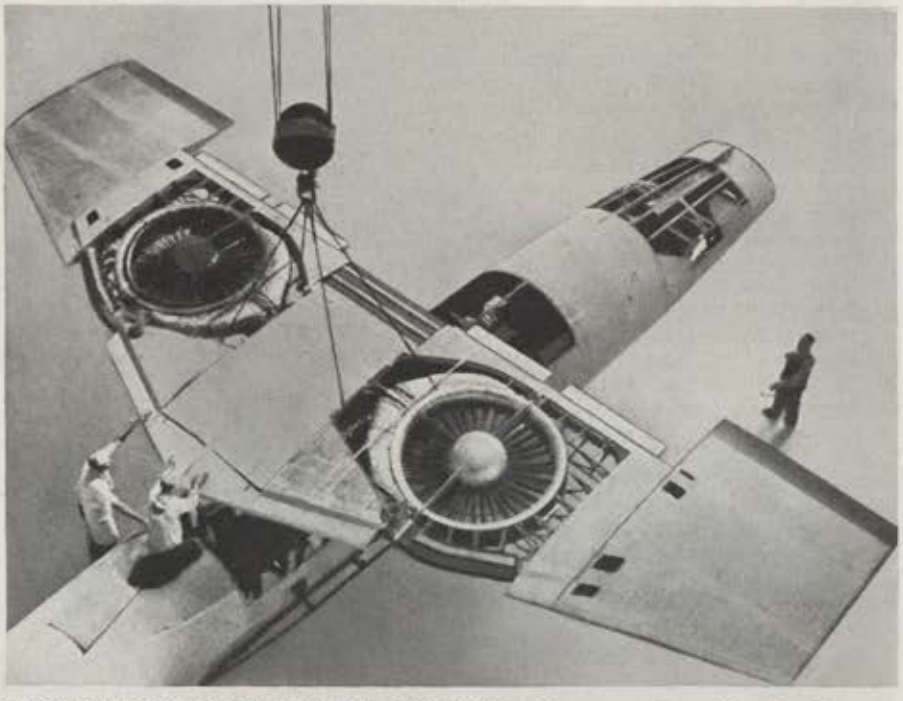
Commercial version of the HSS-2, the Sikorsky S-61, enters commercial service with Los Angeles Airways and Chicago Helicopter Airways later in 1961.

The smaller Sikorsky S-62, powered by a single derated G-E T58 engine, is currently handling passenger service in Los Angeles, San Francisco, and Tokyo. The S-62 was the first U.S. turbocopter to be certificated for commercial operation. Its G-E engine was the first U.S. helicopter gas turbine powerplant certificated by the FAA for commercial operations.

Boeing-Vertol 107: selected by Canada

FIRST RUN-UP OF G-E T64 ENGINES in the deHavilland DHC-4 Caribou occurred at deHavilland's Downsview, Ontario, plant recently. Tie-down tests of the instrumented STOL aircraft will lead to flight testing of the General Electric turboprop engines later this summer. The program is being conducted by G.E.'s Small Aircraft Engine Department and deHavilland Aircraft of Canada under U.S. Navy sponsorship and with cooperation of the Canadian Government.

G.E.'s T64 turboprop version, which develops 2850 equivalent shaft horsepower and has a corresponding specific fuel consumption of 0.49, is currently under consideration for several advanced, medium-range transports. T64 turboshaft configurations have been proposed for a variety of VTOL ships.



FAN-IN-WING MODEL READIED FOR TESTS—Next test phase for the General Electric lift fan will be in a fan-in-wing configuration. Testing will be conducted in the NASA Ames, California, 40' x 80' wind tunnel. The two-fan, two-J85-engine powered wind-tunnel model will provide aerodynamic and mechanical design data for subsequent flight research aircraft.

Tests will begin in September, 1961, in this continuing V/STOL propulsion system research effort under Army (TRECOM) contract.

NEWS

A report about progress in research and products from the Flight Propulsion Division of the General Electric Company

J79 Engine: Power for Eighteen U.S.-held Flight Records

CINCINNATI, O.—U.S. aircraft powered by General Electric J79 engines have captured nearly one-half of world aviation's official jet aircraft speed, altitude, and time-to-climb records during the past two-and-a-half years.

Of 42 internationally recognized marks in these three categories, 20 are currently held by U.S. military aircraft. All but two of the U.S. record flights were flown by J79-powered jets—Convair's B-58 Hustler, the Lockheed F-104 Starfighter, the McDonnell F4H Phantom II, and North American's A3J Vigilante.

Half of these record-shattering performances are credited to the Lockheed Starfighter, which holds the official altitude record of 103,395.5 feet and all eight time-to-climb records from 3000 to 30,000 meters.

Convair's B-58 Hustler, demonstrating its prowess as the nation's first supersonic bomber, has rewritten six world speed records since the start of 1961. In January, the Mach 2 bomber carried a 2000-kilogram payload over a 2000-kilometer closed-course, averaging 1061.8 miles per hour. The flight set new records for three different payload classes. A few days later another Hustler clinched the 1000-kilometer-course record for the same three payload classes with an average speed of 1284.73 mph.

The Hustler received the 1961 Thompson Trophy for this feat. Later, in May another Hustler claimed permanent possession of the Bleriot Trophy—after sustaining a speed of 1302 mph for more than 30 minutes over a closed course.

Another U.S. Mach 2 aircraft, North American's A3J Vigilante, took its place in international aviation annals during 1960 when it smashed the Russian-held 1000-kilogram-payload altitude record by nearly 25,000 feet. The J79-powered Vigilante's record still holds at 91,450.8 feet.

Fourth member of the J79-powered record-breaking team, the McDonnell F4H Phantom II, broke two Russian-held records in the fall of 1960. The Mach 2 Navy fighter streaked over a 500-kilometer closed-course at 1216.78 mph, and a few weeks later logged 1390.21 mph over a 100-km closed-course.

Most recent proof of the Phantom II's prowess came in May of this year when the J79-powered fighter captured the Bendix Trophy by slashing 20 minutes from the previous trans-American flight record.

Of these four J79-powered jets, two —the F-104 and the B-58—are currently in operational duty. The F4H Phantom II and A3J Vigilante are expected to enter fleet operations with the U.S. Navy in the near future.

For a free brochure featuring full-color illustrations of these record-setting aircraft—F4H, A3J, F-104, B-58, and 880—just clip and mail the coupon below.

Navy's record-holding McDonnell F4H will soon become operational with the fleet.

North American A3J smashed a USSR altitude record by nearly 25,000 feet.

Convair 880 powered to three records by CJ-805 engines

Powered by G-E's CJ-805-3 turbojets—commercial version of the J79—the Convair 880 jetliner has established three major domestic speed records since entering service in May, 1960.

On its first delivery flight for Delta Air Lines, the Convair jet raced 2359 miles from San Diego to Miami in three hours and 31 minutes.

A few months later 880's destined for Northeast Airlines cut San Diego to Boston flight time to four hours and 10 minutes.

Most recently, a TWA 880 set a new commercial speed record when it linked San Francisco and Chicago in two hours and 57 minutes—38 minutes under the scheduled flying time.

Convair 880: three records the first year

Lockheed's F-104 holds more world flight records than any other American aircraft.

Record-setting Convair Hustler is the world's first operational Mach 2 bomber.

FREE COLOR BROCHURE

For a brochure on J79-powered record-holders, featuring full-color illustrations by famous aviation artist Bob McCall, (left) check here ☐ and send coupon to:

GENERAL ELECTRIC COMPANY, SECTION B206-34
SCHENECTADY 5, NEW YORK

Also please send:

☐ GED-4507 "VTOL" ☐ GED-3987A "CT58" ☐ GED-4125 "T64"

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GENERAL ELECTRIC

LOGAIR system, in which AFLC contracts for commercial air transport, provides swift and responsive logistic support.

In the first quarter, Project Money Tree, established throughout the Air Force to reduce costs through improved management, paid off in AFLC with estimated savings of $119 million.

Project Count was undertaken to provide AFLC inventory managers with current and reliable asset data (for current and future budget and buying programs) by furnishing an accurate count of the inventory at bases, depots, contractor facilities, Reserve components, and other activities.

The project—directed by the Air Force and monitored by AFLC—was conducted from December 1959 to November 1960. It was completed on schedule and resulted in increased utilization of available assets.

Under the Aircraft Reclamation Program, items needed for AFLC support of the active fleet were recovered from excess and obsolete aircraft at Davis-Monthan AFB.

More than 1,800 aircraft were torn down by AFLC's 2704th Aircraft Storage and Disposition Group during fiscal year 1961. As a result, an estimated $220 million worth of parts will be returned to the inventory.

In order to raise the 2704th to a point of maximum operational efficiency, a plan for necessary construction was adopted in December 1960. When completed, facilities will be grouped compactly, making possible increased production and savings in time and manpower.

Over-all responsibility for Air Force-wide selective management of materiel resources was given to AFLC early in the year. This encompasses programs, policies, and procedures that focus attention on specialized areas within the materiel field.

Under this concept, the three percent of all Air Force items that constitute from fifty to sixty percent of the costs are subjected to strict management controls. Controls are liberalized, on the other hand, on the bulk of items costing less than $10 each.

In the face of a nationwide shortage of engineers, AFLC took steps to improve its engineer recruitment program. These included the employment of professional recruiters at most of the major field installations, a program to employ young engineers from universities and plans for a joint AFLC/AFSC recruitment center. Approximately forty-four engineers a month were hired during the past year, reducing the average number of engineering vacancies per month from 129 to 113.

The role of AFLC is to support the Air Force wherever its mission requires it to be. In the years ahead, operations in space will constitute an increasingly important part of that mission. This is a fact that is bound to have an enormous impact on AFLC. The command's sensible horizons will stretch farther into space along with Air Force operations.

Recovery and reuse of space rockets, for example, would reduce costs by many millions of dollars. The Air Force, accordingly, is seeking ways of recovering at least first-stage boosters. The boosters would have to be rehabilitated so they could be used again. This job, undoubtedly, would be added to the functions of AFLC. So would the task of maintaining vehicles in space, an inevitable need of the future.

On the ground, in the air, and in the continuous operational medium called aerospace, the mission of AFLC—already one of vast dimensions and complexity—is moving into a future as limitless as space itself. —END

NEW NAVY...
NEW WEAPONS

New naval defense concepts are vital in these days of nuclear submarines and guided missiles. One of these: A destroyer-class hydrofoil boat guided to lurking enemy submarines by remote sonobuoys. Ford Instrument is now working to turn this new concept into operational hardware . . . one of the most recent efforts in our 46 years of service to all branches of the armed forces.

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DIVISION OF SPERRY RAND CORPORATION
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Ford Instrument guidance and control components participated in these missile and space "firsts": First Free-World man-into-space vehicle (MERCURY-REDSTONE) • First operational ballistic missile (REDSTONE) • First successful launching of a Free-World satellite • First successfully recovered nose cone • First successful Free-World space probe. 1.4

A CREATIVE TEAM OF SCIENTIFIC, ENGINEERING AND PRODUCTION TALENT

Gen. Bernard A. Schriever was named Commander of the Air Research and Development Command, predecessor to AFSC, in April 1959. From 1954 to 1959 he headed USAF's Ballistic Missile Division, part of ARDC, through the early days of United States missile development. He saw extensive duty as pilot and commander of heavy bombers in the Pacific in World War II.

USAF has concentrated all development and procurement of systems—space, aeronautical, electronic, and ballistic—in a single new "operating" command . . .

AIR FORCE SYSTEMS COMMAND

THE Air Force Systems Command came into being this year in one of the most important organizational changes in the history of the Air Force.

Creation of AFSC climaxed a two-year USAF study of systems management. The new command succeeded the former Air Research and Development Command and also assumed some of the duties of the Air Materiel Command. AMC was modified and became the Logistics Command in the same reorganization (*see page 150*).

The dramatic command changeover amounted to this. USAF concentrated all development and procurement of systems—space, aeronautical, electronic, and ballistic—in a single new command, AFSC.

The mission of this new command was to deliver complete, timely, and operable systems to using commands such as the Strategic Air Command, Tactical Air Command, and Air Defense Command. This mission included most of the research and development responsibilities handled by the former Air Research and Development Command, as well as the responsibility for systems procurement and production that belonged to AMC. The Systems Centers of the AMC were integrated into the new command.

ARDC's Commander, Gen. Bernard A. Schriever, became the first Commander of AFSC. Headquarters, AFSC, remained at Andrews AFB outside Washington, D.C., the home of ARDC.

In the past, ARDC had been responsible for research, development, and testing. AMC had been in charge of procurement, production, and logistic support.

The new USAF organization redistributed the resources and realigned functions and responsibilities. The task of providing all system programs from development and test through production, installation, and checkout delivery to the using command was assigned to the new Systems Command. It has four management divisions:

- Ballistic Systems Division, at Inglewood, Calif., responsible for the Atlas, Titan, and Minuteman programs.
- Space Systems Division, also at Inglewood, responsible for military space programs assigned to USAF and for development projects in support of the Army, Navy, and NASA.

Both of the above were made up of elements of the old ARDC Ballistic Missile Division and AMC's Ballistic Missiles Center.

- Aeronautical Systems Division, at Wright-Patterson AFB, Ohio, responsible for such programs as the B-70 Mach 3 bomber, the C-141 jet transport to be built by Lockheed, and the GAM-77 Hound Dog air-launched missile. It contains elements of the old ARDC Wright Aeronautical Development Division and AMC's Aeronautical Systems Center.
- Electronic Systems Division, at Hanscom Field, Mass., responsible for command and control systems such as the Ballistic Missile Early Warning System (BMEWS) and the Air Defense Control System used by NORAD. It was formed from elements of the old ARDC Command and Control Development Division and AMC's Electronic Systems Center.

On July 1, the new command acquired the Eastern, Central, and Western Contract Management Regions. On that date it also acquired the Aerospace Technical Intelligence Center, which was redesignated the Foreign Technology Division, AFSC.

In more general terms, the reorganization marked a major USAF response to the manifold challenges of the space age and advanced aerospace weapons technology. What USAF wanted to do with this important change was:

• Provide rapid decisions and accelerated action on designated system programs. This included the entire ballistic missile program.

• Ensure efficient, responsive management of the space development mission, major responsibility for USAF as management agency for the Department of Defense. Early in the year, DoD named USAF single manager for development of space systems.

• Provide for effective liaison and active participation by the Army, Navy, and National Aeronautics and Space Administration on projects being developed for these agencies by USAF.

General Schriever, in a briefing for Air Force Association Industrial Associate concerns late in the spring, declared that he considered AFSC "an operating command in every sense of the word." He also placed the new command in perspective in these terms:

"We are involved in a technological competition with the Communist world. How well we do in this competition will determine the role for this nation in the future and perhaps the survival of the nation. Events of the past decade have shown that technology could be the key to our survival. When Senator Jackson (D.-Wash.) studied the decision-making processes

SEE NEXT TWO PAGES FOR AFSC CHART

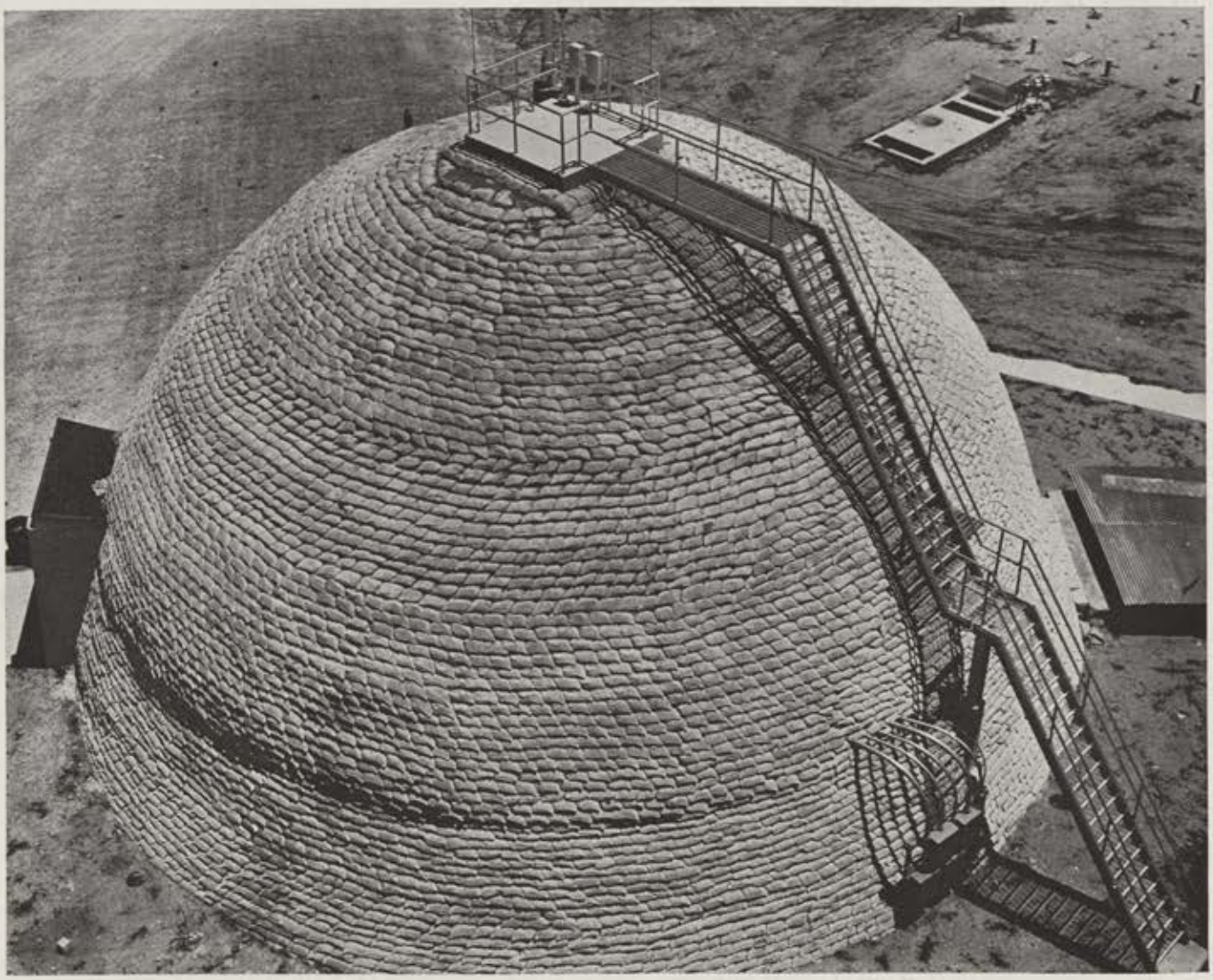
in our government, he concluded that our technology outstripped our management and the real need was for management improvement. One might conclude that the key to survival is the management of our technological resources. I believe that an important improvement has been made by the Air Force in the formation of the Systems Command."

The General thus underlined the command's giant over-all responsibility:

"The Air Force Systems Command has the complete responsibility for managing the acquisition of all system programs for development, test, and production through installation and checkout. Our mission is to deliver complete, timely, and operable systems to the using command."

The AFSC-AFLC reorganization actually included little relocation of personnel and facilities but a good deal in the way of realignment of management authority and responsibility. USAF—and most particularly

(Continued on page 165)



Minuteman ICBM blockhouse covered with sandbags at Cape Canaveral, Fla., an AFSC facility that plays central role in testing of new second-generation, solid-propellant missile. Blockhouse is concrete shell, two levels inside.

AIR FORCE SYSTEMS COMMAND

Headquarters, Andrews AFB, Md.

An **AIR FORCE** Magazine Chart (AS OF AUGUST 15, 1961)

Commander
Gen. Bernard A. Schriever

Vice Commander
Maj. Gen. James Ferguson

Assistant for Bioastronautics
Brig. Gen. B. A. Strickland

Chief Scientist
Mr. A. Wimer

Assistant Vice Commander
Col. T. P. Corwin

Inspector General
Col. W. R. Large

Administrative Services
Col. J. F. Rash

Information Services
Col. R. K. Jacobson

Surgeon
Col. J. A. Jarman

Chaplain
Col. S. M. Powers

Staff Judge Advocate
Col. R. W. Manss

DCS/Foregin Technology
Maj. Gen. H. E. Watson

DCS/Plans
Maj. Gen. J. F. Whisenand

DCS/Research & Engineering
Col. P. M. Butman (acting)

DCS/Systems
Maj. Gen. M. F. Cooper

DCS/Procurement & Materiel
Maj. Gen. C. H. Mitchell

DCS/Personnel
Brig. Gen. J. E. Dougherty

DCS/Comptroller
Maj. Gen. R. J. Friedman

Deputy Commander for Aerospace Systems
Los Angeles, Calif.
Lt. Gen. H. M. Estes, Jr.

AF Missile Test Center
Patrick AFB, Fla.
Maj. Gen. L. I. Davis, Commander

AF Flight Test Center
Edwards AFB, Calif.
Brig. Gen. Irving Branch, Commander

AF Missile Development Center
Holloman AFB, N. M.
Col. R. S. Garman, Acting Commander

Arnold Engineering Development Center
Arnold AFS, Tenn.
Maj. Gen. W. L. Rogers, Commander

Air Proving Ground Center
Eglin AFB, Fla.
Maj. Gen. R. H. Warren Commander

AF Special Weapons Center
Holloman AFB, N. M.
Maj. Gen. C. M. McCorkle

Armed Services Technical Information Agency
Arlington Hall Station, Va.
Col. J. O. Vann, Commander

CONTRACT MANAGEMENT REGIONS

Western CMR
Mira Loma AFS, Calif.
Brig. Gen. G. F. Keeling, Commander

Central CMR
Wright-Patterson AFB, Ohio
Col. D. W. Graham, Commander

Eastern CMR
Olmsted AFB, Pa.
Col. H. J. Mattia, Commander

Ballistic Systems Division
Los Angeles, Calif.
Maj. Gen. T. P. Gerrity, Commander

Vice Commander
Maj. Gen. Don R. Ostrander

Ass't Vice Commander
Col. J. H. Alston

Nike-Zeus Office
Col. L. L. Woodward

Minuteman System Program Director
Col. S. C. Phillips

Atlas System Program Director
Col. J. L. Zoeckler

Titan System Program Director
Col. J. L. McCoy

Deputy for Foreign Technology
Col. H. F. Bunze

Deputy for Technical Development
Col. W. W. Snavely

Deputy for Site Activation
Brig. Gen. A. C. Welling

Detachment #1
Norton AFB, Calif.
Lt. Col. George V. Lane

6555th Test Wing (Development)
Patrick AFB, Fla.
Col. P. R. Wignall, Commander

Atlas Site Activation Task Forces

Minuteman Site Activation Task Force

Titan Site Activation Task Forces

Chief of Staff
Brig. Gen. H. W. Powell

Comptroller
Col. E. W. Phillips

Ass't for Plans & Analysis
Col. C. Arnold (acting)

Ass't for Materiel
Col. R. E. Sims

Ass't for Foreign Technology
Col. D. W. Wickland

Foreign Technology Division
Wright-Patterson AFB, Ohio
Brig. Gen. A. J. Pierce, Commander

Space Systems Division
Los Angeles, Calif.
Maj. Gen. O. J. Ritland, Commander

Vice Commander
Maj. Gen. R. E. Greer

Ass't Vice Commander
Col. R. A. Berg

Deputy for Technical Development
Col. H. H. Eichel

Deputy for Launch Vehicles
Col. J. S. Bleymaier

Deputy for Satellite Systems
Col. H. L. Evans

Deputy for Space Test Operations
Vandenberg AFB, Calif.

Deputy for Foreign Technology
Col. J. C. Manatt

6593d Test Group (Development)
Edwards AFB, Calif.
Col. H. W. Norton

6565th Test Wing (Development)
Vandenberg AFB, Calif.
Col. J. J. Cody, Jr.

6594th Test Wing (Satellite)
Sunnyvale, Calif.
Col. A. N. Moore

Aeronautical Systems Division
Wright-Patterson AFB, Ohio
Maj. Gen. W. A. Davis, Commander

Vice Commander
Brig. Gen. D. M. Jones

Chief of Staff
Col. M. D. Wilson

DCS/Comptroller
Col. R. F. Amos

DCS/Materiel
Col. J. H. Wergen

DCS/Personnel
Lt. Col. F. R. Kaspereen

DCS/Plans & Operations
Col. R. D. Hale

DCS/Procurement & Production
Col. H. A. Budd

Deputy for Foreign Technology
Col. F. R. Feeney

Deputy for Equipment Management
Col. W. M. Davis

Deputy for Systems Management
Brig. Gen. A. T. Culbertson

Deputy for Engineering
Col. A. R. Walker

Deputy for Technology
Col. A. L. Wallace, Jr.

Deputy for Test & Support
Col. R. L. Colligan, Jr.

Directorate of Target & Armament Development
Eglin AFB, Fla.
Col. L. Baker

ASD Field Test Office,
Eglin AFB, Fla.
Col. G. M. McNeese

ASD Field Test Office,
Patrick AFB, Fla.
Col. L. T. Taylor

ASD Field Test Office,
Holloman AFB, N. M.
Lt. Col. W. J. Koral

ADS Field Test Office,
Edwards AFB, Calif.
Col. H. J. McIntire

Electronic Systems Division
Laurence G. Hanscom Field, Mass.
Maj. Gen. K. P. Bergquist, Commander

Vice Commander
Brig. Gen. C. H. Terhune, Jr.

Chief of Staff
Col. W. K. Kincaid

DCS/Comptroller
Col. R. D. Banker

DSC/Personnel
Col. J. W. Townsend

DCS/Materiel
Col. J. A. Trask

DCS/Plans & Operations
Col. G. W. McLaughlin

DSC/Procurement & Production
Col. W. A. Bennett, Jr.

Deputy for Advance Planning
Col. B. B. Townsend

Deputy for Systems Management
Col. N. J. McGowan

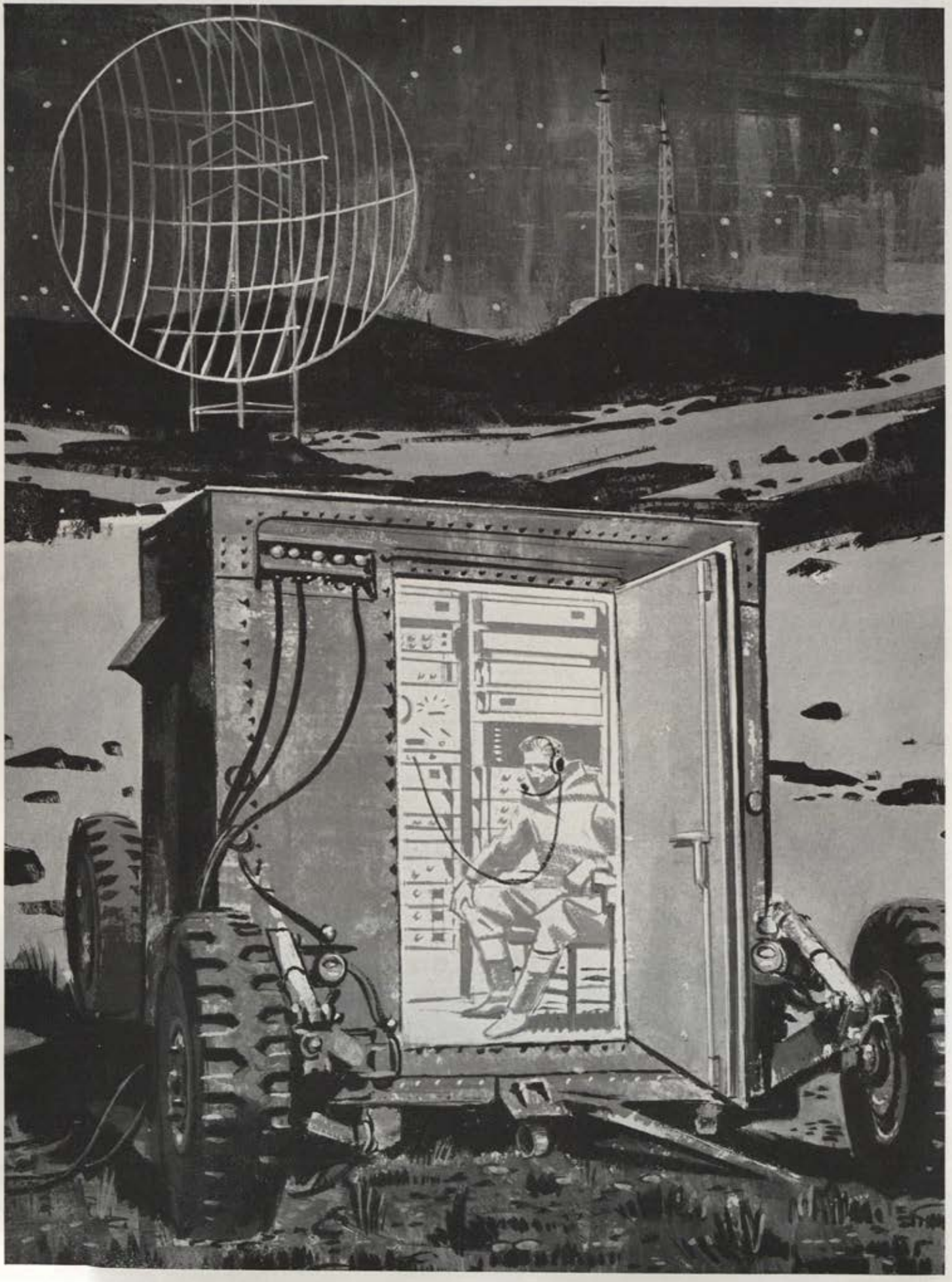
Deputy for Technology
Col. K. D. Coleman

Deputy for Installations
Col. D. S. Chamberlain

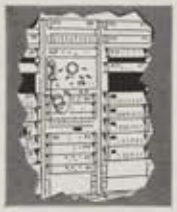
Deputy for Foreign Technology
Col. W. R. Ray

Rome Air Development Center
Griffiss AFB, N. Y.
Maj Gen. D. C. Doubleday, Commander

3245th Air Base Wing
Laurence G. Hanscom Field, Mass.
Col. G. C. Willcox



LENKURT TELECOMMUNICATIONS



help put the Air Force "in business"–anywhere

Today, the USAF can fly a complete multiplexing communications center into any area, and set it up in the field at a moment's notice.

It's the new AN/FCC-17 tactical communications package, designed, developed, and manufactured by Lenkurt Electric for the Rome Air Development Center. The 60-channel Tactical Communications Package is currently being delivered for use on Project 412-L Air Weapons Control System.

This fully transistorized universal multiplexer set is housed in a mobile tactical package, which provides 60 channels of high-quality voice, teletype, data and graphic communication—via microwave, troposcatter or cable.

The fixed-station version of the AN/FCC-17 will accommodate up to 600 channels.

Both versions are capable of 100% data loading and are designed to withstand all military environmental conditions, including the high shock levels at hardened missile sites.

The Lenkurt Multiplexer Set will serve as one of the standard systems throughout the USAF.

Lenkurt Electric multiplex and microwave systems have been used by the Armed Forces in many of the major telecommunications systems since 1953. Today, Lenkurt Electric is working on the most advanced systems for ground and space communications.

Lenkurt Electric Co., Inc., San Carlos and Los Angeles, California; Washington D.C.; Rome, New York.

LENKURT ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

Specialists in VIDEO, VOICE and DATA TRANSMISSION

RAIN

HAIL

THUNDER

LIGHTNING

ICE PELLETS, SLEET

HIGH DRIFTING SNOW

weather bird

Rain (••) hail (A) thunder (ϗ) lightning (ᚲ) ice pellets, sleet (✳) high drifting snow (✢) are merely symbols on a weather map—not expected to be problems to the U. S. Army's SERGEANT missile system.

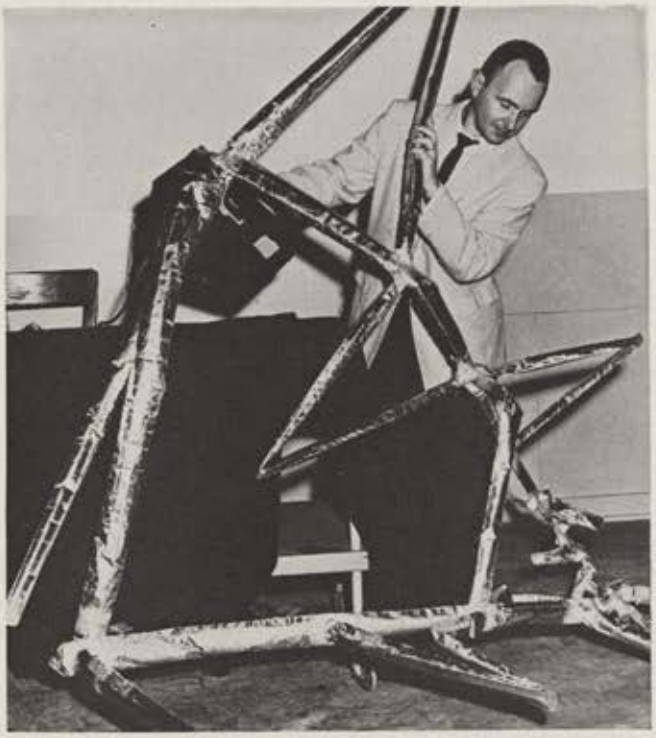
SERGEANT missile system's objectives are to be ready for action in the meanest weather, the most extreme temperatures and environments, at high and low altitudes. It can be checked out by one man with minimum training, emplaced and fired In a very short time by a six-man crew.

The land, sea and air-transportable SERGEANT system, produced for the Army by Sperry Utah—when it becomes operational—will take its place among the tough and dependable sergeants of U. S. Army tradition.

SPERRY

VISIT OUR BOOTHS 234-240; 333-339
AT THE 1961 AEROSPACE PANORAMA

SPERRY UTAH COMPANY, *DIVISION OF SPERRY RAND CORPORATION • SALT LAKE CITY, UTAH*



AFSC is deeply involved in space developmental projects. Above, a collapsible antenna proposed for space vehicles.

This is not a space suit, but AFSC-developed garb to protect radar technicians working on electronic antennas.

AFSC and the Logistics Command—phased smoothly into this new management setup as the year moved along.

As this process went forward, USAF developmental programs, prime concern of ARDC and now AFSC, swung along at an accelerated pace.

The year saw two successful Atlas ICBM test flights of over 9,000 statute miles, duplicating an Atlas record shot into the Indian Ocean in May 1960. The more recent of these two flights, in July 1961, was the first full-range Atlas flight to use inertial guidance.

Backing up Atlas is the second-generation liquid-fueled missile, the Titan, which was tested extensively during the year. An advanced version of this missile, Titan II, will be fueled by storable propellants and can be fired directly from an underground silo. A successfull test flight on May 3 from a silo at Vandenberg AFB, Calif., helped verify the design of the Titan II.

Minuteman, a smaller, simpler, less expensive solid-propellant ICBM, promises the advantages of a solid-fuel propulsion system. It will be capable of being stored indefinitely and of being launched on very short notice.

On February 1, 1961, a major milestone was achieved when the first operational prototype Minuteman missile successfully met its test objectives. All three stages fired as programed, and the missile traveled approximately 4,600 miles down the Atlantic Missile Range. Other tests were to follow.

Many of the advances made by the Air Force in missile technology—new knowledge about propulsion systems, design characteristics, and guidance techniques—have been relevant to the exploration of space. Versions of both the Atlas ICBM and Thor IRBM have been used as booster vehicles. The Thor—currently known as the "work horse" of space exploration—has been particularly useful in placing a variety of satellites into earth orbit.

One of the best known US satellite programs is the Air Force Discoverer series. Since the first Discoverer was sent into orbit in February 1959, a total of twenty-seven Discoverer satellites has been launched, nineteen of which achieved the desired polar orbit. On August 11, 1960, the data capsule from Discoverer XIII was successfully recovered from the Pacific Ocean—the first man-made object to be recovered after being in orbit. Since then five additional capsules have been recovered, four of them by air retrieval.

Beginning with Discoverer XVI in October 1960, the Agena-B was substituted for the earlier Agena-A orbiting vehicle. The Agena-B is larger and heavier than the Agena-A and can be restarted in space to achieve a change in orbit.

Begun as a research and development system, Discoverer has not only yielded a wealth of scientific knowledge, but has also been used in developing and proving the hardware, procedures, and techniques required in a variety of military satellite systems. It has proved to be a highly successful forerunner of the current series of Midas early-warning satellites.

At the same time, the past year has seen marked progress in the development of manned aerospace systems, which will continue to be an essential portion of Air Force strength. The B-52H bomber, an advanced model powered by high-performance turbofan engines, had its initial flights this year and has successfully test-launched the Hound Dog air-to-ground missile. The Hound Dog increases the effective range of the B-52 by hundreds of miles. It will be followed by the Sky-

(Continued on following page)

This 1,428-foot high television tower near Dallas, Tex., does double duty as the world's tallest meteorological research structure through a Systems Command contract.

bolt, an air-launched ballistic missile. And, in spite of uncertainty over the eventual size of the program, development work has continued on the supersonic B-70, a Mach 3 bomber.

In the future there will be a need for manned vehicles that can operate outside the earth's atmosphere. The first steps in development of such controllable, maneuverable vehicles have been taken through the X-15 program, which has shown dramatic progress. During the year the slim, black, rocket-powered craft, flown by Maj. Robert White, USAF, Joe Walker of NASA, North American Aviation test pilot Scott Crossfield, and Lt. Cmdr. Forrest Petersen of the Navy, attained a height of more than thirty-one miles above the earth's surface—beyond 99.9 percent of the earth's atmosphere—and speed of more than 3,600 miles an hour. Both higher altitudes and greater speeds are expected in the future.

The follow-on to the X-15 is the Dyna-Soar, a delta-winged glider that will be boosted by a modified Titan II. It will be capable of hypersonic reentry from orbital altitudes and velocities and will land normally at conventional airfields.

In support of Dyna-Soar and future programs, AFSC has conducted a series of studies of the high-altitude space environment, using the Blue Scout rocket, and has carried out a series of investigations in the bioastronautics area, studying such problems as weightlessness, space feeding, and radiation shielding. As part of the bioastronautics program, Capt. Joseph W. Kittinger, Jr., made a record nineteen-and-a-half-mile parachute jump from a balloon over southern New Mexico in August 1960. His safe descent after the record-breaking leap proved that it is possible for the pilot of a high-flying craft to bail out and survive.

Equally important achievements have also been made during the year in the electronics area. Two of the three gigantic BMEWS missile-warning radar stations became operational—the first, at Thule, Greenland, in the fall of 1960, and the second, at Clear, Alaska, in the summer of 1961. These are planned to provide a fifteen-minute warning of surprise missile attack on this continent, so that our offensive and defensive forces can begin to take effective countermeasures. A third BMEWS is now being built in northern England.

A short warning period requires the speediest possible command and control systems for our aerospace forces. Among those being developed by AFSC are the NORAD Combat Operations Center which provides the NORAD Commander with instant access to status of air defense forces and the means to control them; the Strategic Air Command Control System which through automatic data-processing and display gives the same capability to the SAC Commander; and the Air Communications System, which will assure inter- and intrasystem communications services to support global Air Force operations.

These are but a few of the many aerospace systems for which the development and procurement are being directed by AFSC. Its total range of responsibility—which involves the spending of forty percent of the Air Force annual budget—includes a variety of additional systems. These range from tactical and air defense missiles, designed for current requirements, to segmented solid-rocket engines and ion propulsion systems that may see extensive use later on. They include tactical aircraft such as the V/STOL fighter, and support aircraft such as the C-141 transport.

In this way AFSC carries out a double responsibility. Its first task is to acquire the superior aerospace systems that the Air Force needs today and tomorrow. But it must also look ahead to the day after tomorrow, and much of AFSC's current applied research is directed toward the defense requirements of coming years.

Speaking of future requirements, General Schriever pointed out in a recent speech, "We must strengthen our military space program for the decade ahead . . . and develop the basic space capabilities required for future utilization of space. I think these to be the ability to: (1) reliably place large payloads in orbit by 1965; (2) navigate and maneuver; (3) deorbit and land; (4) transport, support, and utilize man in space; (5) rendezvous; and (6) construct manned and unmanned space stations.

"If we do these things," he added, "we can put our nation in the forefront of space achievement. . . . There is no reason why we cannot achieve all our goals in space."

This vision and determination represent the spirit to be found in AFSC. Its more than 70,000 officers, airmen, and civilians recognize that in their hands lies the continuing strength of the US Air Force—strength that is vital for the United States and the entire free world. —END

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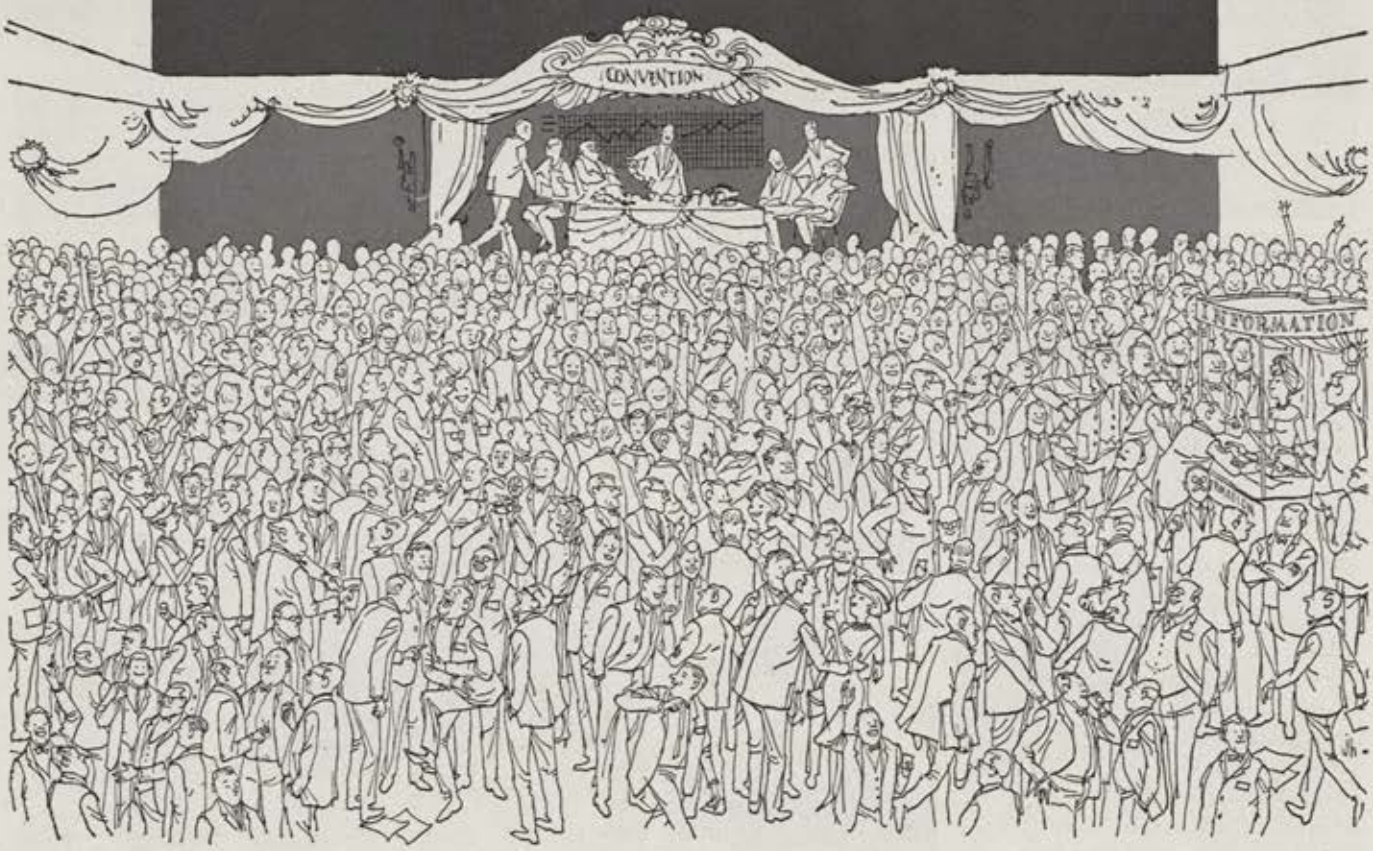

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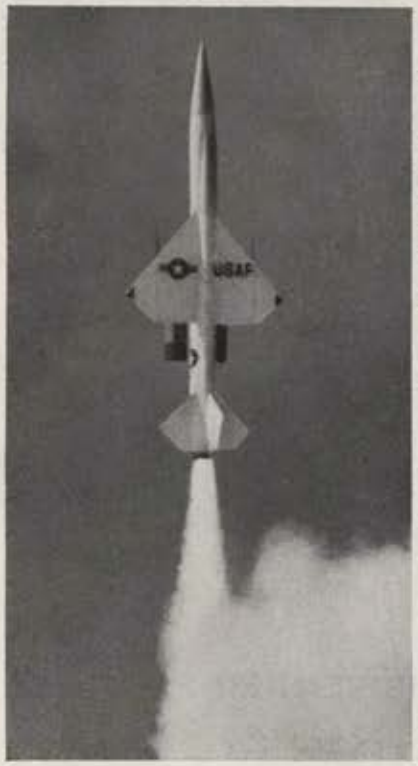

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Maj. Gen. Harold W. Grant, first Commander of the new Air Force Communications Service, was previously Director of Telecommunications under USAF's Deputy Chief of Staff for Operations. He served in communications posts in Europe and the Pacific in World War II and saw extensive service in the Far East after the war prior to assignment to his post under DCS/O.

Modern requirements in command and control have dictated the creation of a sixteenth major Air Force command responsible for all communications and navigational aids . . .

AIR FORCE COMMUNICATIONS SERVICE

THE sixteenth major command of the Air Force was created on July 1, 1961, to be the single operator for Air Force communications. The establishment of a single agency to be responsible for communications and the operation of electronic aids to air navigation for all commands of the Air Force was a command decision, as Gen. Curtis E. LeMay, Air Force Chief of Staff stated, ". . . in keeping with the express desires of the President for improved means of effecting command and control of our forces."

The decision came after years of study. Over the years, tremendous strides had been made in the modernization of communications techniques. Equipment had been developed to match operational requirements. However, organizational changes for managing the highly sophisticated communications systems had only recently caught up with the state of the art, and the rapidly advancing organizational concepts of the rest of today's streamlined Air Force.

The MATS Airways and Air Communications Service had been charged with operating a long-haul communications system for the Air Force for the past twenty-two years. Worldwide in scope, it required the services of approximately 30,000 skilled technicians. During the same period of time, the individual commands, responding to requirements of their own, developed communications systems manned by an additional 30,000 people, outside of AACS.

The activation of the AFCS came as the last of three organizational steps taken by the Air Force to improve Air Force communications management. The first step was the creation of a central communications and electronics procurement and logistics agency in the Rome Air Materiel Area, N. Y., and the creation of the Ground Electronics Engineering and Installation Agency (GEEIA), to accomplish all Air Force engineering and installation of ground communications-electronics equipment.

The second step was the establishment of the Command and Control Development Division of the Air Research and Development Command (later redesignated the Electronic Systems Division of the Air Force Systems Command) for development, integration, and procurement of command and control systems under the management of a single Air Force agency.

All communications operating functions are now being consolidated in AFCS to guarantee system integrity for all Air Force needs; to assure responsiveness, flexibility, and dependability to meet total Air Force communications requirements; and to respond, as well, to the needs of the individual commands.

Presently, AFCS is composed of approximately 32,000 communications and air traffic control technicians (30,000 former AACS personnel and an additional 2,000 from other commands working in more than 300 locations in forty-six of the fifty states and in thirty-five foreign countries). AFCS is a tenant command. Although it has no bases of its own, its units operate on every Air Force base in the world and at some remote installations manned only by AFCS personnel.

As the communications functions of all Air Force commands are integrated during the next two years, strength of AFCS will grow to more than 50,000 men. Although this represents a significant growth to AFCS, there will be an over-all saving in manpower for the Air Force.

In summarizing the mission of the AFCS, it may be said that this command is charged with providing the Air Force with two distinct services: **flight facilities**—to provide commanders with the means to launch

(Continued on following page)

General Grant and his deputy, Maj. Gen. Donald P. Graul.

and recover manned aerospace weapons in all weather conditions; and **worldwide communications**—to provide commanders the capability to coordinate all elements of the Air Force so that the full combat potential of the mixed force of manned and unmanned weapons may be brought to bear in any given situation.

Flight facilities for the Air Force are organized as a common system of en-route and terminal navigational aids and air traffic control facilities—control towers, airways stations, beacons, TACANs, GCAs, etc.—deployed worldwide. These services are coordinated with the Federal Aviation Administration in the United States, and with the International Civil Aviation Organization and the sovereign governments concerned overseas.

The total capability of AFCS by 1963 will include not only interbase communications in an integrated worldwide system, but intrabase communications as well.

The prime capability for interbase communications is contained in the Aerospace Communications Complex (AIRCOM). The nucleus of this complex is a ten-station network of Plan 55 automatic communications relay centers. Each Air Force operating location throughout the world is linked, ultimately, to this network of high-speed automatic switching centers, and through them, to all other Air Force operating locations throughout the world.

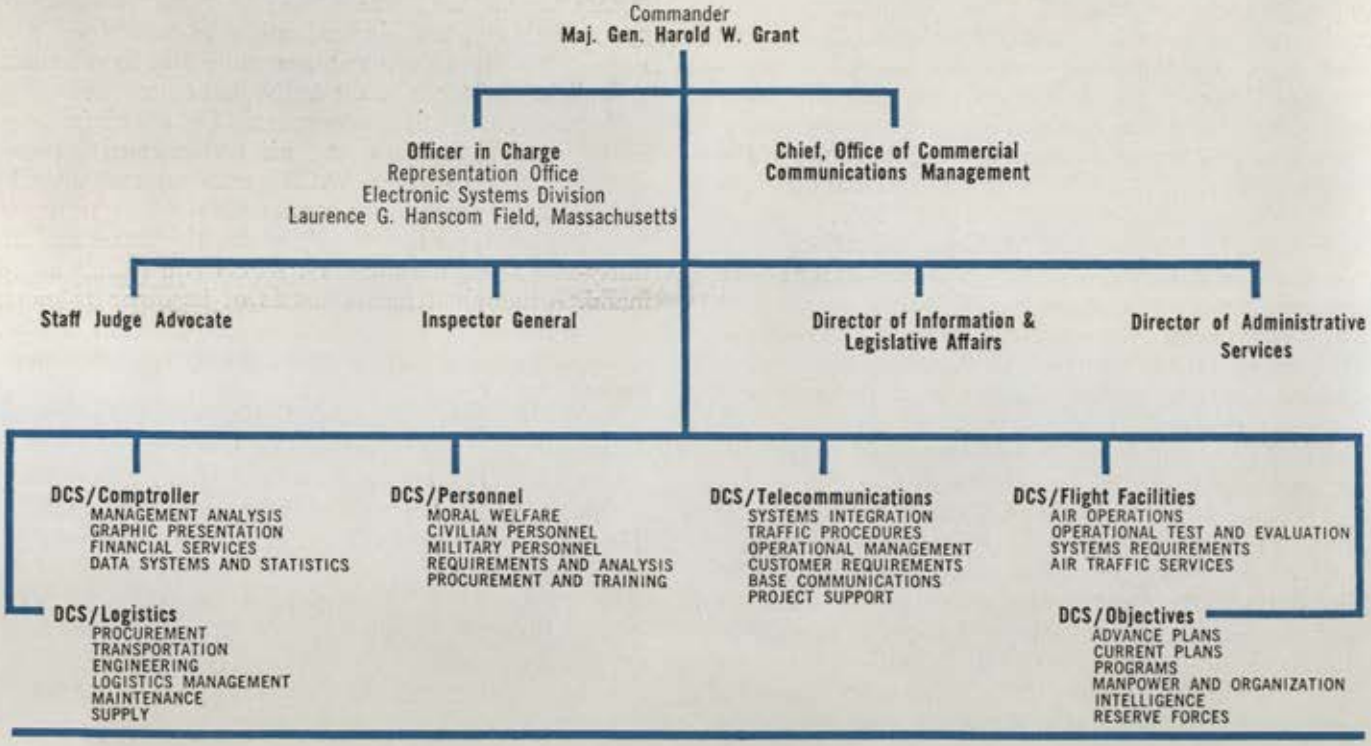
Intrabase communications facilities for which AFCS will become responsible include base telephone systems, message centers, intercom systems, maintenance and supply expediter systems, air police security networks, and the Air Force Division Military Affiliate Radio System (MARS).

An additional current responsibility of the AFCS is the management of contracts for commercial communications service for all commands of the Air Force. The function is accomplished by a 154-man unit called the Office of Commercial Communication Manage-

(Continued on page 175)

AIR FORCE COMMUNICATIONS SERVICE

Headquarters, Scott AFB, Ill.



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A-1217-V4*	1700-2000	0.0005	25	5
A-1119*	2000-4000	0.001	20	12
A-1207-V5*	2190-2310	0.001	20	4.5
A-1207-V10*	3500-4000	0.001	25	5
A-1139*	1000-2000	0.01	20	12
4019	1000-2000	0.01	28	17
4017	2000-4000	0.01	30	16
4020	4000-7000	0.01	28	18

PPM POWER TYPE TRAVELING-WAVE TUBES (listed by Power-Frequency Ratings)

4009	2000-4000	0.01	33	—
A-1140*	8000-12000	0.01	33	—
A-1215*	12000-15000	0.01	30	—
A-1189*	4000-7000	0.1	30	—
4021	1000-2000	1	27	—
4010	2000-4000	1	33	—
A-1205*	4000-7000	1	30	—
4015	8000-12000	1	33	—
A-1225*	12000-15000	1	30	—
A-1093*	1700-2300	15	27	—
A-1160*	2000-4000	10#	25	—
A-1181*	7500-11200	25#	27	—
A-1136*	5000-6000	50#	30	—
A-1179*	2000-4000	80#	23	—
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Type No.	Description	Max. Dimensions (in.)	
		Length	Diam.
A-15131*	CW integral-cavity type for fixed-tuned oscillator service—300 mw useful power output. Variants available to cover 50 Mc intervals, 975-1225 Mc.	4.6**	0.98▲
A-15132*	Similar to A-15131, but for pulsed-oscillator service—500-watts peak useful power output.	4.6**	0.98▲
A-15227*	CW integral-cavity type for fixed-tuned oscillator service—300 mw useful power output. Variants available to cover 100 Mc intervals, 1800-2250 Mc.	2.5**	1.0▲
A-15228*	Similar to A-15227, but for plate-pulsed oscillator service—300 watts peak useful power output.	2.5**	1.0▲
A-15235*	CW integral-cavity type for fixed-tuned oscillator service—50 mw useful power output. Variants available to cover 100 Mc intervals, 3000-3450 Mc.	5.5**	1.0▲
A-15236*	Similar to A-15235, but for plate-pulsed oscillator service—50 watts peak useful power output.	5.5**	1.0▲
7552	For low-noise, Class-A service at altitudes up to 100,000 ft. without pressurization. 13 db min. power gain for 5 Mc Bw.	1.62	0.557
7553	Similar to 7552, but has additional performance and environmental features. 14 db min. power gain for 5 Mc Bw.	1.62	0.557
7554	For low-noise, class-C service at altitudes up to 100,000 ft. (at reduced ratings without pressurization). 1.6 watts power output at 500 Mc.	1.62	0.557
A-15205*	Similar to 7554, but for plate-pulsed oscillator service—250 watts peak useful power output.	1⅜	9/16

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SS-100*	L-Band, mechanically tunable tunnel-diode type	SS-500*	L-Band, tunnel-diode type	6521	5400 ±20	75	None
SS-104*	L-Band, electronically-tunable tunnel-diode type	SS-1000*	S-Band helix-type parametric amplifier	7008	8500-9600	200	Servo
SS-107*	UHF and into S-Band, fixed-tuned tunnel-diode type	SS-1001-V1*	S-Band helix-type parametric amplifier	7111	8500-9600	200	Hand
		SS-1002*	L-Band mechanically tunable low-noise parametric amplifier				

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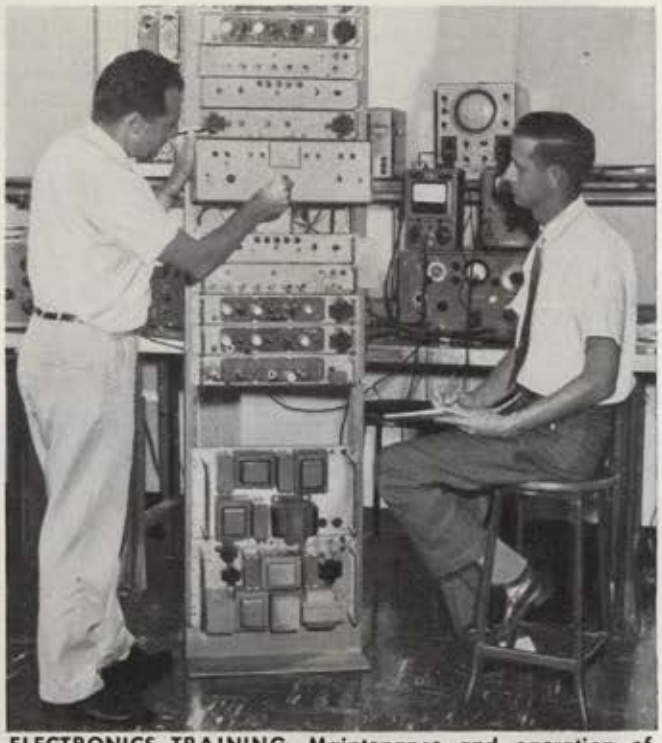

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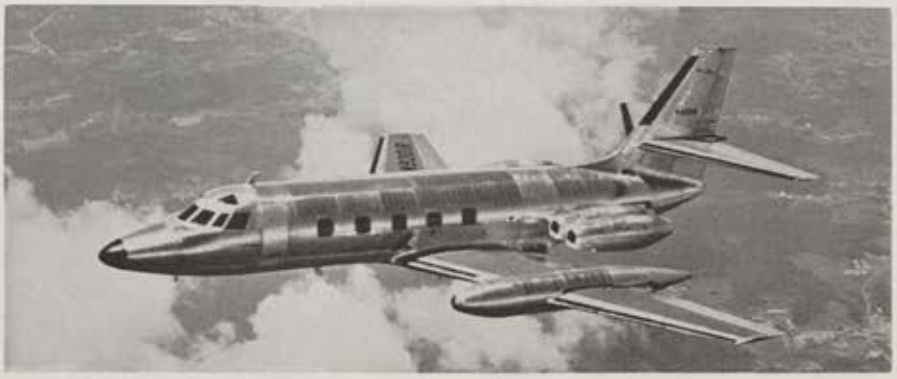


New AFCS is responsible for electronic aids to navigation. Right, a C-140 JetStar in use by command to make in-flight inspections of navigation aids.

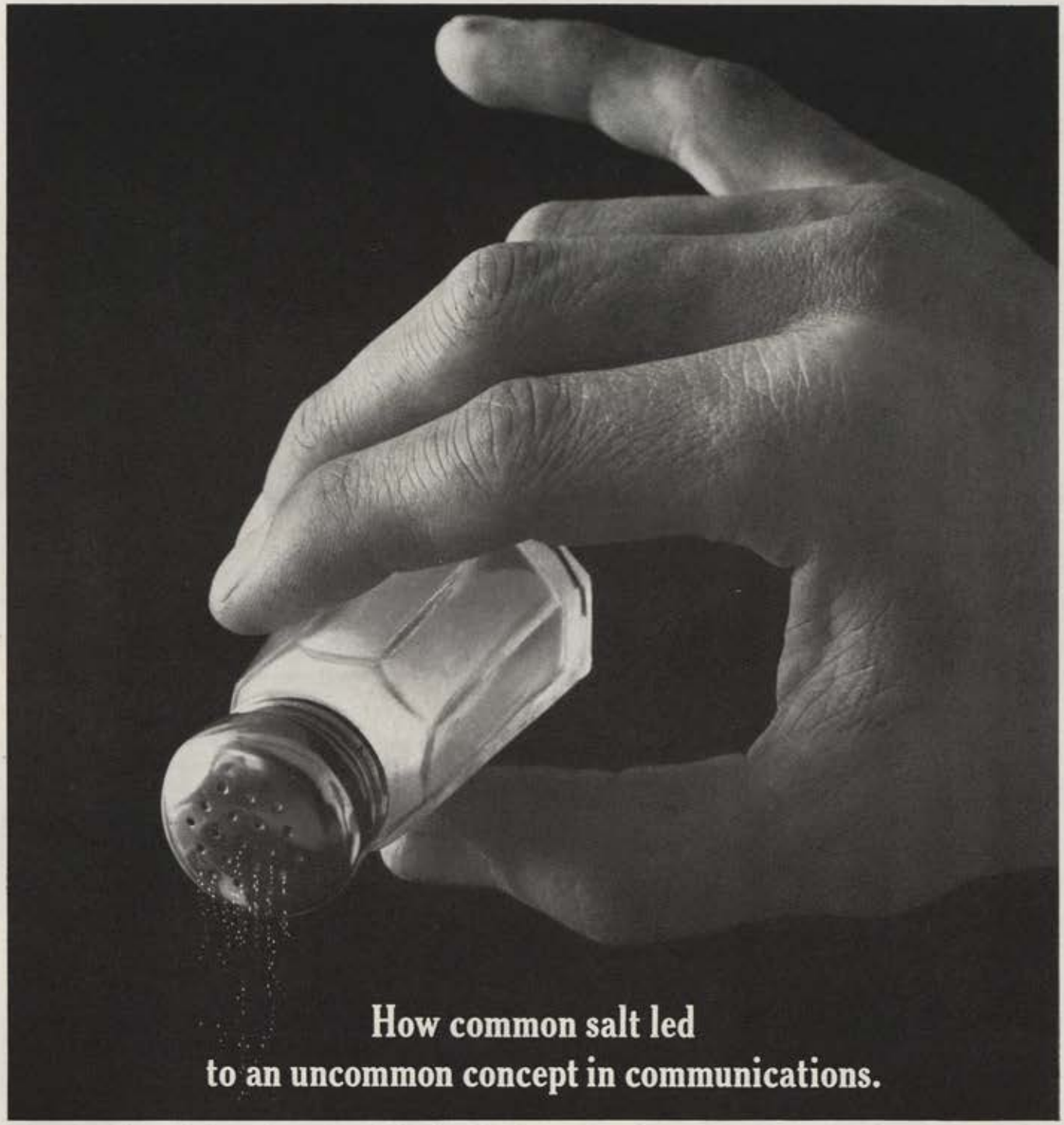
USAF's sixteenth major command also has assumed over-all responsibility for worldwide communications in line with requirements of modern age of weaponry. Left, basic communications functions being performed at Carswell AFB, Tex.

ment. So effective have the operations of this office been that it is expected to assume similar responsibilities for the Department of Defense in the near future.

The integration of the Air Force's communications operating capability within one command will make possible major operational and management improvements including:

- **Improved operational reliability**—through standardization of equipment, maintenance and operating procedures, and communications control techniques.
- **Improved operational flexibility**—because as much of the total Air Force communications operating resource as necessary may be brought to bear on a single mission.
- **Improved personnel management and career monitoring**—because most of the communications operating personnel will be in one command.
- **Improved input to the Air Training Command**—as the prime employer of communications operating personnel, AFCS can test and evaluate the output of the communications schools, and can recommend training needs of the future.
- **Improved "systems thinking" input to the Air Force Systems Command**—because AFCS will be a prime planner for future communications systems.
- **Improved liaison with the communications industry**—because AFCS, as the prime user of communications equipment, will be the major source of communications operating experience.
- **Improved responsiveness to the Defense Communications Agency**—because AFCS will be a single point of contact for Air Force communications operations.

This then, is AFCS—the Air Force Communications Service—created to improve the operational capability of the Air Force—created, once again to quote General LeMay, ". . . to provide commanders with the reins of command."—END



How common salt led to an uncommon concept in communications.

An unusual new device to increase radio reflectivity, now under development at Northrop's Radioplane Division, may well revolutionize the field of space communications. Called ADSAT (for Anomalous Dispersion Spherical Array Target), it should extend the usefulness of passive communications satellites out to 22,000 miles—the 24-hour orbit.

The germ of the ADSAT idea actually came from early X-ray diffraction experiments with ordinary salt crystals which yielded a pattern of intense bright and dark spots. This hint of resonance with the crystal lattice led Northrop researchers to attempt to duplicate this effect at radio frequencies—and the first version of ADSAT looked much like a molecular model, with silver-coated ping-pong balls serving as "atoms." The size of the balls and the intervals between them were carefully calculated to resonate with and reinforce the incoming frequencies.

In its present, basic form, the ADSAT satellite is a collapsible, spherical network, 100 to 400 feet across, with the resonant balls at each intersection of the network. It is designed to be launched in a small package, and inflated in orbit, much like Echo. The reflected signal, however, can be 1,000 times as strong as that obtained from a simple, Echo-type target of equal size.

The development of the ADSAT concept demonstrates once again Northrop's unique ability to visualize problems in space technology, decide what should be done, and come up with solid, workable answers.

RADIOPLANE
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Lt. Gen. Joe W. Kelly, Jr., took command of MATS in June of 1960. Prior to this he commanded ARDC's Air Proving Ground Center, Eglin AFB, Fla. He was USAF Director of Legislative Liaison from 1953 to 1958, after a tour as Commander of FEAF's Bomber Command. General Kelly commanded a B-26 bomb group in Europe during the second World War.

Progress in mobility and modernization herald the beginnings of a true space age airlift capability for the superb US aerial transport force . . .

MILITARY AIR TRANSPORT SERVICE

FOR the Military Air Transport Service, Commanded by Lt. Gen. Joe W. Kelly, Jr., fiscal year 1961 was a year of change and progress—in airlift mobility and modernization, in Reserve Forces programing, in commercial contract augmentation, in joint strategic airlift exercises, and in support of the expanding US missile and space programs.

It was, at the same time, a year in which one thing remained grimly the same—the necessity for unremitting MATS D-Day readiness combined with the ability to meet global emergency airlift demands in response to *any* degree of emergency.

That ability was put to the test shortly after the fiscal year began, when political turmoil in the newly independent Republic of the Congo led to the call for a stabilizing influence in the form of United Nations forces. Airlift—to bring food to a shattered economy, to evacuate refugees, and to deploy the UN forces from the near and far corners of the globe—was the order of the day, one that was to develop into a very large order indeed.

The UN Congo Airlift, or "Operation New Tape" as it was called, continued in varying degrees throughout the year and showed no signs of immediate termination when FY 1961 ended. As many as fifty-nine MATS C-124 Globemasters, operating under control of USAFE's 322d Air Division, with 322d support, were committed to this airlift at one time. By the year's end, the C-124s had flown 28,405 Congo hours, more than 700 round-trip missions, (some longer than 23,000 miles, with an average round-trip distance between France and the Congo of 11,600 miles), and had airlifted more than 25,139 troops of seventeen nations and 4,490 tons of their equipment to and from Congo.

Like Exercise Big Slam/Puerto Pine and the humanitarian Amigos Airlift to Chile of the previous year, the Congo experience underscored one vital fact. In order to provide swift global mobility for all the US armed forces, the strategic airlift forces and technical services of MATS must themselves be capable of worldwide mobility no matter how unfamiliar the routes or inadequate the facilities encountered in the remote areas of the world. Much effort during this fiscal year was devoted to the distillation of experience, previous lessons, and airlift judgment into a Mobility Manual (MATS Manual 2-2) to provide a quick reference and source of guidance as to what personnel and materiel resources are required to handle a specific aircraft flow through an en-route or turn-around station.

In effect, by prescribing the modules or building blocks from which varying degrees of capability may be assembled, this manual constitutes the basic guidance for planning and conducting mobile airlift operations in support of contingency requirements anywhere in the world.

However, if self-contained mobility depends upon this cellular approach to degrees of requirement and varying conditions, it is equally a function of the aircraft available to the MATS global airlift force, and is directly related to such limiting characteristics as speed, range, flexibility, and carrying capacity. For that reason, it is significant that fiscal 1961 was also the historic Year One of airlift modernization, beginning as it did with the appropriation of $310.8 million for the purpose, and ending with the delivery of the first two Boeing C-135 jet Stratolifters to MATS Eastern Transport Air Force.

Of the $310.8 million appropriated by the 86th Congress, $50 million was for the start of development work on an optimum jet cargo aircraft, and $250 mil-

(Continued on following page)

lion was specifically for MATS modernization through procurement of currently available aircraft types. In December 1960, as the first step in this long-range program, the Air Force issued a letter order for sixteen C-130E turboprop cargo and troop-carrying aircraft, an extended-range version of the proven C-130B Hercules.

Following President Kennedy's order for immediate airlift buildup in his January State-of-the-Union message, the procurement of thirty Boeing C-135 jets, delivery to begin at a two-per-month rate in June 1961, and the acceleration of the C-130E program to deliver a total of fifty between March 1962 and March 1963 was announced.

Shortly thereafter, the competition for design and production of the optimum airlift aircraft, to be designated the C-141, was won by the Lockheed Aircraft Corporation. The contract which was awarded is expected to total $1 billion over a ten-year period, with delivery forecast to begin sometime in fiscal year 1965; until that time, increased mobility effectiveness for MATS—and for the Air Force, Army, and Navy combat forces which look to MATS for global airlift—will depend upon the interim modernization represented by the C-135 and C-130E.

Early in June 1961, the first two C-135s were delivered to MATS at McGuire AFB, N. J., and the long-awaited airlift modernization program became a concrete fact.

New and refined mobility concepts and new aircraft capable of translating those concepts into reality keynoted this fiscal year. But total US airlift capability was boosted in still another way when responsibility for the supervision of training and inspection of MATS-assigned D-Day units of the Air National Guard was transferred to MATS from CONAC during the year. The two Air National Guard C-97 wings with their six squadrons, which originally joined MATS in FY 1960, considerably enhanced their capability to provide backup airlift this past year. From the receipt of the first C-97 in January 1960 through June 1961, these units have flown a total of 22,697 accident-free hours. They have flown cargo missions over MATS wartime routes to both the Atlantic and Pacific areas.

These six original ANG squadrons, with only one week's notice, flew a total of thirty-four transpacific missions between May 1 and 15, airlifting 160 tons of cargo in seventeen California-Japan round trips and seventeen between Travis AFB, Calif., and Hickam AFB, Hawaii. Attaining an over-all reliability rate for these thirty-four missions of better than seventy-seven percent, the Guard units vividly demonstrated their ability to surge into activation, foreshadowing the effectiveness with which they can respond to their wartime mission as backup forces for MATS. By the end of the year, eleven C-97 squadrons were included on the MATS global airlift team.

As the year came to a close, the ANG C-119 Aeromedical Transport Squadrons had increased to a total of nine units with ninety aircraft. Between January 1960 and June 1961, they flew 21,323 domestic medical airlift hours without accident.

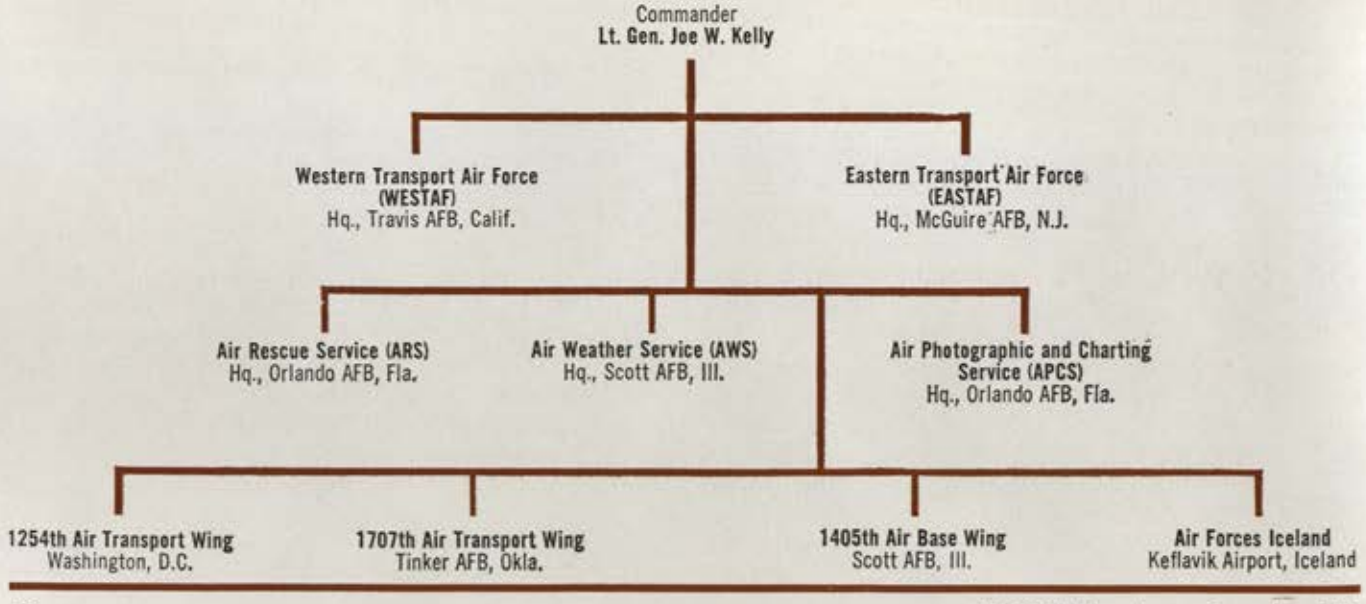
As to commercial contract augmentation, this was the year in which MATS instituted the movement of DoD passengers to and from overseas areas through the use of regularly scheduled commercial airlines. Category "A" airlift was established as "the movement of individually ticketed passengers on regularly scheduled commercial flights in less than plane-load lots." The purpose was to supplement plane-load lots of personnel and/or cargo that were contracted for. The year also marked the first commercial jet service to Europe and the Far East under MATS contract procedures.

It was a year of negotiated contracts, of specific commercial rate "floors" prescribed by the Civil Aeronautics Board, of the requirement that contract car-

(Continued on page 181)

MILITARY AIR TRANSPORT SERVICE

Headquarters, Scott AFB, Ill.



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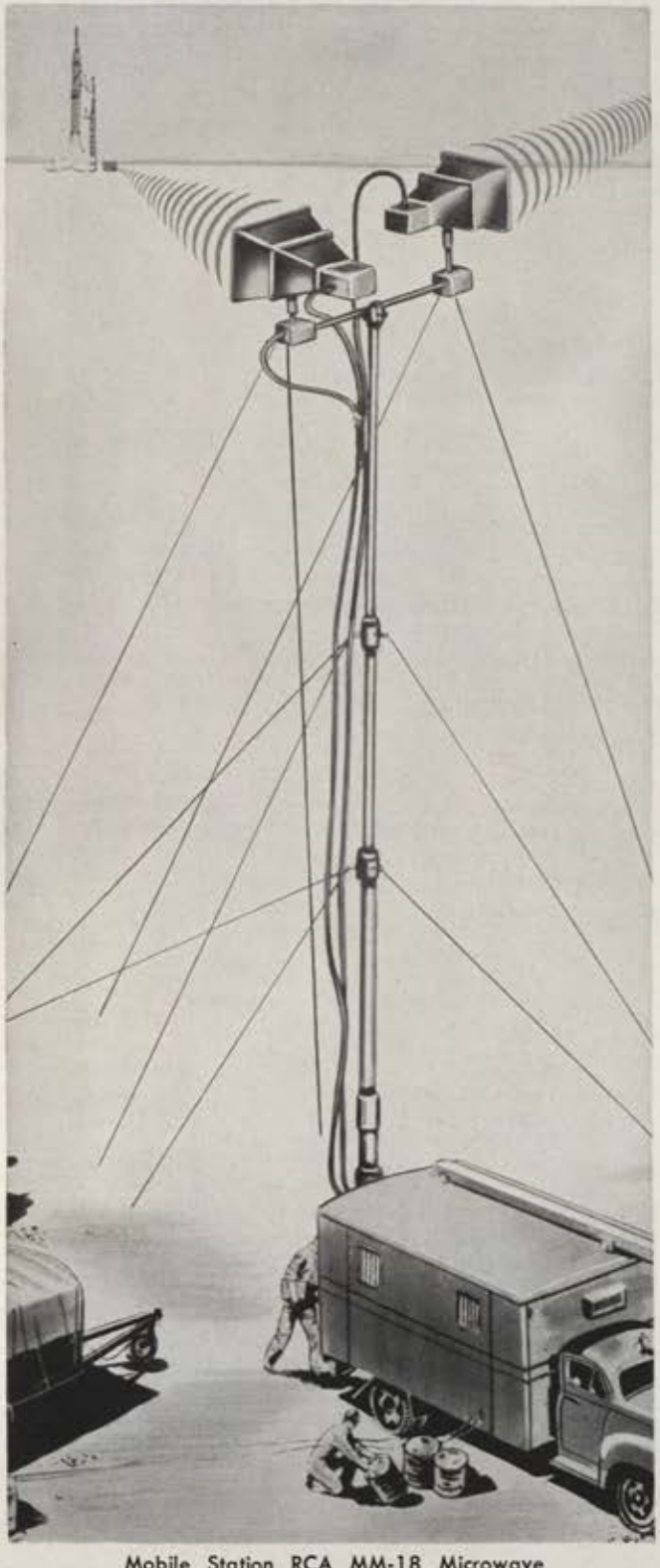

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Standard MM-18 Microwave packages are available from RCA to provide extremely flexible communications systems for mobile applications. Similar to famous RCA equipment that has been proved in use by over a million channel miles, this MM-18 Mobile System provides a broad radio highway over which many teletype channels and duplex voice channels can be operated simultaneously. The directivity of the radio beam and the multiplexing of the communication channels assure a high degree of security for transmitted messages. Truck-mounted, the portable RCA Microwave System also includes a tower that can be rapidly raised and easily transported from one place to another. RCA Mobile Microwave performance matches the reliability found in fixed stations.

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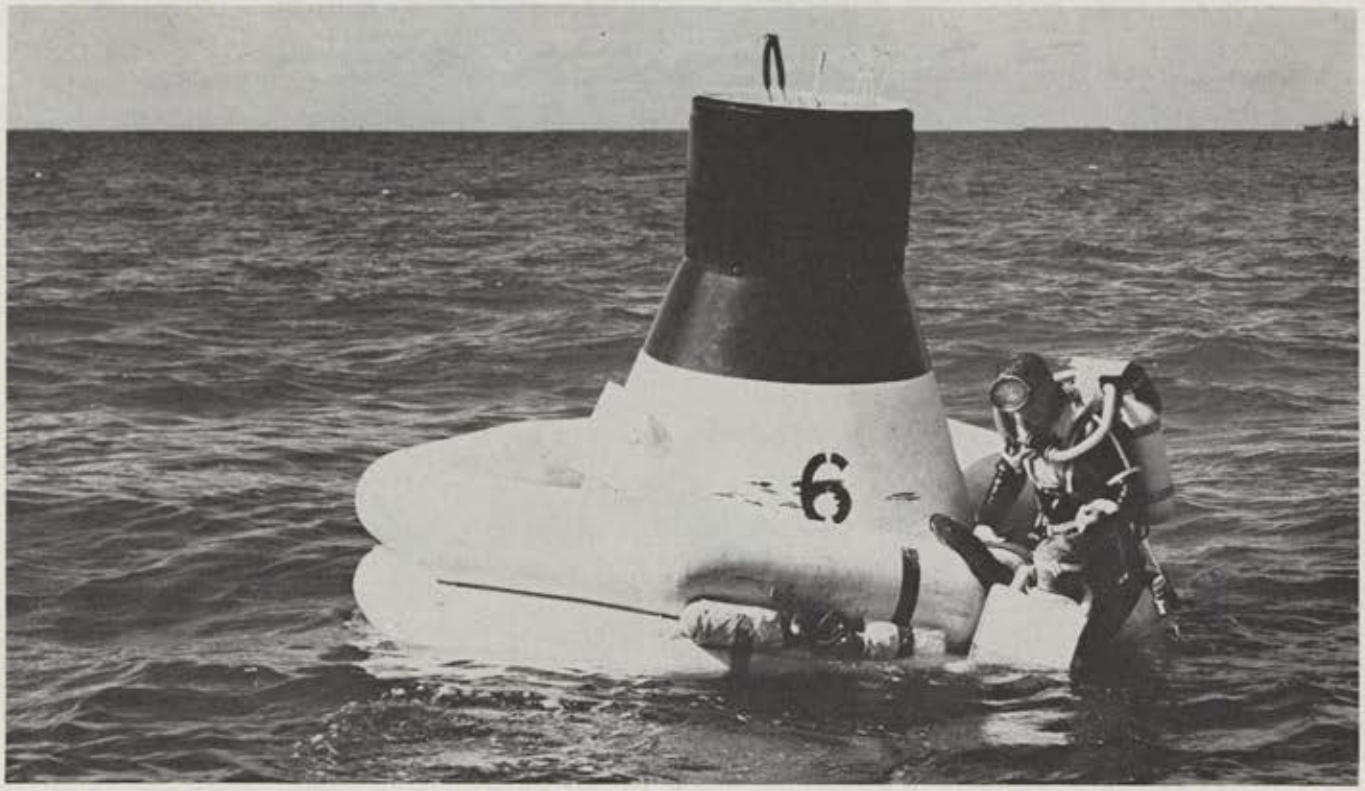

MATS Air Rescue Service men train for Astronaut recovery. One crew pulled a Discoverer capsule out of sea in June.

riers be committed to the Civil Reserve Air Fleet, and of the highest annual amount paid to the airlines by MATS to date for overseas air transportation. The total was $111.8 million, of which $24.8 million was for airmail and $87.0 million for the airlift of military cargo, personnel, and ordinary mail. This figure compares with $70.4 million and $64.1 million, respectively, for the previous two years under Industrial Fund operations. Airmail costs must, of course, be added for proper comparison.

In addition to worldwide logistical airlift for the Army, Navy, and Air Force and the commitment to the Congo Airlift, MATS continued throughout the year to supply large amounts of special assignment airlift for all US forces and for joint mobility and strategic airlift tests and exercises.

In support of Strategic Air Command rotations and tests, for example, 276 missions were flown in 1961 to airlift 5,784 personnel and 2,061 tons of cargo. In the case of the Tactical Air Command, the figures were 141 missions, 4,167 people, and 982 tons. These encompassed such SAC operations as Jack High, Air Mail, Reflex Action, Rabble Rouser, and Texas Star, and for TAC, Junex Blue V, Cross Switch, and Broadway Bill.

In conjunction with the Strategic Army Corps, and on occasion with both STRAC and TAC, such joint mobility exercises as Bright Star/Pine Cone III, South Wind, Snow Chute, Willow Freeze, Long Pass, and Lava Plains were conducted in 1961. From the global airlift point of view, perhaps the most significant of these was Operation Long Pass.

Long Pass, carried out in February 1961, involved the airlift of STRAC and TAC personnel and equipment from the United States to the Philippines and return. The one-way distance of 7,600 miles provided a realistic test of strategic airlift, and the airlifted forces and equipment went immediately into tactical maneuvers in support of air and ground forces based in the Pacific theater. The total force from the US numbered 1,700 troops and 1,400 tons of combat equipment.

This was also the fourth consecutive year in which a MATS airlift task force furnished long-range support to the US Navy scientific Antarctic project, Operation Deep Freeze. In some of the worst flying weather and communications conditions in the world, MATS crews on Deep Freeze VI flew more than 3,700 hours, airlifting 881 tons from Christchurch, New Zealand, to McMurdo Sound, Antarctica. From that point they airdropped close to 1,100 tons of equipment at South Pole and Byrd Stations in sixty-eight drops. Included in this year's Deep Freeze cargo were two Swiss snowmilling machines, grossing out at 36,000 pounds each. The millers, capable of hacking out sixteen-foot-deep trenches in the Antarctic ice, were airlifted by C-133 from France to the United States to New Zealand, then dismantled and loaded aboard C-124s for the flight to McMurdo Sound.

In the missile and space area, MATS airlift and technical service forces continued and increased their support of all military departments and the National Aeronautics and Space Administration. Having already demonstrated its ability to carry both Atlas and Titan intercontinental missiles, the MATS airlift force on August 1 operated the first airlift of the solid-fueled Minuteman ICBM. The second and third stages were carried in two C-124s, while the first stage

(Continued on following page)

MATS planes took part under USAFE control in giant Congo Airlift this year. Here Congolese unload big MATS C-124.

—grossing 71,500 pounds with its solid propellant—was airlifted in the C-133 Cargomaster. Meanwhile, MATS airlift of the fleet ballistic missile Polaris to US Navy submarine bases was in progress and, as the year ran out, plans were being made by NASA and the Douglas Aircraft Company for the "piggy-back" airlift of the second-stage Saturn S-IV rocket atop a modified MATS C-133.

Airlift in support of NASA's Project Mercury continued, with a total of twenty-nine missions carrying seventy-nine people and 239 tons of space cargo.

The MATS **Air Rescue Service** had its specialists and technicians standing by around the world, trained and ready to recover the first and second US Astronauts if their point of impact had varied from the programed target area. In June 1961, three ARS pararescuemen, trained in jumping, medical techniques, survival, and scuba-diving, parachuted into the Pacific Ocean from an SC-54 Rescuemaster to recover and secure the instrument capsule of Discoverer XXV.

The **Air Weather Service** of MATS put its own self-contained mobility to the test when three of its WB-50 reconnaissance aircraft flew special weather missions in support of NATO's Fallex 60 fall exercises. The weather task force was part of the 55th Weather Reconnaissance Squadron's new mobility force, designed to provide special on-call weather reconnaissance anywhere in the world.

During 1961, AWS also worked as part of a joint Air Force-Navy team engaged in reducing, interpreting, disseminating, and evaluating the data derived from the weather satellite Tiros II. AWS filed a historic pilot weather report from space. It encoded Commander Shepard's observation in this terse weather transmission: LFI 1445Z PIREP E COF 1437Z OTP ¾ CLD COVERAGE COF-HAT MERCURY CAP [Langley 9:45 A.M. (EST), pilot reports: East of Cocoa, Fla., at 9:37 a.m., on top, three-eighths cloud coverage Cocoa, Fla., to Cape Hatteras, N. C., Mercury capsule.]

The MATS **Air Photographic and Charting Service** carried on its exacting global missions of photomapping, electronic aerial surveying, missile site surveys, and photographic documentation of Air Force activities around the world.

This was also the last year during which the veteran Airways and Air Communications Service was a part of the MATS family. On July 1, 1961, the twenty-three-year-old call sign of "Double A" was retired, and its 30,000 communications-electronics experts joined the newly activated Air Force Communications Service.

It was, in summary, a year like many others. In keeping itself D-Day ready every day, MATS put in 365 days of rigorous training—and thereby produced a global airlift capability that was used by the Department of Defense and the government for a broad variety of routine, special, and extraordinary global airlift missions and mobility exercises.

On the other hand, it was a year of marked intensification, its tensions underscoring an ever-growing requirement for ready military global airlift. The capability to satisfy the tremendous demands of the times was clearly foreshadowed in the increase in military exercises, in the development and refinement of MATS mobility concepts, and, above all, in the concrete beginnings of the long-awaited airlift modernization.—END.

I'll be back Thursday—

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Lt. Gen. Troup Miller, Jr., succeeded Lt. Gen. Walter E. Todd as Commander of Air University on August 1, 1961. General Miller was previously Commander of the Arnold Engineering Development Center, Tullahoma, Tenn., following duty in charge of the Northern Air Materiel Area in Europe. He served in the Pacific theater in World War II.

The aim of the Air Force's professional education and doctrine center in meeting challenges to freedom now and in the future is "to make progress unhindered by custom" . . .

THE AIR UNIVERSITY

AIR University, headquartered at Maxwell AFB, Ala., met the challenges of a global Air Force in the space age in myriad ways during the past year. Continuing to fulfill its obligations as the Air Force professional education and doctrine center, AU adapted to requirements of a changing technology and anticipated needs of future years in its planning. Lt. Gen. Troup Miller, Jr., is AU's Commander.

The command motto, *Proficimus more irretenti,* is translated, "We make progress unhindered by custom." This was never more true than in fiscal '61. In AU's subordinate colleges, schools, and institutes, fresh material was continuously injected into class and study material, new courses were opened and outdated ones eliminated, and studies were made to assure the quality programs for which AU has been known since its establishment in 1946.

Unchanged was the AU mission of preparing officers for Air Force command and staff duties, providing scientific and technical education in certain fields, functioning as the Air Force doctrinal, educational, and research center, and instructing college students in the Air Force ROTC program.

AU is directed toward applying the polish to an officer's leadership and professional abilities, and keeping that gleam through a phased program of advanced education and special schools. AU graduates are reflecting this accomplishment throughout every command in the Air Force, the other services, and most allied nations.

Only in an atmosphere of free research, reading, discussion, and writing can this learning process be most effective. AU, unique in military education, provides the facilities and direction toward this end.

A direct response to the space age was a new course, Space Systems Orientation, set up in AU's **Warfare Systems School** as a one-week survey. Eight classes during its first full year turned out 831 graduates.

A study of the curriculum, however, indicated that it is difficult to differentiate space systems from what had once been considered normal warfare systems. So in September 1961 the space course will be combined with Warfare Systems Orientation (653 graduates from eight classes in '61) for a single eight-day course.

Two other new courses planned for the fall are a Senior Officer Space Orientation and an Aerospace Operations Course. The latter will teach about thirty officers per class, primarily air defense men, a wide range of material ranging from the basic sciences through theory of operating satellite systems. A pilot course of several weeks duration starts in November. WSS has graduated 1,779 from its twenty-four classes during the year.

The **Institute of Technology** at Wright-Patterson AFB, Ohio, is planning to launch classes in reliability engineering and further expand its student load. By 1964, quotas in scientific and engineering courses will double the 1961 figures. Emphasis is increasing also in civil-engineering education as that field becomes more vital with construction of complex missile sites. The Institute graduated 550 from its resident courses at Wright-Patterson, 981 more from its programs in seventy-five civilian colleges, and 108 from training programs with industry.

The Institute also administers the new Airman Education and Commissioning Program, which turned out its first graduates during the year. The plan gives qualified airmen up to twenty-four months of college education and then training at the Officer Training School at Lackland AFB, Tex., producing college graduates and commissioned officers. Selected to begin the program this year are 199 airmen.

The **Air Force Educational Requirements Board** at AU turned out its first reports, covering all but two career areas. Working for Headquarters USAF, the board studies each Air Force career area for several months to determine what is needed in the way of academic study to provide the professional preparation necessary in the Air Force.

Use of closed-circuit television was expanded in **Command and Staff College,** with about one-third of the total hours of instruction being devoted to its use. TV allowed CSC to reach all students with a standard high quality on each subject. The TV operation, directed by the AU Library, is being extended to **Squadron Officer School** and **Academic Instructor and Allied Officer School** this fall in an expansion that will more than triple the investment in this medium.

Command and Staff College, the intermediate-level professional school, graduated 530 from its nine-month course, with fifty-five more students, including allied officers, completing the fifteen-week first phase only. The two-week Reserve Officer Orientation Course was completed by 397 students.

Squadron Officer School graduated 2,800 junior officers from three classes during the year. **War College,** the senior school, graduated 172 US, British, and Canadian officers and civilian officials from its '61 ten-month course.

Since large numbers of senior Air Force officers do not have an opportunity to attend the resident War College course, a nonresident program was established. This nonresident program had, before this year, been confined to a correspondence course. This was expanded during the year to include an **Associate War College** course which is designed to permit senior officers to participate in seminars of about twelve officers at the Air Force base where they are assigned as they pursue the course. A trial program at four Air Force bases this year was so successful that it is likely this course will be expanded to additional bases next year for active-duty officers.

Ideas are the medium of exchange at AU's Command and Staff College seminars, part of nine-month course for officers.

Academic Instructor School was renamed **Academic Instructor and Allied Officer School** in January, reflecting more prominently its important mission of preparing allied officers for AU courses by developing their spoken English and providing a thorough indoctrination in American ways and thinking during their entire stay.

Through a "mentor" program, each faculty member becomes an expert on one country which sends students to AU, and works with and counsels those students during their stay. A "sponsor" program carries it a step further. Each allied officer has a military sponsor from Maxwell and a civilian sponsor from nearby Montgomery, Ala., through the cooperation of civic groups. Sponsors invite their guests into their homes, observe holidays of both nations, attend sports events together, and generally allow the visitor to see the normal workings of an American family. Each class is also taken on three orientation tours to differ-

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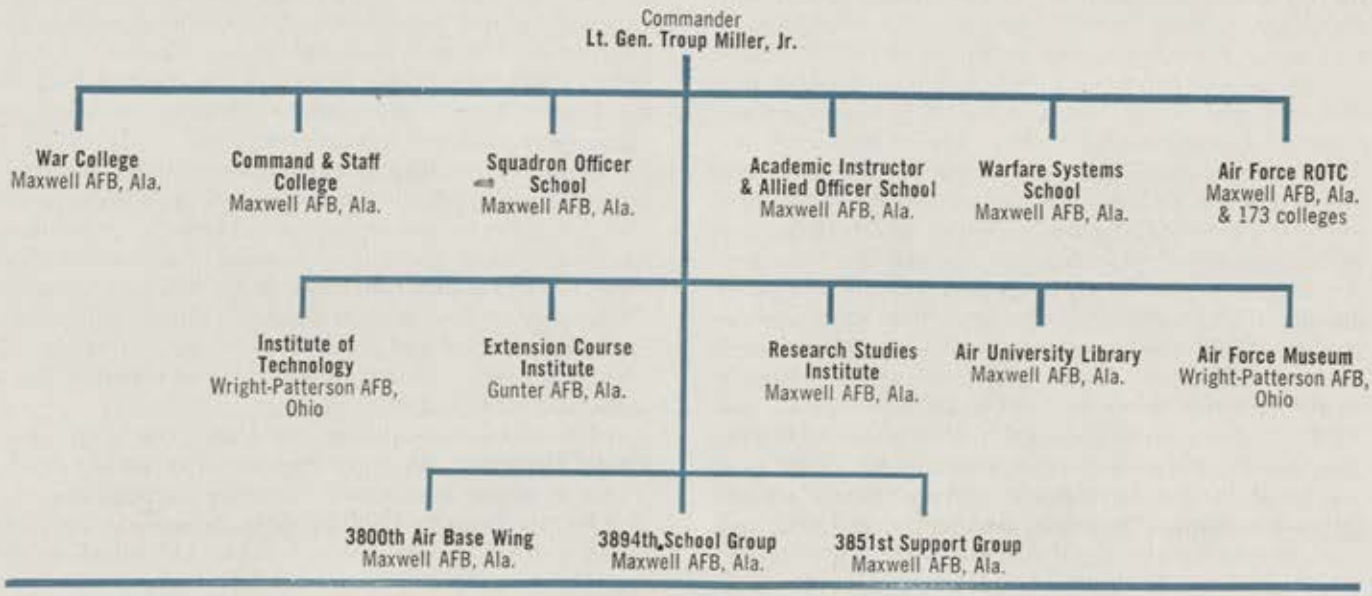
AIR UNIVERSITY

Headquarters, Maxwell AFB, Ala.



Institute of Technology student runs test at Wright-Patterson AFB, Ohio.

Warfare Systems School course at AU.

ent parts of the United States. About 135 allied officers completed the four familiarization courses during the year.

The **Academic Instructor Course** graduated almost 1,000 students from its six six-week classes, the equivalent of a full semester's work at most colleges. Students ranged from airman third class to colonel, and from high school certificate holders to doctors of philosophy. About 190 Reservists attended two two-week short courses of AIC.

The **Air Force ROTC** program in 173 colleges commissioned 3,452 cadets. There are 93,850 students enrolled in the four-year program. Now under study by the Department of Defense is the **Officer Education Program,** a two-year and two-summer college plan that would replace the present Air Force ROTC. If approved by DoD and Congress, OEP would select students for scholarships worth about $2,200 during their junior and senior years. Students would attend a four-week summer camp just prior to the junior year as an introduction to the program and as a further screening process. Three hours a week would be scheduled for the Officer Education Program during the two academic years. A five-week summer camp would be scheduled before the senior year. The plan would save the Air Force many manpower spaces, take care of junior college graduates, and make fewer demands on the students' time. It has the endorsement of the AF Precommission Schools Council and the AFROTC Advisory Panel to the Secretary of the Air Force.

Interest in the Air Force's correspondence school, **Extension Course Institute,** sent both enrollment and participation figures past the capacity of ECI to handle them in November 1960. All new enrollments were closed for a time, to allow the workload to return to the limits of the Institute's manpower and money. Courses were reopened in a phased operation, with all 102 available again by May. Average enrollment for the year was 340,000 with 135,409 students completing courses. More than 1,113,000 examinations were processed during the year and 267,835 new enrollments accepted. Many volumes were revised and updated to include the latest information on weapons and equipment.

The **Air University Library,** in addition to expanding its television work, served more than 250,000 patrons, acquired 24,886 books to bring its collection to 228,052, received 49,170 magazines and 88,489 maps and charts, and produced eighty bibliographies and publications. It is one of the largest libraries in the federal government, and, with 516,297 documents, has the largest known collection of nontechnical documents pertaining to military activities.

The **Research Studies Institute** conducted work in several areas, including the research and writing of basic Air Force concepts and doctrines. Published works included *Air Force Combat Units of World War II, The Russian Air Force in the Eyes of German Commanders,* a revision of Strategic Briefs, a bibliography on survival and an analysis of survival training, several volumes of communications-electronics doctrine, and many other works.

An important addition to Air University is the **Air Force Museum,** Wright-Patterson AFB, Ohio, which traces, in actual hardware on exhibit, the path of aviation history from its beginnings to supersonic jets and missiles. The museum came under AU direction in October 1960.—END

6 5 4 3 2 1

AIR FORCE
BLUE SCOUT
SIX
SUCCESSIVE FIRINGS—
FOUR
SUCCESSFUL FLIGHTS

[1] CAPE CANAVERAL, Fla., Sept. 21, 1960--United States Air Force Officers and Airmen of the Air Force Ballistic Missile Division (ARDC) today successfully launched a four stage solid fuel Blue Scout Junior research rocket high over the Atlantic Missile Range. [2] CAPE CANAVERAL, Fla., Nov. 8, 1960--The Air Force Ballistic Missile Division today test launched for the second time a four stage, solid fuel, Blue Scout Junior research rocket. Today's firing is part of the Air Force program to launch vitally needed scientific space packages on a regularly scheduled basis. [3] CAPE CANAVERAL, Fla., Jan. 7, 1961--The Air Force today launched the largest solid fueled Ballistic vehicle to date at the Atlantic Missile Range. Carried for the first time aboard the Blue Scout test vehicle was a guidance system operative during all three stages. [4] CAPE CANAVERAL, Fla., Mar. 3, 1961--An Air Force Blue Scout rocket today lofted a 172 pound payload approximately 1,580 statute miles into space. The payload was designed to make detailed radiation measurements as it travelled through the lower edges of the Van Allen Belt. [5] CAPE CANAVERAL, Fla., April 12, 1961--Development Flight No. 5 of the Blue Scout was successfully launched today, the Air Force announced. Carrying seven experiments, three bursts of seven flares were fired and tracked by a camera system from Cape Canaveral. [6] CAPE CANAVERAL, Fla., May 10, 1961--A range safety officer made a $500,000 decision yesterday and ordered destruction of a Blue Scout Junior rocket seconds after it was launched. Yesterday's failure was only the second for the Blue Scout in six firings.

The reliability of the Air Force Blue Scout is one of the highest in the industry. Aeronutronic is system engineer, payload and test contractor on Blue Scout. Additional information is available upon request.

Ford AERONUTRONIC
AERONUTRONIC DIVISION Ford Motor Company, DEFENSE PRODUCTS GROUP
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Four ways to tell a true airlifter

1. Loads from the rear

2. Truck-bed height

A true airlifter is a special breed of bird—built without compromise for its special kind of work. Huge rear doors allow cargo to be loaded straight in. Cargo floor is truck-bed height; no hoisting cargo up and jockeying it around corners. Rear doors can be opened in flight for bulldozer-size paradrops. And a true airlifter need not be pampered with paving. It lands and takes off in sand and rough dirt, close to the action, just like a bush plane. Lockheed's C-130 Hercules propjet is the true airlifter. Now in its second million miles of operation, 14 different versions are flying or being built for the U.S. Air Force, Navy, Marines, and Coast Guard—and for the air forces of Canada, Australia, and Indonesia.

The big Lockheed/Georgia cargo jets of the future will be true airlifters, too; they will have the same four basic attributes Hercules has.

3. Paradrops big equipment

4. Lands on short, rough fields

LOCKHEED GEORGIA COMPANY

Marietta, Georgia • A Division of Lockheed Aircraft Corporation

Maj. Gen. William S. Stone, Academy Superintendent since August 1959, was a member of a board that prepared the first program of instruction for the young institution. He was the Director of Weather Services for the Air Corps in the Pacific in World War II, and held the post of Ass't DCS/Personnel at Hq. USAF before assuming his duties at the Academy.

Tomorrow's aerospace force will mirror today's achievements at the young, visionary, educationally advanced "school of the sky" in the Colorado Rockies . . .

UNITED STATES AIR FORCE ACADEMY

THE Air Force Academy provides instruction, experience, and motivation to each Cadet so that he will graduate with the knowledge, character, and qualities of leadership essential to his progressive development as a career officer in the United States Air Force.

Although it has only been two years since the Air Force Academy graduated its first class, there is ample evidence that this mission of the Academy is being accomplished. The products of the Air Force Academy constantly prove the value of concentrated instruction balanced with disciplined experience. Every member of each graduating class individually reflects this continuance of the Air Force Academy's mission.

In addition to the prescribed academic curriculum of 189 semester hours, the Air Force Academy has had a curriculum enrichment program in operation since the spring semester of 1957. Through this program of accelerated and advanced elective courses tailored to the individual's ability and his prior preparation, every Cadet at the Air Force Academy is challenged with the opportunity to perform beyond the required minimum curriculum. The only restriction is his own limit of ability.

Approximately sixty percent of all Cadets at the Air Force Academy participate in this program, and about twenty-five percent graduate with one or more majors in the basic sciences, engineering sciences, social sciences, or humanities. In the Class of 1961, for example, the number-two man in the graduation order of merit, completing thirty-eight semester hours beyond the prescribed curriculum, graduated with two majors—one in basic science and the other in engineering science. The average Cadet in the Class of 1961 completed eight semester hours beyond the basic minimum curriculum requirements—with eighty percent of the varsity letter winners participating in the enrichment program as compared to sixty-three percent for the Cadet student body as a whole.

But the Class of 1961 is no exception; both previous graduating classes have given proof that they are capable of even more advanced education. Of the 206 graduates of the Class of 1959, seven went directly to their first assignments as officers to graduate schools—one to Oxford as a Rhodes Scholar, one to Princeton as a graduate student in political science, one to the California Institute of Technology for graduate study in aeronautical engineering, and four to the Massachusetts Institute of Technology for graduate education in aeronautics and astronautics. The lieutenant who went to California Institute of Technology earned his master of science degree in aeronautical engineering in one year—with the highest grade point average in his class—and has now been awarded the degree of aeronautical engineer. Of the four who attended MIT, three of them (including two former football players) earned both the master of science and engineer's degrees in aeronautics and astronautics. The fourth (also an ex-footballer) completed his graduate degree requirements by specializing in propulsion.

The graduates of the Class of 1960 continued the trend of educational enrichment as practiced at the Air Force Academy. The number-one man in the graduation order of merit successfully completed the additional requirements to graduate with two majors. Four of the graduates were sent on their first assignments as commissioned officers to graduate schools to continue their education in graduate weapon systems.

The most recently graduated class, the Class of 1961, with fifty-four single majors and four double majors, had eight of its members assigned for further education at their first duty assignments. Three have

Air Force Academy Cadets ceremonially toss caps in air at June Commencement. Academy has now graduated three classes.

been assigned for graduate aeronautics—one to the University of Southern California, one to California Institute of Technology, and one to Princeton. One has gone to North Carolina State for graduate work in nuclear engineering effects, and the four others have been assigned to the Massachusetts Institute of Technology—three for graduate astronautics and one for graduate electrical engineering.

The 208 other members of the Class of 1961 reflect career motivation with 181 being assigned for pilot training (one graduate—a former pilot—going to pilot transition training), fifteen assigned directly as navigators, one assigned for advanced navigational training, seven to technical training, and four commissioned into other branches of the services.

One of the keys that makes the enrichment program successful at the Air Force Academy is the policy—since the beginning—that all members of the faculty should be career Air Force officers and have graduate degrees in their teaching fields. Furthermore, most of them have many years of professional experience related to their academic specialties. It is the combination of academic education and related professional experience that gives the Air Force Academy's faculty the knowledge and the vision of the needs of today's and tomorrow's Air Force.

To carry out all elements of its mission—which is not just to impart knowledge, but to relate the knowledge imparted to professional needs, to develop character, to develop qualities of leadership, and to motivate the graduate toward his progressive development as a career officer—the Air Force Academy has always maintained that it must have an all-military faculty. Such practice ensures that classroom instructors teach by what they are as well as by what they say; such practice also ensures success in the firmly established curriculum enrichment program initiated by the Air Force Academy.

The results speak for themselves. In addition to assignment of outstanding graduates to institutions of even more advanced education, the Class of 1961 also showed up well in the Graduate Record Examination given to college seniors at 187 leading colleges and universities throughout the United States. On the basis of the latest available data, the Class of 1961 ranked second in composite scores. The class of only one college had a higher composite score than those of the Air Force Academy's graduating classes of 1961, 1960, and 1959. Using these same data published by the Educational Testing Service of Princeton, N. J., the Class of 1961 ranked number one in the natural sciences, second in the social sciences, and sixth in the humanities areas tests.

Devoted to both academic achievement opportunity and military career development, the Air Force Academy's staff and faculty also fully realize the importance of staying abreast of today's scientific changes and refinements by sponsoring various seminars and conferences for the benefit of both the Cadet students and themselves. The sixteenth annual meeting of the Institute of Navigation—at which leading authorities

(Continued on following page)

in the field of space vehicle design and flight, interplanetary colonization, and interstellar, marine, and jet navigation were present—was one such conference held at the Air Force Academy this past year.

Fifty-nine leading colleges and universities sent their top students to the third annual Air Force Academy Assembly, held at the Academy in conjunction with Columbia University. And sixty-two college-level institutions enrolled their crack debaters in the second Annual Air Force Academy's National Invitational Debate Tournament.

The physical education program kept abreast of the academic program during the past year at the Air Force Academy. The over-all level of national competition in the fifteen-sport intercollegiate athletic program continued at a high level of accomplishment. The Cadet Wing not only showed an increase in their winning average over the previous years, but one team went undefeated and five posted the best marks in the Air Force Academy's five-year varsity history.

The Cadet fencers became the seventh varsity team in five seasons to fashion an undefeated campaign. They also successfully defended their Western Intercollegiate Fencing Conference crown in an impressive manner, thereby gaining recognition as the best college fencing team west of the Mississippi since World War II.

Other varsity squads in intercollegiate competition with better marks than ever before were cross-country with an eight and one record, gymnastics with a five and one total, golf with a ten and five, and tennis with a twelve and three final tally. Ten Falcon varsity teams were at or above the .500 mark. In addition to those above, the Air Force Academy scored in soccer with a 4-4-2, in basketball with a 12-12, in swimming with a 9-3, in baseball with a 12-12, and in track with a 4-4. Almost without exception, the Falcon Frosh surpassing anything accomplished by previous Fourth Classmen have created an extremely bright future for forthcoming varsity teams.

In addition to varsity competition, Air Force Academy intramural sports among the twenty Cadet Squadrons was equally vigorous. Each Squadron—about 100 Cadets—fielded enthusiastic teams in football, lacrosse, soccer, basketball, handball, squash, swimming, water polo, wrestling, hockey, and rugby. Such extensive physical education programs complement the academic enrichment achievements by creating sound bodies for sound minds as well as whetting the aggressive spirit of each individual Cadet.

The third phase of Cadet life—military training and education—has also kept pace with other advancements at the Air Force Academy. As each new class enters, their orientation with military life begins. The Class of 1965, now entering, has served a seven-week intensive training course that includes basic military training, weapon familiarization, survival indoctrination, and flight orientation. Complementing the academic and physical education programs, the military training program is geared to both the individual Cadet's class and his personal adaptability so that privileges and responsibilities are progressively increased within the framework of military discipline.

All is not drill, drill, and more drill in the military education phase of Cadet life. Each Cadet—during his summer training periods—will visit service installations in the United States to learn first-hand what all elements of the Department of Defense do to accomplish their mission; he will be assigned as a "Third Lieutenant"—actively serving at an Air Force base as an individual assistant to an Air Force officer in his day-to-day tasks; and he will also make an extensive tour to an overseas area in order to study foreign and allied nation's armed services.

The Department of Leadership studies augmented the Cadet's knowledge by establishing a keystone for future conferences dedicated to the role of the professional military man. During this last year the Air Force Academy hosted the first of a series of panels and round-table discussions on leadership studies. Attendees from seventeen agencies of the Army, Navy, Coast Guard, and federal and state governments participated with representatives from the Air Force Academy.

There were also a number of developments in the Academy physical plant this year. The Cadet Chapel, which will assume a place in architectural prominence on the Academy campus when it is completed in 1962, was started. The Academy's 135-bed hospital was opened for business.

Construction of the $3.5 million Falcon football stadium was started. Secretary of the Air Force Eugene M. Zuckert poured the first concrete. Funds for the stadium were raised through private subscriptions by the Air Force Academy Foundation, a nonprofit organization dedicated to providing the Cadet Wing with recreational and cultural facilities not available from appropriated fund sources.

As the Air Force Academy completes its sixth year of existence as one of the nation's outstanding educational institutions, the Academy Superintendent, Maj. Gen. William S. Stone, sums up its purpose in these words:

"Our aim is to produce leaders whose abilities extend across the full horizon of activities—Air Force officers of solidly balanced backgrounds whose training includes all fields, the social and cultural as well as the scientific and technical. Looking to the future, the Academy is putting more emphasis on space technology. It is part of our program of giving a fundamental education in all fields, but also one that is always in tune with Air Force requirements."

The record so far shows clearly that the Academy has made great strides forward in the accomplishment of its goals—both in the creation of expanded instruction, and in greater levels of experience within unique physical surroundings. Each class's graduating members thus far have gained knowledge, developed character and qualities of leadership essential as a foundation for their progressive development as career officers. Subsequent graduating Cadets forecast even greater success of the fulfillment of the Air Force Academy's mission, which will be mirrored in the Air Force of tomorrow.—END

THE VOICE OF THE "FIREBEE"

Firebee is precisely maneuvered by remote controller as he receives flight data transmitted from Dorsett telemetry system in the drone.

Ryan uses airborne telemetry systems by DORSETT

Near-sonic, Ryan's Q-2C "Firebee" Target Drone provides a fast, high-flying, evasive target simulating combat tactics. Rugged and recoverable for reuse, the "Firebee" is daily putting the "test of fire" on American airborne and surface-to-air missile systems.

Firebee can be precisely controlled from airborne or ground stations, since in addition to radar tracking data, engine r.p.m., airspeed and altitude are telemetered continuously to the controller by the Dorsett Model TM-4-31 system.

When additional data is required for missile development programs and special applications, the system may be expanded to a total of ten subcarrier oscillators in the pre-wired chassis.

The Firebee telemetry system is one of the many designed and built by Dorsett Electronics. Put Dorsett's experience to work for you on your next telemetry requirement. Your inquiries and specifications will receive a prompt reply.

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The entire Mercury system was designed around the safety of the astronaut. Perched atop his capsule is an escape system powered by a GCR solid-propellant rocket. It will hurl the astronaut—capsule and all—up and out of trouble should the booster fail during launch or low-altitude flight. This GCR rocket must work. It does work. In more than 60 test shots, it has fired perfectly every time. This super-reliable propulsion system is one of several important solid-rocket projects now in production at GCR. In propulsion system research and development, GCR is at work on advanced programs for huge segmented boosters, hybrid rockets, ultra-high performance propellants, and a variety of other promising projects.

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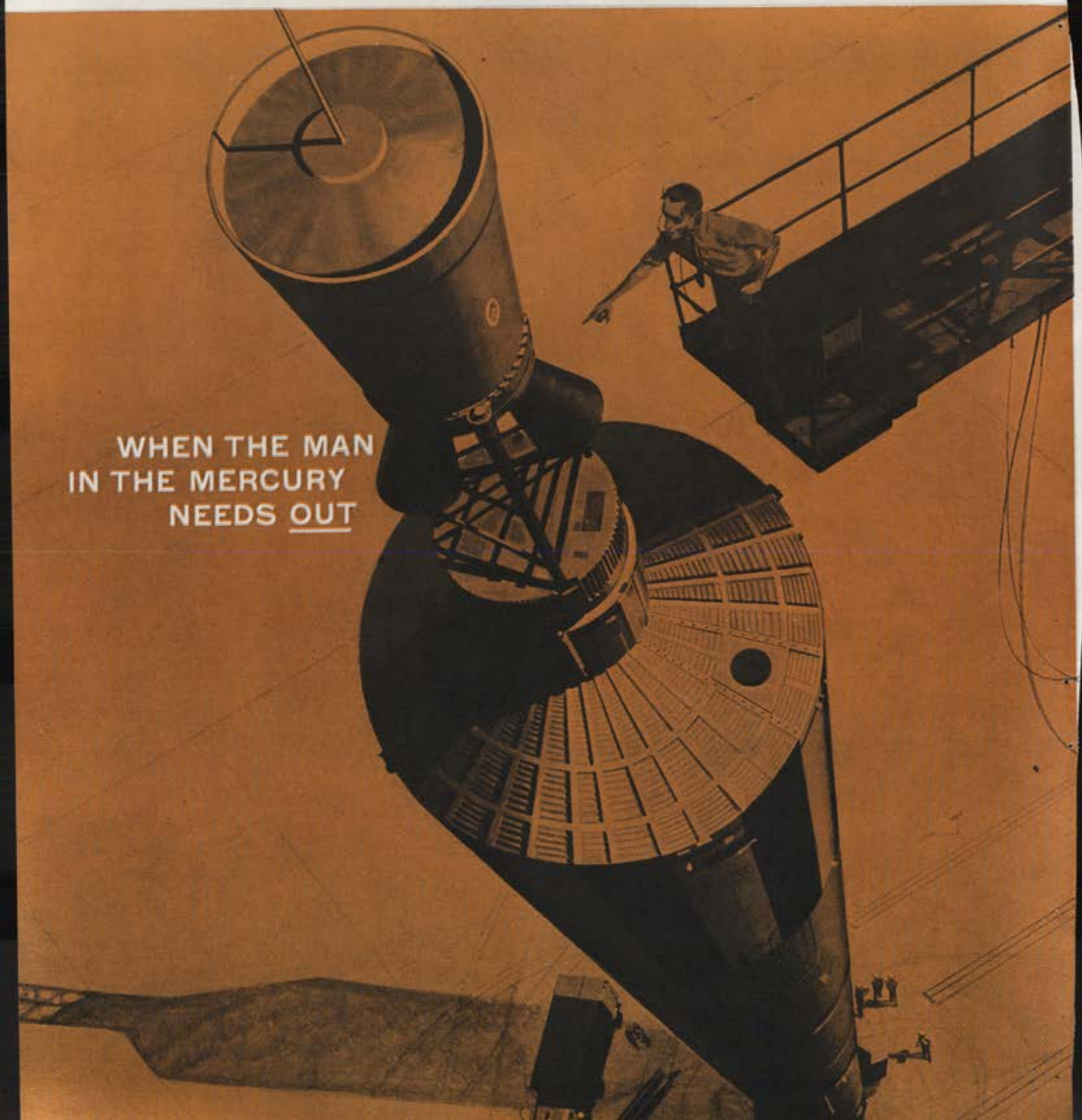

Maj. Gen. Leland S. Stranathan has commanded the Caribbean Air Command since August 1959. He was, prior to this assignment, Director of Development Planning, Hq. USAF, from 1955 to 1959, and served with the Armed Forces Special Weapons Project at Sandia Base, N. M., for the seven preceding years. General Stranathan flew B-29s in the Pacific in WW II.

South of the border, the job is to help organize and train Latin American air arms for the united defense of the Western Hemisphere . . .

CARIBBEAN AIR COMMAND

ONE of the Caribbean Air Command's primary missions is the support of Latin American air forces. Such support to allies south of the border serves the national interests of both the United States and the individual countries concerned—and, indeed, the free world.

The major concerns of the command are the USAF Mission System throughout Latin America, the School for Latin America at Albrook AFB in the Canal Zone, and the Air Force phase of the Military Assistance Program for the area. Albrook's Tropic Survival School is also an important activity. Flight operations are maintained at Howard AFB, also in the Canal Zone, and Albrook.

The command's goal is to aid Latin American republics in developing air forces consistent with national requirements, desires, and support capabilities. In the process of working closely with their counterparts in Latin America, the personnel of the Caribbean Air Command have an unrivaled opportunity to make true and lasting friends for the United States and the United States Air Force in a vital area increasingly troubled by political-economic cross currents.

Fourteen USAF missions operate in Latin America. A Joint US Military Commission with USAF participation functions in Brazil. The command is thus represented in all but five Latin American countries. These are Cuba, the Dominican Republic, Mexico, Costa Rica, and Panama. Utilizing USAF methods and procedures, the training Missions advise and assist their host Air Forces in all phases of operations, training, supply, administration, maintenance, and development of modern aviation facilities in the interests of building sound air units capable of sharing in the mutual defense of the Americas. Insofar as possible, the aim is to standardize procedures and equipment throughout the Western Hemisphere.

Consistent with the close identification between military and commercial aviation in some countries, the Missions also contribute to the development of commercial transportation by advising on the planning and construction of modern airfields, and in advising on the installation of communications systems which serve both military and commercial aviation. In this way, the Missions effectively help promote the economic development of Latin America.

About ten percent of the command's personnel strength is assigned directly to the Mission detachments. The balance are stationed at Albrook. Here are located Headquarters Caribbean Air Command; the 5700th Air Base Group and its component squadrons; the 5700th USAF Dispensary; the 776th Air Force Band; a detachment of the 8th Weather Group; a detachment of the Aeronautical Chart and Information Center; the 1978th AFCS Squadron; the USAF School for Latin America; and the CAirC Tropic Survival School. Each of the units at the Canal Zone base performs a major mission objective of the Caribbean Air Command.

As the air component of the unified all-service Caribbean Command, the Caribbean Air Command participates in joint training exercises annually with elements of the US Army and US Navy in order to test defense procedures for the Panama Canal. Operation Solidarity was one of the year's highlights. For the second consecutive year, military forces from Latin American countries joined with US forces to participate in this readiness exercise in the Canal Zone and in training areas in the Republic of Panama. The inclusion of air, ground, and naval forces from some of the Latin Amer-

(Continued on following page)

Operation Solidarity brings together US, Latin American forces in joint operations in Panama. Upper left, USAF colonel works with Colombian, Peruvian Air Force officers at Carribbean Air Command Headquarters during exercise. At left, assault transports cover Albrook AFB, C. Z., during Solidarity. Above, CAirC airman undergo survival training required of all command flying personnel. Command also runs important Tropic Survival School at Albrook AFB.

ican republics provided experience in combined military operations. It also contributed to the strengthening of friendly and cooperative relations between the military organizations of the Americas. US Army airborne troops were airlifted to Panama by the Tactical Air Command (TAC). TAC also furnished close-support aircraft and flew intercept missions during the exercise.

Graduation ceremonies at the USAF School for Latin America in early June and December each year are major events for the command. The school, unique in the Air Force, offers important technical training for officers and airmen of Latin America. Instruction is given in Spanish. Since it opened for the first group of students in 1943, the school has graduated over 4,500 officers and airmen representing all of the Latin American countries.

Students from the various countries mix in classrooms, day-to-day living, recreational activities, and sports events. They have a chance to get acquainted with each other and with the US Air Force personnel of the school and Albrook AFB. The graduation ceremonies are colorful affairs to which members of the diplomatic corps and high-ranking military and civilian officials are invited.

For a number of years the 5700th Air Base Group has maintained a Tropic Survival School at Albrook for the benefit of the command's pilots who fly over extremely dangerous terrain in the normal performance of their duties. Utilizing techniques and procedures as developed by the Research Studies Institute of the Air University and perfected locally, the tropic survival training prepares aircrews to survive until rescued in either jungle or water areas which characterize the terrain in the tropics. As the facilities permit, the training is made available to Army and Navy personnel and to selected members of Latin American Air Forces.

Because of the hazards to flying safety occasioned by the lack of good airfields, lack of navigation aids, and lack of experience in areas of South America characterized by rugged mountainous or jungle terrain, some of the USAF Mission Chiefs have recommended that their host air forces initiate survival training programs similar to that of the Caribbean Air Command at Albrook. During the past year, the director of the training school visited Colombia and Peru to advise and assist in the establishment of survival schools. It is anticipated that similar assistance will be provided to other nations.

The Caribbean Air Command is a small command in hardware and personnel, with only 2,300 officers, airmen, and civilians, and a handful of planes. But the area of its responsibility—geographically, strategically, and in terms of its role in strengthening ties of inter-American friendship—is immense. The command, under Maj. Gen. Leland S. Stranathan, worked hard this year as always to meet this responsibility.—END

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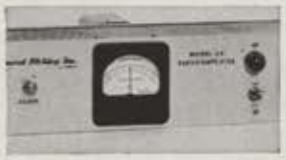

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Torque Motors. Group of electro-mechanical transducers which transform a few watts of electrical power into a mechanical motion proportional to input current. Only one moving part, supported by frictionless flexure bearings.

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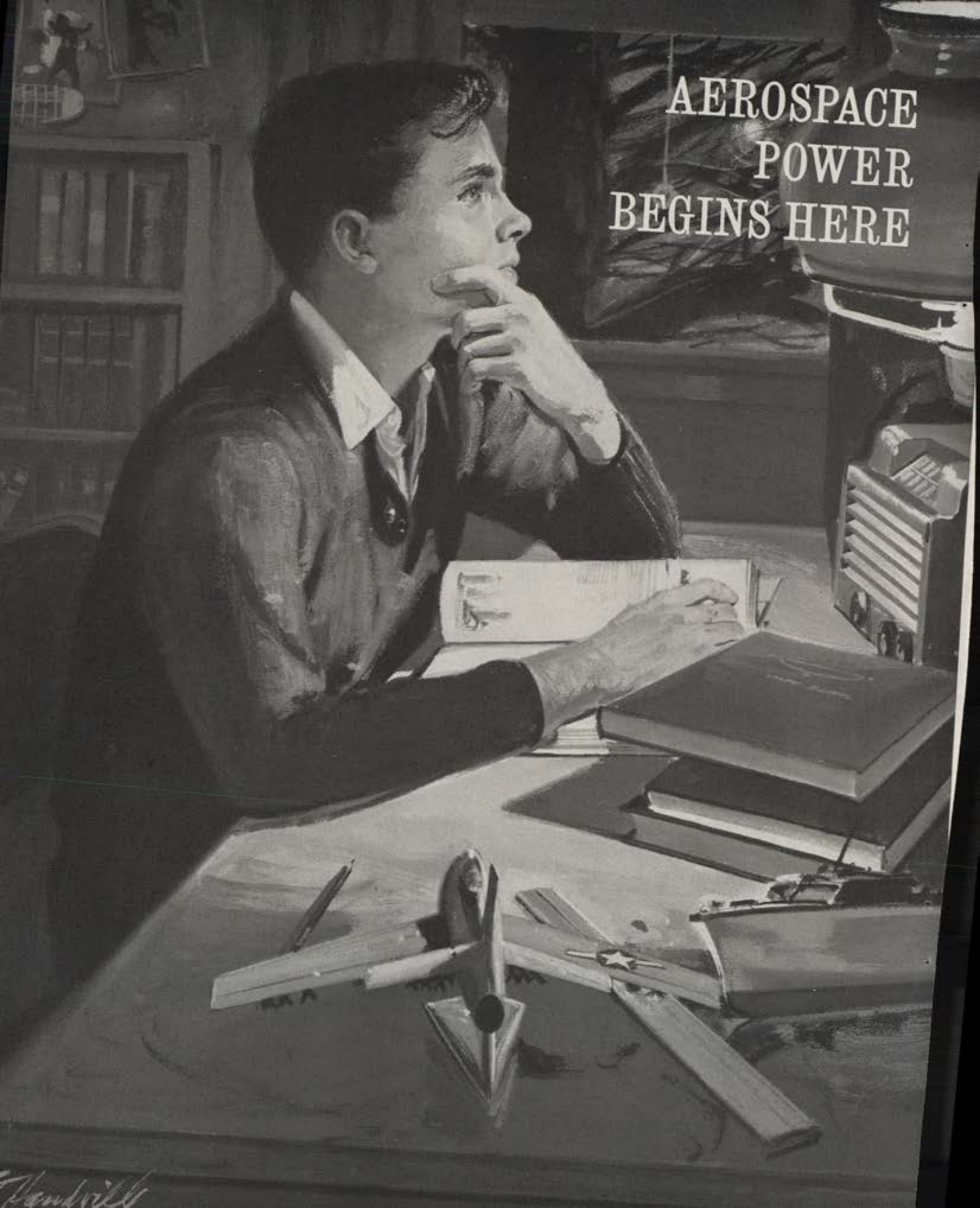
AEROSPACE
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In homes all over America the raw material from which tomorrow's Air Force will be forged is coming of age. You who are interested in the Air Force can play an important part in its progress by encouraging these young people to investigate the career opportunities open to them... in the Air Force.

In addition, your company may want to assist local Air Force recruiters in local recruiting drives. Such help is more than welcome.

What are these opportunities? Perhaps the most important one is the opportunity to become an active participant in the Aerospace Age. Backed by Air Force training and experience, a young man can expect to make steady progress in this age of supersonic flight, space probes, and advanced electronics. This is the light in which a young person should review a career in Air Force blue. And those of you who have friends with sons in the Air Force can help us get this story across.

As far as the Air Force is concerned, its very efficiency in performing its missions depends to a large extent upon the quality of its new members. What we want as new airmen and officers are forward-looking young men... men who want to get the job done well... and men who will consider service to country and to self to be part of their way of life.

U.S. AIR FORCE RECRUITING SERVICE

Brig. Gen. Paul W. Scheidecker assumed command of AFAFC in 1960 after four years as Comptroller of the Air Defense Command. A graduate of West Point, Harvard Business School, and the Air War College, he served previously with the Far East Air Forces and the Air Research and Development Command, succeeding Brig. Gen. E. J. Hopkins as head of AFAFC.

Across-the-board progress in organization and management characterized the past year at the headquarters for USAF's worldwide fiscal network . . .

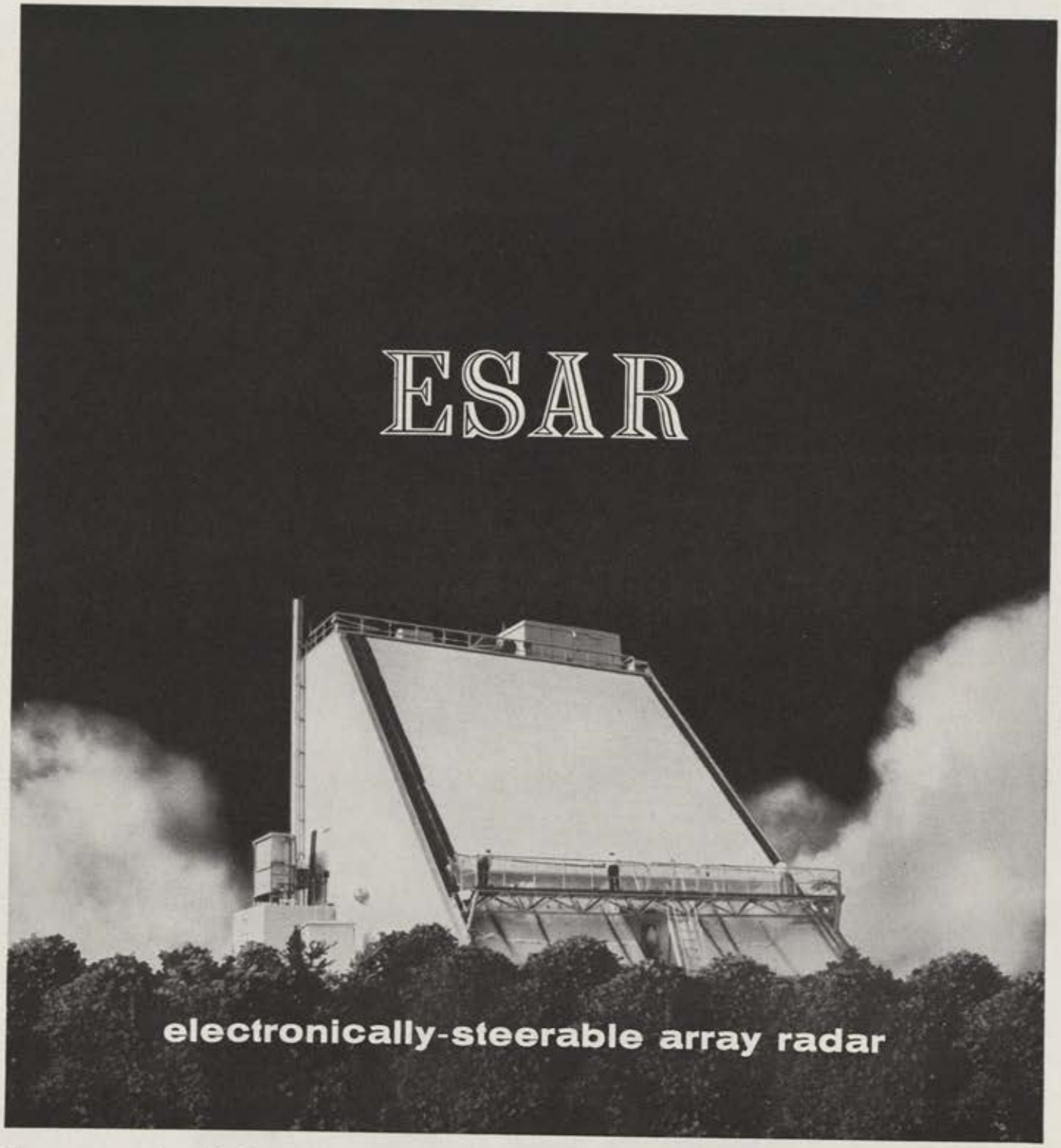
AIR FORCE ACCOUNTING AND FINANCE CENTER

IN THE past year, the Air Force Accounting and Finance Center has made significant and substantial progress in accomplishing its mission as headquarters for USAF's worldwide fiscal network. In so doing, the Center continued and improved the record of service inherited from the first nine years of its existence. Brig. Gen. Paul W. Scheidecker is Commander, AFAFC.

• Early in the year, aggressive and enthusiastic planning to install an electronic data-processing system was encouraged. Certain high-volume, repetitive-type work called for EDP at the earliest feasible time. Events after the start of computer operations in April 1961 have substantiated this decision. Better and faster service is being provided to Air Force personnel and their dependents, and to many governmental agencies, with considerable savings to the taxpayers. Single source financial reporting was first programed, then allotments. To follow are more centralized accounting,

(Continued on page 203)

More than 500 USAF offices throughout the world report to AFAFC. Information is processed by Center computer, above.



An experimental model ESAR radar which demonstrates the fundamental aspects of electronically-steerable array radar is now undergoing test at Bendix Radio. The successful culmination of this experimental effort could provide the basis for a new technology leading to the development of multiple function, electronically-steerable array radars capable of searching, tracking, deep space communications and command control. ESAR is part of Project DEFENDER, the program of advanced research in ballistic missile defense directed by the Advanced Research Projects Agency, Department of Defense. The ESAR contract is administered by the Rome Air Development Center of the U.S. Air Force. Organizations working on advanced space concepts are invited to contact Bendix Radio for details, and to see ESAR in operation.

Bendix Radio Division
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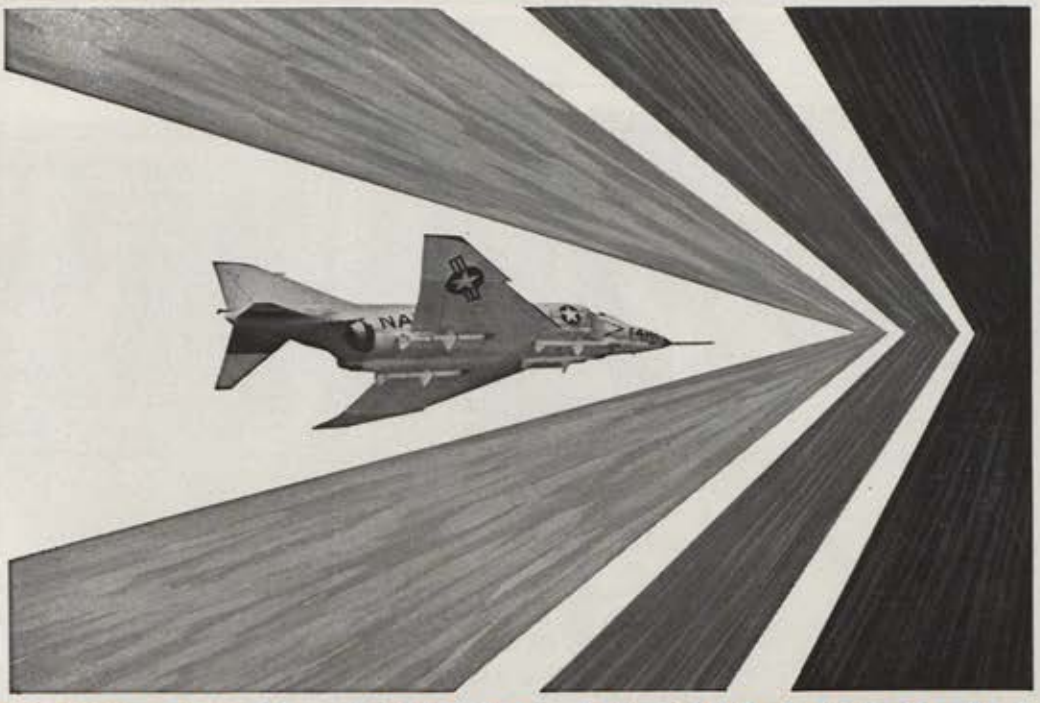
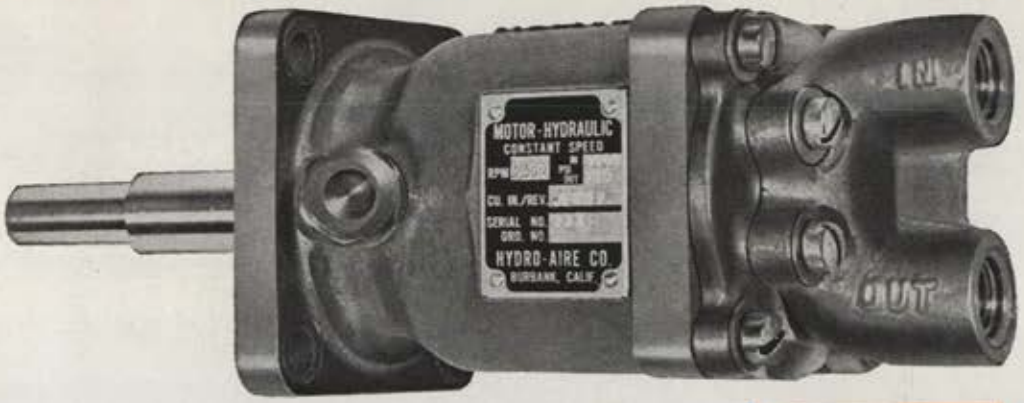


HYDRO-AIRE ADVANCED HYDRAULIC MOTORS PROVE RELIABILITY DRIVING FUEL PUMPS ON MACH 2+ F4H-1!



You can bet McDonnell had good reasons to choose Hydro-Aire hydraulic motors for this advanced application. The first is reliability resulting from optimum design simplicity and now proved both in flight and in extensive environmental tests. Others are reflected in the characteristics of this typical model, 68-193-079. Displacement: 0.0787 cu. in. per rev. Torque: 30.4 in. lbs. at 2800 PSI inlet to outlet pressure differential and 12,000 rpm. Hp/Wt. ratio: 3.92:1. Life: 1200 hours. Write now for data sheets on available models and/or a prompt quote on your specifications.

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- A new organizational doctrine delegating authority in fact was established, with decisions being made at the lowest possible level equipped with sufficient sound information to make good decisions. This promoted individual responsibility, initiative, and capability. It was judged to have brought about significant attitude improvement.
- Faster, more effective reaction time to meet aerospace-age administrative needs was developed. Improved communications, both oral and written, resulted from key AFAFC personnel taking advanced study in readable writing and oral presentations. Training courses were also conducted in EDP.
- The Center's Staff Judge Advocate developed a Fiscal Law Manual to serve as a basis for cooperative solution of legal accounting and finance problems at all organizational levels. This was approved for publication by the Judge Advocate General, USAF.
- The Center's planning and programing efforts were stepped up. Specific documents resulted—Planning Directives, Operating Programs, and Improvement Programs.
- A Management System was installed, integrating and costing out the various individual programs being used to manage the Center's resources.
- Considerable progress was made to improve the completeness and accuracy of the Center's emergency plans. The basic aim was for the Center to move rapidly and effectively, in an orderly manner, into a state of maximum readiness for any emergency, whether natural or man made.
- A firmer management control grip was established on both the Center and the Air Force accounting and finance network. Two principal tools were "Trends," which provided data on how well the Center was accomplishing its mission; and "Checkpoints," which evaluated network performance, stressing accuracy and timeliness. Both are succinct, summary-type publications which appear monthly.

These are a few selected highlights of what the Center has done to enhance the quality and responsiveness of its services to well over a million customers. The result has been substantial military, economic, and social benefits, spread over ninety-four countries and possessions. More will be done, capitalizing on the capabilities of state-of-the-art data-processing and communications.—END

Maj. Gen. Brooke E. Allen has been Commander of Headquarters Command since July 1959. He commanded NATO's Sixth Allied Tactical Air Force from 1957-1959. General Allen saw extensive service in B-17s and B-24s in the Pacific in World War II. He was pilot of one of the two B-17s that got airborne from Hickam Field on December 7, 1941, to search for the attackers.

One of the most diversified missions in the Air Force provides a welcome mat for distinguished visitors, balloons for high-altitude research, music for all occasions . . .

THE HEADQUARTERS COMMAND

HEADQUARTERS Command has one of the most wide-ranging missions in the United States Air Force.

The command, with its headquarters at Bolling AFB on the outskirts of downtown Washington, D. C., performs these varied functions:

- Conducts and supports balloon operations of the 1110th Balloon Activities Squadron at Goodfellow AFB, Tex. The 1110th is the only organization of its type in the service.
- Provides aircraft for and supervises administrative and combat-readiness flying in the Washington area.
- Organizes, trains, and maintains a unit that includes the USAF Band and USAF Drill Team. The Band is comprised in turn of the Symphony Orchestra,

(Continued on following page)

General White retired this year in ceremony at Andrews AFB, D.C. With him above, General LeMay and Secretary Zuckert.

the Drum and Bugle Corps, the Airmen of Note, and the Singing Sergeants. These groups and the Drill Team perform for the general public here and abroad and at special ceremonies. The command also runs a bandsmen's school in this connection.

- Acts as the main welcoming command for foreign and US dignitaries who fly in and out of the United States through Bolling and nearby Andrews AFB, Md., each year. Among distinguished foreign visitors this year were the Crown Prince of Norway, the Crown Prince and Crown Princess of Japan, the King and Queen of Denmark, the Chancellor of the West German Republic, the Prime Ministers of Greece and Malaya, and the Presidents of Ghana, Indonesia, and Tunisia.
- Acts as "housekeeper" for airmen on duty within the Military District of Washington, providing housing and dining facilities.
- Performs logistic and administrative support duties and disbursing services for Headquarters USAF and assigned Air Force units.
- Operates a major area military hospital, the USAF Hospital at Andrews.
- Supports USAF Missions, MAAGs, Air Attachés, and special missions throughout the world through the 1020th Special Activities Wing, Fort Myer, Va.
- Monitors a Reserve training program.

A significant development in the past year was activation of Project Auto Mate at Bolling. This was a pilot project to determine the feasibility of adopting an entirely new system for military personnel management and administration.

Major attention was focused on the progress of new construction at Andrews, which was destined to become the operating location for all fixed-wing flying in the Washington area, including that now done at Bolling and the Anacostia Naval Air Station. Andrews is the home of the Air Force Systems Command.

Air Force participation in President Kennedy's Inauguration included the USAF Band and Drum and Bugle Corps from Bolling and legions of marchers. The latter were composed of a wing from Bolling and Andrews, a WAF Squadron from Andrews, and AFROTC units from Georgetown, the University of Maryland, and Howard University. The entire Cadet corps from the USAF Academy marched in the parade. There were Air Force floats that emphasized steps toward the threshold of space.

The passing of an era was marked by two notable retirements. Gen. Nathan F. Twining, Chairman of the Joint Chiefs of Staff, was honored with appropriate ceremonies at Bolling on September 30, 1960. Gen. Thomas D. White, Chief of Staff, USAF, retired at Andrews AFB on June 30, 1961.

Again, one of the major events of the year for Headquarters Command was the Armed Forces Day commemoration for the national capital area at Andrews. Several hundred thousand persons viewed exhibits and demonstrations put on by all the services at Andrews in May.

Maj. Gen. Brooke E. Allen is Commander, Headquarters Command, a post he has held since mid-1959. His immediate subordinates this year were Brig. Gen. William T. Smith, Commander at Andrews and recently transferred to duty as Chief of Staff of the newly activated Air Force Communications Service at Scott AFB, Ill.; Col. Wilson R. Wood at Bolling; Col. Robert W. Elliott of the 1020th Special Activities Wing at Fort Myer, and Maj. Robert L. Ray of the 1110th Balloon Activities Squadron. Col. Archie A. Hoffman commands the USAF Hospital at Andrews. The Band is headed by Col. George S. Howard.—END

TACAN ACCURACY RIGHT OFF THE SHELF

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HLI-119A (AN/ARM-25)
Radio Test Set

JANized portable unit radiates simulated ground beacon signal to check accuracy of any model TACAN (while operating in aircraft) for range, bearing and identification signals. Also checks power and sensitivity. Federal Stock No. 6625-724-8868.

HLI-103B
TACAN Beacon Simulator

Simulates functions of TACAN or DME surface beacons to enable maintenance men perform complete laboratory and bench tests on all model TACAN sets. Federal Stock No. 5625-668-4227.

HLD-129
Azimuth Error Analyzer

Detects and provides visual and recorded indication of static and dynamic tracking errors in azimuth portion of TACAN sets being checked by HLI-103B.

HLI-116A
Peak Power Calibrator

Measures peak output power of TACAN transmitter in kilowatts without use of calibration charts or auxiliary equipment.

HLD-141/144/146
Instrument & Power Panels

Simulates aircraft wiring in testing all AN/ARN-21 and ARN-65(V) TACAN sets and instruments removed from the aircraft. Federal Stock Nos. 6625-724-9938, 6625-448-7172, 6625-448-7177.

Send for complete data file on Hoffman TACAN test equipment and TACAN air navigational systems.

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(As of August 15, 1961)

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The MAJOR COMMANDS

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(As of September 30, 1961)

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Hq. Robins AFB, Ga.
(As of September 30, 1961)

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Guide to Air Force Bases

WHERE THEY ARE LOCATED • THEIR PHONE NUMBERS
WHAT THEIR JOBS ARE • HOW THEY WERE NAMED

ALTUS AFB, Okla., 2 mi. E of Altus. Phone: HUdson 2-2060. Heavy bomber base, 2d AF, SAC; projected Atlas ICBM site. Named for city.

AMARILLO AFB, Tex., 14 mi. SE of Amarillo. Phone: DIamond 9-1511. Technical Training Center; jet mechanics and airframe repair schools, ATC; heavy bomber base, 15th AF, SAC. Named for nearby city.

ANDREWS AFB, Md., 1 mi. E of Camp Springs, 11 mi. SE of Washington, D. C. Phone: 981-9111. Hq. AFSC; fighter-interceptor base, ADC; Hq. 2d Reserve Region, CONAC. Formerly Camp Springs AAB, renamed for Lt. Gen. Frank M. Andrews, airpower pioneer, CG, European Theater of Operations, killed in aircraft accident, Iceland, 1943.

ARNOLD ENGINEERING DEVELOPMENT CENTER, Tenn., 10 mi. E of Tullahoma. Phone: GLendale 5-2611. Hq. AEDC, AFSC. Named for Gen. H. H. "Hap" Arnold, WW II AF CG.

BAKALAR AFB, Ind., 3 mi. N of Columbus. Phone: DRexel 2-2500. Reserve training, CONAC. Formerly Atterbury AFB, renamed for Lt. John E. Bakalar, WW II fighter pilot, killed in France, September 1944.

BARKSDALE AFB, La., 1 mi. S of Bossier City, 6 mi. E of Shreveport. Phone: SHreveport 5-1211. Hq. 2d AF, SAC; strategic heavy bomber base; Reserve training, CONAC. Named for Lt. Eugene H. Barksdale, WW I pilot, killed near Wright Field, Ohio, August 1926, while testing observation-type plane.

BEALE AFB, Calif., 11 mi. SE of Marysville. Phone: STerling 8-2231. Heavy bomber base, 15th AF, SAC; projected Titan ICBM site. Formerly Camp Beale, named for Brig. Gen. Edward F. Beale, California Indian agent before the Civil War.

BELLOWS AFB, Oahu, Hawaii, 11 mi. NE of Honolulu. Phone: through Hickam AFB, Honolulu 44-111. Primary communications site. Named for 2d Lt. Franklin B. Bellows who was killed in 1918 while on a reconnaissance mission over France.

BERGSTROM AFB, Tex., 7 mi. SE of Austin. Phone: GReenwood 6-6481. Heavy bomber base, 2d AF, SAC. Formerly Del Valle AAB, renamed for Capt. John A. E. Bergstrom of Austin, killed at Clark Field, P. I., December 1941, during Japanese bombardment.

BIGGS AFB, Tex., 6 mi. NW of El Paso. Phone: LOgan 6-6711. Heavy bomber base, 15th AF, SAC. Named for Lt. James B. Biggs, WW I fighter pilot, killed in an accident in France, October 1918.

BLYTHEVILLE AFB, Ark., 3 mi. NW of Blytheville. Phone: LEhigh 2-5667. Heavy bomber base, 2d AF, SAC. Named for nearby city.

BOLLING AFB, 3 mi. S of Washington, D. C. Phone: JOhnson 2-9000. Hq. Command, USAF. Named for Col. Raynal C. Bolling, Assistant Chief of Air Service, died saving life of a 19-year-old private near Amiens, France, 1918.

BROOKLEY AFB, Ala., 3 mi. SW of Mobile. Phone: HEmlock 8-6011. Air Materiel Area, AFLC. Formerly Bates Field, renamed for Capt. Wendell H. Brookley, test pilot, killed in BT-2B crash near Bolling Field, February 1934.

BROOKS AFB, Tex., 7 mi. SSE of San Antonio. Phone: LEhigh 2-8811. USAF Aerospace Medical Center, School of Aerospace Medicine, ATC; Hq. Air Evacuation, MATS. Formerly Gosport Field, renamed for Lt. Sidney J. Brooks, Jr., of San Antonio, killed in air crash near Hondo, Tex.,

(Continued on following page)

Glossary of Terms Used in Guide to AFBs

AAB	Army Air Base
AB	Air Base
ADC	Air Defense Command
AEDC	Arnold Engineering Development Center
AF	Air Force
AFB	Air Force Base
AFCS	Air Force Communications Service
AFLC	Air Force Logistics Command
AFROTC	Air Force Reserve Officers Training Corps
AFSC	Air Force Systems Command
ANG	Air National Guard
AP	Airport
ASD	Aeronautical Systems Division
ATC	Air Training Command
AU	Air University
AWS	Air Weather Service
CBI	China-Burma-India Theater
CG	Commanding General
CMH	Congressional Medal of Honor
CO	Commanding Officer
CONAC	Continental Air Command
DFC	Distinguished Flying Cross
DSC	Distinguished Service Cross
EASTAF	Eastern Transport Air Force
ETO	European Theater of Operations
ICBM	Intercontinental Ballistic Missile
MATS	Military Air Transport Service
NAS	Naval Air Station
NORAD	North American Air Defense Command
OCS	Officer Candidate School
SAC	Strategic Air Command
SAGE	Semi-Automatic Ground Environment
TAC	Tactical Air Command
USAF	United States Air Force
WAF	Women in the Air Force
WESTAF	Western Transport Air Force
WW I	World War I
WW II	World War II

November 1917, on final day of cadet training and commissioned posthumously.

BUNKER HILL AFB, Ind., 9 mi. S of Peru. Phone: GRidley 3-6601. Medium bomber base, 2d AF, SAC; fighter-interceptor base, ADC. Former naval air station. Named geographically.

CANNON AFB, N. M., 7 mi. W of Clovis. Phone: SUnset 4-3311. Tactical fighter base, 12th AF, TAC. Formerly Clovis AFB, renamed for Gen. John K. Cannon, TAC Commander from 1950-54, who was Commander of Allied AFs in the Mediterranean in WW II.

CARSWELL AFB, Tex., 7 mi. WNW of Fort Worth. Phone: PErshing 8-3511. Heavy and medium bomber base, 2d AF, SAC. Formerly Tarrant Field, renamed for Maj. Horace C. Carswell, Jr., of Fort Worth, WW II B-24 pilot and recipient of CMH, killed in China, October 1944.

CASTLE AFB, Calif., 7 mi. NW of Merced. Phone: RAndolph 3-1611. Heavy bomber base, 15th AF, SAC; fighter-interceptor base, ADC. Formerly Merced Field, renamed for Brig. Gen. Frederick W. Castle, WW II B-17 pilot and recipient of CMH, killed over Germany 1944.

CHANUTE AFB, Ill., 1 mi. SE of Rantoul. Phone: TWining 2-3111. Aircraft maintenance and weather schools, Technical Training Center, ATC. Named for Octave Chanute, aviation pioneer and navigation engineer, died in US, 1910.

CHARLESTON AFB, S. C., 10 mi. N of Charleston. Phone: SHerwood 7-4111. Air transport base, EASTAF, MATS; fighter-interceptor base, ADC. Named for city.

CHENNAULT AFB, La., 3 mi. E of Lake Charles. Phone: HEmlock 6-9461. Medium bomber base, 2d AF, SAC. Base was to have been closed, April 1962; full operation restored with continuation of B-47 program. Formerly Lake Charles AFB, renamed for Lt. Gen. Claire L. Chennault, famed leader of WW II Flying Tigers and commander of wartime 14th AF in CBI, died July 1958.

CLINTON CO. AFB, Ohio, 2 mi. SE of Wilmington. Phone FU. 2-3811. Reserve training, CONAC. Named geographically.

CLINTON SHERMAN AFB, Okla., 1 mi. W of Burns Flat. Phone: CLinton 2010. Heavy bomber base, 2d AF, SAC. Formerly Clinton NAS.

COLUMBUS AFB, Miss., 9 mi. N of Columbus. Phone: GEneva 4-7322. Heavy bomber base, 2d AF, SAC.

CONNALLY AFB. *(See James Connally AFB.)*

CRAIG AFB, Ala., 5 mi. SE of Selma. Phone: TRinity 4-7431. Undergraduate pilot training, ATC. Named for Bruce K. Craig, flight engineer for B-24 manufacturer, killed during B-24 test flight in US, 1941.

DALLAS NAS, Tex. (Hensley Field), 11 mi. SSW of Dallas. Phone: ANdrews 4-2163. Reserve training, CONAC; joint use with Navy. Named for Maj. William N. Hensley, airpower pioneer, died in US, 1929.

DAVIS FIELD, Okla., 6 mi. S of Muskogee. Phone: MUrray 7-5404. Reserve training, troop carrier, CONAC. Field is named locally.

DAVIS-MONTHAN AFB, Ariz., 4 mi. SE of Tucson. Phone: EAst 7-5411. Medium bomber base, 15th AF, SAC; fighter-interceptor base, ADC; projected Titan ICBM site. Formerly Tucson Municipal Airport, renamed for Lt. Samuel H. Davis, killed in US, 1921, and Lt. Oscar Monthan, bomber pilot, who was killed in Hawaii in 1924.

DOBBINS AFB, Ga., 2 mi. SE of Marietta. Phone: MArietta 9-4461. Reserve training, troop carrier, Hq. 3d Reserve Region, CONAC; ADC, joint use. Formerly Marietta AFB, renamed for Capt. Charles M. Dobbins, killed transporting paratroops over Sicily, July 1943.

DONALDSON AFB, S. C., 7 mi. SSE of Greenville. Phone: CEdar 5-7411. Troop carrier base, EASTAF, MATS. Activity was to have been reduced, spring 1962, with transfer of troop carrier wing to Hunter AFB where B-47 wing was to have been deactivated; full operation restored with continuation of B-47 program. Formerly Greenville AFB, renamed for Maj. John O. W. Donaldson, US ace in WW I, who was killed in flying accident near Philadelphia, September 1930, during performance at aerial circus.

Arnold | Cannon | Carswell | Castle | Chennault | Dyess | Ellsworth

DOVER AFB, Del., 3 mi. SE of Dover. Phone: REdfield 4-8211. Air transport base, EASTAF, MATS; fighter-interceptor base, ADC; air refueling base, 8th AF, SAC. Named for city.

DOW AFB, Me., 2 mi. W of Bangor. Phone: BAngor 2-5251. Heavy bomber base, 8th AF, SAC; fighter-interceptor and air defense missile base, ADC. Formerly Bangor AB, renamed for 2d Lt. James F. Dow of Oakfield, Me., killed in crash near Mitchel Field, June 1940.

DULUTH MUNICIPAL AP, Minn., 7 mi. NNW of Duluth. Phone: RAndolph 7-8211. Fighter-interceptor and air defense missile base, ADC. Formerly Williamson-Johnson AP, renamed for city.

DYESS AFB, Tex., 6 mi. SW of Abilene. Phone: OWen 2-1212. Medium bomber base, 15th AF, SAC; projected Atlas ICBM site; troop carrier base, TAC. Formerly Tye Field, Abilene Municipal Airport, and Abilene AFB, renamed for Lt. Col. William E. Dyess of Albany, Tex., WW II fighter pilot in South Pacific, killed in P-38 crash in December 1943 in California.

EDWARDS AFB, Calif., 2 mi. S of Muroc. Phone CLifford 8-2111. Hq. AF Flight Test Center, AFSC. Formerly Muroc AFB, renamed for Capt. Glen W. Edwards, test pilot, killed at Muroc Field, June 1948, in crash of YB-49 "Flying Wing."

EGLIN AFB, Fla., 2 mi. SW of Valparaiso. Phone: EGlin 6-6302. Hq. Air Proving Ground Center, AFSC; heavy bomber base, 8th AF, SAC. Named for Lt. Col. Frederick I. Eglin, killed in US, 1937.

EGLIN AF AUXILIARY FIELD #9 (Hurlburt Field), Fla., 6 mi. W of Fort Walton. Phone: OR. 118. Missile training, ADC. On Eglin AFB reservation.

EIELSON AFB, Alaska, 26 mi. SE of Fairbanks. Phone: DRake 7-3107. Support base for SAC mission; weather reconnaissance base, WESTAF, MATS; Alaskan Air Command. Named for Capt. Carl E. Eielson, Alaskan air pio-

neer who flew across the North Pole with Sir Hubert Wilkins in 1928, flew the first US airmail in Alaska, and was killed in a crash while attempting to aid an iced-in vessel in the Bering Sea.

ELLINGTON AFB, Tex., 16 mi. SE of Houston. Phone: HUdson 6-7181. Air Reserve, CONAC. Named for 2d Lt. Eric L. Ellington, killed during training flight near San Diego in 1913.

ELLSWORTH AFB, S. D., 8 mi. NE of Rapid City. Phone: FIllimore 2-2400. Heavy bomber wing, 15th AF, SAC; projected Titan and Minuteman ICBM site. Formerly Rapid City AFB, renamed for Brig. Gen. Richard E. Ellsworth, killed in B-36 crash in Newfoundland, March 18, 1953.

ELMENDORF AFB, Alaska, 4 mi. NE of Anchorage. Phone: BRoadway 5-8001. Hq. Alaskan Air Command; fighter-interceptor squadron, AAC; support base for SAC mission. Named for Capt. Hugh M. Elmendorf, who was killed in 1933 during a test flight of a P-25.

ENGLAND AFB, La., 6 mi. NNW of Alexandria. Phone: HI. 3-4561. Tactical fighter base, 12th AF, TAC. Formerly VIctorville 6-3411. Tactical fighter base, 12th AF, TAC; fighter-interceptor base, ADC. Formerly Victorville AAB, renamed for Brig. Gen. Harold H. George, WW I ace, commander of US Air Forces in Australia in WW II, killed in Australia, April 1942.

GLASGOW AFB, Mont., 18 mi. NNE of Glasgow. Phone: 228-4311. Fighter-interceptor base; heavy bomber base, 15th AF, SAC. Named for city.

GOODFELLOW AFB, Tex., 2 mi. SE of San Angelo. Phone: San Angelo 2-2471. USAF Security Service base. Named for Lt. John J. Goodfellow, Jr., of San Angelo, killed in fighter combat, in France, 1918.

GRAND FORKS AFB, N. D., 14 mi. W of Grand Forks. Phone: Grand Forks 2-3431. Fighter-interceptor base, ADC; air refueling base, 15th AF, SAC mission.

GRAY AFB, Tex., 6 mi. SW of Killeen. Phone: MErcury 4-3161. Special activities base, AFLC. Formerly Camp Hood AAB, renamed for Capt. Robert M. Gray, pilot on first Tokyo bombing mission of WW II, killed in India, 1942.

Ent | Fairchild | Mitchell | Gentile | George | Holloman | Hunter

Alexandria AFB, renamed for Lt. Col. John B. England, WW II ace killed in air crash in France, November 17, 1954.

ENT AFB, Colo., Colorado Springs. Phone: MElrose 5-8911. Hq. NORAD; Hq. ADC. Named for Maj. Gen. Uzal G. Ent, CG, 2d AF, recipient of DSC, died in 1948.

FAIRCHILD AFB, Wash., 11 mi. WSW of Spokane. Phone: CHestnut 4-2511. Heavy bomber base, 15th AF, SAC; Atlas ICBM site. Formerly Spokane AFB, renamed for Gen. Muir S. Fairchild, WW I bomber pilot, Vice Chief of Staff, USAF, died of heart attack, Washington, D. C., March 1950.

FORBES AFB, Kan., 7 mi. S of Topeka. Phone: UNion 2-1234. Medium strategic recon base, 2d AF, SAC; projected Atlas ICBM site. Formerly Topeka AAB, renamed for Maj. Daniel H. Forbes, Jr., WW II bomber pilot killed at Muroc Field, Calif., in the crash of the YB-49 "Flying Wing," June 1948.

FRANCIS E. WARREN AFB, Wyo., 2 mi. W of Cheyenne. Phone: CHeyenne 2-8911. Atlas ICBM site, SAC. Named for Wyoming's first US Senator and first elected governor, Civil War recipient of CMH, died in US, 1929.

GENERAL MITCHELL FIELD, Wis., 6 mi. S of Milwaukee. Phone: HUmboldt 1-6400. Reserve training, troop carrier, CONAC. Also known as Milwaukee County AP. Named for Gen. Billy Mitchell, pioneer flyer whose defiant faith in airpower brought about his court-martial, died in US, 1936.

GENTILE AF STATION, Ohio, 2 mi. SE of Dayton. Phone: CLearwater 2-6551. Specialized depot, AFLC. Named for Maj. Don S. Gentile, WW II fighter ace, credited with shooting down twenty-three German aircraft. Killed in an aircraft accident near Andrews AFB, Md., on January 28, 1951.

GEORGE AFB, Calif., 6 mi. NW of Victorville. Phone:

GREATER PITTSBURGH AP, Pa., 5 mi. SW of Coraopolis. Phone: AMherst 4-5000. Air Reserve, CONAC. Named for nearby city.

GREENVILLE AFB, Miss., 6 mi. NE of Greenville. Phone EDison 2-1571. Technical training, ATC. Named for city.

GRENIER FIELD, Manchester Municipal AP, N. H., 4 mi. S of Manchester. Phone: NAtional 4-4031. Reserve training, troop carrier, CONAC. Named for 2d Lt. Jean D. Grenier of Manchester, killed in US, 1934, while in snowstorm during airmail test run.

GRIFFISS AFB, N. Y., 2 mi. NE of Rome. Phone: Rome FF 6-3200. Hq. Rome Air Development Center, AFSC; Rome AF Depot, AFLC; fighter-interceptor base, ADC; heavy bomber base, 8th AF, SAC. Formerly Rome AB, renamed for Lt. Col. Townsend E. Griffiss of Buffalo, recipient of DSC, killed in flight from Russia to England, February 1942.

GUNTER AFB, Ala., 5 mi. NE of Montgomery. Phone: AMherst 2-6661. Extension Course Institute, USAF, AU; School of Aerospace Medicine, USAF, Medical Service School, ATC; SAGE Direction Center, ADC. Named for William A. Gunter, mayor of Montgomery for 27 years, ardent exponent of airpower, died in 1940.

HAMILTON AFB, Calif., 6 mi. NNE of San Rafael. Phone: TUcker 3-7711. Fighter-interceptor base, ADC; Hq. 6th Reserve Region, CONAC; SAGE combat center. Formerly Marin Meadows, renamed for 1st Lt. Lloyd A. Hamilton, recipient of DSC, killed in fighter combat, France, August 1918.

HANSCOM FIELD. *(See Laurence G. Hanscom Field.)*

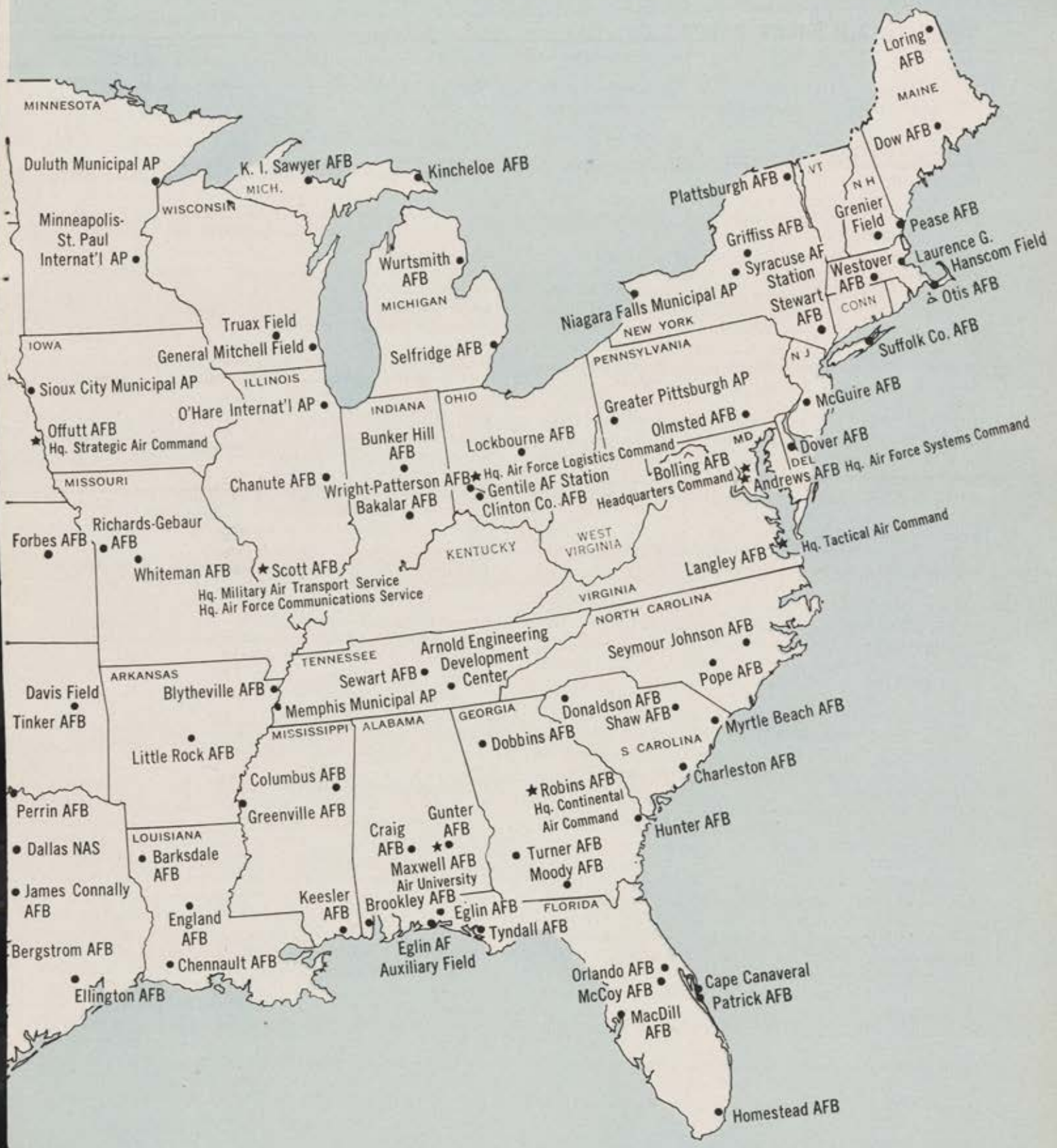
HARLINGEN AFB, Tex., 3.5 mi. NE of Harlingen. Phone: GArfield 3-3200. Navigator training, ATC. Base to be closed in June 1962. Named for city.

HENSLEY FIELD. *(See Dallas NAS.)*

HICKAM AFB, Oahu, Hawaii, 6 mi. SW of Honolulu.

(Continued on page 218)


WASHINGTON
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
IDAHO
OREGON
CALIFORNIA
NEVADA
UTAH
COLORADO
NEBRASKA
KANSAS
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
Paine AFB
McChord AFB
Larson AFB
Spokane Internat'l AP
Fairchild AFB
Glasgow AFB
Malmstrom AFB
Minot AFB
Grand Forks AFB
Portland Internat'l AP
Kingsley Field
Mountain Home AFB
Ellsworth AFB
Hill AFB
Francis E. Warren AFB
Travis AFB
Beale AFB
McClellan AFB
Hamilton AFB
Mather AFB
Stead AFB
Castle AFB
Lincoln AFB
Lowry AFB
USAF Academy
Ent AFB
Hq. Air Defense Command
Peterson Field
Schilling AFB
McConnell AFB
Indian Springs AFB
Nellis AFB
Edwards AFB
Vandenberg AFB
Norton AFB
Oxnard AFB
George AFB
March AFB
Vance AFB
Clinton Sherman AFB
Amarillo AFB
Altus AFB
Kirtland AFB
Cannon AFB
Luke AFB
Williams AFB
Davis-Monthan AFB
Walker AFB
Reese AFB
Sheppard AFB
Holloman AFB
Carswell AFB
Dyess AFB
Webb AFB
Biggs AFB
Goodfellow AFB
Hq. USAF Security Service
Gray AFB
Randolph AFB
Hq. Tactical Air Command
Lackland AFB
Kelly AFB
Laughlin AFB
Brooks AFB
Laredo AFB
Harlingen AFB
ALASKA
Eielson AFB
Elmendorf AFB
Hq. Alaskan Air Command
OAHU, HAWAII
Wheeler AFB
Bellows AFB
Hickam AFB
Hq. Pacific Air Forces Command



Major Active Air Force Bases in the United States

An ***AIR FORCE*** Magazine Map (As of August 15, 1961)

Phone: Honolulu 44-111. Hq. PACAF; air transport base, WESTAF, MATS; support base for SAC mission; fighter-interceptor base, ANG. Named for Lt. Col. Horace M. Hickam, commander of 3d Attack Group, killed in an air crash at Fort Crockett, Tex., 1934.

HILL AFB, Utah, 6 mi. S of Ogden. Phone TAylor 5-2211. Hq. Air Materiel Area, AFLC. Named for Maj. Ployer P. Hill, killed near Wright Field while testing one of the first B-17s, October 1935.

HOLLOMAN AFB, N. M., 8 mi. SW of Alamogordo. Phone: GRanite 3-6511. Hq. AF Missile Development Center, AFSC. Formerly Alamogordo AAB, renamed for Col. George V. Holloman, guided missile pioneer who was killed in an air crash on Formosa, March 1946.

HOMESTEAD AFB, Fla., 5 mi. NNE of Homestead. Phone: EDison 6-8011. Converting from medium to heavy bomber base, 8th AF, SAC; Reserve training, CONAC. Named for city.

HUNTER AFB, Ga., 3 mi. SW of Savannah. Phone: ADam 4-4461. Medium bomber base, 8th AF, SAC. Named for Maj. Gen. Frank O'D. Hunter, WW I ace; recipient of DSC, four clusters; past AFA Director.

HURLBURT FIELD. *(See Eglin AF Auxiliary Field #9.)*

INDIAN SPRINGS AFB, Nev., 1 mi. NW of Indian Springs. Phone: Indian Springs 20. Bombing and gunnery range support base, TAC. Named for city.

JAMES CONNALLY AFB, Tex., 7 mi. NNE of Waco. Phone: SWift 9-3611. Navigator training, Instrument Pilot Instructor School, ATC. Formerly Waco AFB, renamed for Col. James T. Connally of Waco, killed on B-29 mission over Yokohoma, Japan, May 1945.

KEESLER AFB, Miss., 2 mi. WNW of Biloxi. Phone: IDlewood 2-1561. Technical Training Center, ATC. Named for Lt. Samuel R. Keesler, Jr., of Greenwood, Miss., aerial observer, killed on special bombing mission near Verdun, France, October 1918.

KELLY AFB, Tex., 6 mi. WSW of San Antonio. Phone: WAlnut 3-5411. Hq. Air Materiel Area, AFLC. Named for Lt. George E. M. Kelly, pioneer Army pilot, killed in US, 1911.

KINCHELOE AFB, Mich., 3 mi. SE of Kinross. Phone: MElrose 5-5271. Fighter-interceptor and air defense missile base, ADC; heavy bomber base, 2d AF, SAC. Formerly Kinross AFB, renamed in honor of Capt. Iven C. Kincheloe, Jr., Korean War jet ace and holder of world altitude record of 126,200 feet, set in 1956 in Bell X-2 rocketplane; killed July 26, 1958, in crash of an F-104 Starfighter at Edwards AFB, Calif.

KINGSLEY FIELD, Ore., 5 mi. SE of Klamath Falls. Phone: TUxedo 2-4411. Fighter-interceptor base, ADC. Formerly Klamath Falls Municipal Airport, renamed in honor of 2d Lt. David R. Kingsley, killed in Ploesti raid in June 1944.

KIRTLAND AFB, N. M., 4 mi. SSE of Albuquerque. Phone: CHapel 7-1711. Hq. AF Special Weapons Center, AFSC. To be turned over to the city of Albuquerque. Formerly Albuquerque AAB, renamed for Col. Roy S. Kirtland, aviation pioneer and former CO of Langley Field, died in 1941.

K. I. SAWYER AFB, Mich., 16 mi. S of Marquette. Phone: DIckens 6-9211. Fighter-interceptor base, ADC; heavy bomber base, 2d AF, SAC. Origin of name unknown.

LACKLAND AFB, Tex., 7 mi. WSW of San Antonio. Phone: WAlnut 3-3411. Military Training Center, OCS, WAF training, pilot-observer preflight, USAF Recruiting School, USAF Chaplain School, USAF Marksmanship Center, Officer Training School, ATC. Formerly San Antonio Aviation Cadet Center, renamed for Brig. Gen. Frank D. Lackland, former commandant of Kelly Field flying school, died in 1943.

LANGLEY AFB, Va., 3 mi. N of Hampton. Phone: PArk 2-7911. Hq. TAC; refueling base, TAC; fighter-interceptor and air defense missile base, ADC. Named for Samuel P. Langley, pioneer aeronautical scientist, died in 1906.

LAREDO AFB, Tex., 3 mi. NE of Laredo. Phone: RAndolph 3-9121. Undergraduate pilot training, ATC. Named for city.

LARSON AFB, Wash., 6 mi. NNW of Moses Lake. Phone: ROckwell 2-2331. Fighter-interceptor base, ADC; heavy bomber base, 15th AF, SAC; projected Titan ICBM site. Formerly Moses Lake AFB, renamed for Maj. Donald A. Larson, native of Yakima, Wash., WW II ace, killed on fighter mission over Ulzen, Germany, August 1944.

LAUGHLIN AFB, Tex., 7 mi. E of Del Rio. Phone: CYpress 8-3511. Strategic recon base, 2d AF, SAC; projected for undergraduate pilot training, ATC. Base was to have been closed by June 1962 with transfer of U-2 recon wing to Davis-Monthan AFB; full operation restored for pilot training, with U-2 wing remaining. Named for Lt. Jack T. Laughlin, pilot who was killed in action in the Far East in 1942.

LAURENCE G. HANSCOM FIELD, Mass., 1 mi. SSW of Bedford, Phone: CRestview 4-6100. Hq. AF Cambridge Research Laboratory, AFSC. Formerly Bedford AFB, renamed for Laurence G. Hanscom, Boston and Worcester newspaperman, Army Reserve pilot, killed near base, 1941.

LINCOLN AFB, Neb., 5 mi. NW of Lincoln. Phone: GRover 7-6011. Medium bomber base, 2d AF, SAC; projected Atlas ICBM site. Named for city.

LITTLE ROCK AFB, Ark., 15 mi. NE of Little Rock. Phone: FRanklin 2-8311. Medium bomber, strategic recon base, 2d AF, SAC; projected Titan ICBM site. Named for city.

LOCKBOURNE AFB, Ohio, 11 mi. SSE of Columbus. Phone: TEmple 3-8211. Medium bomber base; 8th AF, SAC; fighter-interceptor base, ADC. Named for nearby city.

LORING AFB, Me., 2 mi. NW of Limestone. Phone: FAirview 8-7311. Heavy bomber base, 8th AF, SAC; fighter-interceptor base, ADC. Formerly Limestone AFB, renamed for Maj. Charles J. Loring, Jr., CMH recipient, killed in Korea in November 1952 when he crashed his damaged F-80 into enemy artillery emplacements, destroying them.

LOWRY AFB, Colo., 5 mi. ESE of Denver. Phone: DUdley 8-5411. Technical Training Center, ATC; Titan ICBM site, 15th AF, SAC. Named for Lt. Francis B. Lowry of Denver, recipient of DSC, killed on photo mission over France, September 1918; only Colorado airman to be killed in WW I.

LUKE AFB, Ariz., 20 mi. WNW of Phoenix. Phone: WEstport 5-9311. Tactical fighter crew training, 12th AF, TAC. Named for Lt. Frank Luke, Jr., "balloon-busting" WW I ace recipient of CMH and DSC, killed in France, September 1918.

MacDILL AFB, Fla., 8 mi. SSW of Tampa. Phone: Tampa 66-1411. Medium bomber base, 8th AF, SAC. Activity was to have been reduced, June 1962, with inactivation of B-47 wing; full operation restored with continuation of B-47 program. Named for Col. Leslie MacDill, fighter pilot, killed in air crash at Anacostia, Md., 1938.

MALMSTROM AFB, Mont., 4 mi. E of Great Falls. Phone: GLendale 2-9561. Air refueling base, 15th AF, SAC; fighter-interceptor base, ADC; SAGE interim control cen-

ter; projected Minuteman ICBM site. Formerly Great Falls AFB, renamed for Col. Einar A. Malmstrom, killed in airplane accident near Great Falls, August 21, 1954.

MARCH AFB, Calif., 9 mi. SE of Riverside. Phone: Moreno LD 20. Hq. 15th AF, SAC; medium bomber base, SAC; Reserve training, troop carrier, CONAC. Named for Lt. Peyton C. March, Jr., son of WW I Army Chief of Staff, killed in air crash in US, 1918.

MATHER AFB, Calif., 10 mi. E of Sacramento. Phone: EMpire 3-3161. Heavy bomber base, 15th AF, SAC; navigator training, ATC. Named for Lt. Carl S. Mather, killed near Ellington Field during training flight, 1918, five days after receiving commission.

MAXWELL AFB, Ala., 1 mi. WNW of Montgomery. Phone: AMherst 5-5621. Hq. Air University; War College; Command and Staff College; Hq. AFROTC Research Studies Institute. Named for 2d Lt. William C. Maxwell of Natchez, killed on Luzon, Philippines, August 1920.

McCHORD AFB, Wash., 8 mi. S of Tacoma. Phone: JUniper 8-2121. Fighter-interceptor base, ADC; SAGE combat

Kincheloe Kingsley Lackland Larson Loring Luke McGuire

center; troop carrier base, WESTAF, MATS; air refueling base, 15th AF, SAC. Named for Col. William C. McChord, killed in US, 1937.

McCLELLAN AFB, Calif., 10 mi. NE of Sacramento. Phone: WAbash 2-1511. Hq. Air Materiel Area, AFLC; aircraft early warning and control, ADC. Named for Maj. Hezekiah McClellan, pioneer in Arctic aeronautical experiments, killed during the test flight of a new plane in the US, 1936.

McCONNELL AFB, Kan., 5 mi. SE of Wichita. Phone: MUrray 3-6511. Medium bomber crew training, 2d AF, SAC; projected Titan ICBM site. Formerly Wichita AFB, renamed for the two McConnell brothers of Wichita, Thomas L., killed July 10, 1943, in the South Pacific, and Fred M., Jr., killed in 1945 in a private plane crash in Kansas.

McCOY AFB, Fla., 7 mi. S of Orlando. Phone: ORlando 3-7611. Heavy and medium bomber base, 8th AF, SAC. Formerly Pinecastle AFB, renamed for Col. Michael N. W. McCoy, B-47 wing commander, killed in aircraft accident, October 1957 near Orlando.

McGUIRE AFB, N. J., 1 mi. SE of Wrightstown. Phone: RAymond 4-2100. Hq. EASTAF, MATS; fighter-interceptor and air defense missile base, ADC; SAGE direction center; air refueling base, 8th AF, SAC; Reserve training, CONAC. Formerly Fort Dix AAB, renamed for Maj. Thomas B. McGuire, Jr., of Ridgewood, N. J., second ranking WW II ace, P-38 pilot, recipient of CMH and DSC, killed over Leyte, 1945.

MEMPHIS MUNICIPAL AP, Tenn., 6 mi. SSE of Memphis. Phone: FAirfax 3-7661. Reserve training, CONAC. Named for city.

MINNEAPOLIS-ST. PAUL INTERN'L AP, Minn., 7 mi. SSE of Minneapolis. Phone: PArkway 1-2915. Reserve training, CONAC. Formerly Wold Chamberlain Field.

MINOT AFB, N. D., 11 mi. N of Minot. Phone: TEmple 7-1161. Fighter-interceptor base, ADC; heavy bomber base, projected Minuteman ICBM site, 15th AF, SAC mission. Named for city.

MITCHELL FIELD. *(See General Mitchell Field.)*

MOODY AFB, Ga., 12 mi. NNE of Valdosta. Phone: EDdgewood 3-4211. Undergraduate pilot training, ATC. Named for Maj. George P. Moody, fighter pilot, killed in US, 1941.

MOUNTAIN HOME AFB, Idaho, 11 mi. WSW of Mountain Home. Phone: TEmple 2-4611. Medium bomber base, 15th AF SAC; projected Titan ICBM site. Named for city.

MYRTLE BEACH AFB, S. C., 3 mi. SW of Myrtle Beach. Phone Myrtle Beach 7411. Tactical fighter base, 9th AF, TAC. Named for city.

NELLIS AFB, Nev., 8 mi. NE of Las Vegas. Phone: DUdley 2-1800. Tactical fighter crew training, fighter weapons, 12th AF, TAC. Formerly Las Vegas AFB, renamed for Lt. William H. Nellis of Las Vegas, fighter pilot, killed in action over Luxembourg, December 1944.

NIAGARA FALLS MUNICIPAL AP, N. Y., 4 mi. E of Niagara Falls. Phone: BU. 5-6691. Reserve training, CONAC; air defense missile base, ADC. Named for city.

NORTON AFB, Calif., 5 mi. ENE of San Bernardino. Phone: TUrner 9-4411. Hq. Air Materiel Area, AFLC; air defense sector, Hq. ADC. Formerly San Bernardino Air Depot, renamed for Capt. Leland F. Norton, bomber pilot, killed in aircraft accident near Amiens, France, May 1944.

OFFUTT AFB, Neb., 9 mi. S of Omaha. Phone: 291-2100. Hq. SAC; air refueling base, SAC; Atlas ICBM site. Named for 1st Lt. Jarvis Jennes Offutt, who was killed in fighter action, France, 1918.

O'HARE INTERNAT'L AP, Ill., 15 mi. NW of Chicago. Phone VAnderbilt 7-1151. Reserve training, troop carrier base, CONAC. Formerly Douglas Airport, renamed for Lt. Cmdr. Edward H. O'Hare of Chicago, Navy pilot in WW II, recipent of CMH, killed in action near Tarawa in the Pacific, 1943.

OLMSTED AFB, Pa., 1 mi. NW of Middletown. Phone: WHitney 4-5521. Hq. Air Materiel Area, AFLC. Formerly Middletown Air Depot, renamed for Lt. Robert S. Olmsted, balloon pilot, killed when his balloon was struck by lightning over Belgium, September 1923.

ORLANDO AFB, Fla., 2 mi. E of Orlando. Phone: GArden 3-0561. Hq. Air Photographic and Charting Service; Hq. Air Reserve Service, MATS. Named for city.

OTIS AFB, Mass., 9 mi. NNE of Falmouth. Phone: LOcust 3-5511. Fighter-interceptor and air defense missile base, ADC; aircraft early warning and control, ADC; air refueling base, 8th AF, SAC. Named for Lt. Frank J. Otis, killed in air crash in US, 1937.

OXNARD AFB, Oxnard, Calif. Phone: HUnter 3-1151. Fighter-interceptor base, ADC. Named for city.

PAINE AFB, Wash., 6 mi. S of Everett. Phone: ELiot 3-1106. Fighter-interceptor base, ADC. Named for 2d Lt.

(Continued on following page)

Topliff O. Paine, airmail pilot, who was killed while mapping airmail routes, 1922.

PATRICK AFB, Fla., 12 mi. SE of Cocoa. Phone: ULysses 7-1110. Hq. AF Missile Test Center, AFSC. Formerly Banana River NAS, renamed for Maj. Gen. Mason M. Patrick, Chief of Army Air Service during and after WW I, died in US, January 1942.

PEASE AFB, N. H., 3 mi. W of Portsmouth. Phone: GEneva 6-0100. Medium bomber base, 8th AF, SAC; Formerly Portsmouth AFB, renamed for Capt. Harl Pease, Jr., CMH recipient, WW II pilot missing over Rabaul, New Britain, on August 6, 1942.

PERRIN AFB, Tex., 6 mi. NNW of Sherman. Phone: ST. 7-2971. Pilot interceptor training (Adv.), ATC. Named for Lt. Col. Elmer D. Perrin of Boerne, Tex., killed testing a B-26 near Baltimore, June 1941.

PETERSON FIELD, Colo., 6 mi. E of Colorado Springs. Phone: MElrose 5-8911. Administrative flying, ADC. Named for 1st Lt. Edward J. Peterson, killed in US, in airplane crash, 1942.

SCHILLING AFB, Kan., 4 mi. SW of Salina. Phone: TAylor 7-4411. Medium bomber base, 15th AF, SAC; projected Atlas ICBM site. Formerly Smokey Hill AFB, renamed for Col. David C. Schilling, WW II fighter ace and pioneer of in-flight refueling techniques who led first nonstop transatlantic flight of jet fighters, killed in automobile accident, in England, August 1956.

SCOTT AFB, Ill., 6 mi. ENE of Belleville. Phone: Adams 4-4000. Hq. MATS; Hq. AWS; Hq. AFCS. Named for Cpl. Frank S. Scott, first enlisted man to die in an air accident, killed at College Park, Md., 1912.

SELFRIDGE AFB, Mich., 3 mi. E of Mount Clemens. Phone: HOward 3-0511. Fighter-interceptor base, ADC; Hq. 5th Reserve Region, CONAC; air refueling base, 2d AF, SAC. Named for Lt. Thomas E. Selfridge, killed in 1908 while on flight with Orville Wright to demonstrate Wright plane.

SEWART AFB, Tenn., 3 mi. N of Smyrna. Phone: GLendale 9-2561. Troop carrier base, 9th AF, TAC. Formerly Smyrna AFB, renamed for Maj. Allan J. Sewart, Jr., bomber pilot, recipient of DSC, killed in action over the Solomons, November 1942.

Olmsted | Pease | Tinker | Travis | Vance | Vandenberg | Westover

PITTSBURGH AP. *(See Greater Pittsburgh AP.)*

PLATTSBURGH AFB, N. Y., 1 mi. SW of Plattsburgh. Phone: JOrdan 3-4500. Medium bomber base, 8th AF, SAC; projected Atlas ICBM site. Named for city.

POPE AFB, N. C., 12 mi. NW of Fayetteville. Phone: HYatt 7-2311. Troop carrier base, 9th AF, TAC. Named for 1st Lt. Harley H. Pope, killed while making a forced landing in a Jenny in South Carolina, January 1919.

PORTLAND INTERNAT'L AP, Ore., 7 mi. NE of Portland. Phone: ATlantic 8-5611. Fighter-interceptor base, ADC. Named for city.

RANDOLPH AFB, Tex., 15 mi. ENE of San Antonio. Phone: OLive 8-3511. Hq. ATC; Jet Qualification Course (Adv.), ATC; Hq. 4th Reserve Region, CONAC. Named for Capt. William M. Randolph of Austin, fighter pilot, killed in aircraft accident in Texas, 1928.

REESE AFB, Tex., 12 mi. W of Lubbock. Phone: POrter 3-1951. Undergraduate pilot training, ATC. Formerly Lubbock AFB, renamed for Lt. Augustus F. Reese, Jr., of Shallowater, Tex., killed on bomber mission over Cagliari, Italy, May 1943.

RICHARDS-GEBAUR AFB, Mo., 16 mi. S of Kansas City. Phone: EMerson 1-5200. Fighter-interceptor base, ADC; Air Division Hq. SAGE; Reserve training, CONAC. Formerly Grandview AFB, renamed for Lt. John F. Richards, II, of Kansas City, first area pilot to die in combat in WW I; and for Lt. Col. Arthur W. Gebaur, Jr., who was killed in action over North Korea in 1952.

ROBINS AFB, Ga., 14 mi. SSE of Macon. Phone: WAlker 6-5511. Hq. Air Materiel Area, AFLC; Hq. CONAC; expanding to handle 8th AF, SAC components. Named for Brig. Gen. Augustine Warner Robins, Chief of Materiel Division, Air Corps, who devised system of cataloging in 1920s still used; died in 1940.

SAWYER AFB. *(See K. I. Sawyer AFB.)*

SEYMOUR JOHNSON AFB, N. C., 2 mi. SSE of Goldsboro. Phone: REpublic 5-1121. Tactical fighter base, 9th AF, TAC; fighter-interceptor base, ADC; heavy bomber base, 8th AF, SAC. Named for Lt. Seymour A. Johnson, Navy pilot of Goldsboro, killed in 1942.

SHAW AFB, S. C., 7 mi. WNW of Sumter. Phone: SPruce 5-1111. Hq. 9th AF, TAC; tactical recon; combat crew training group. Named for 1st Lt. Erwin D. Shaw of Sumter, killed during recon flight over German lines, July 1918, while serving with Royal Flying Corps.

SHEPPARD AFB, Tex., 6 mi. N of Wichita Falls. Phone: 322-5621. Technical Training Center, ATC; heavy bomber base, 2d AF, SAC. Named for Morris E. Sheppard, US Senator from Texas, chairman of Senate Military Affairs Committee, died in 1941.

SHERMAN AFB *(See Clinton Sherman AFB.)*

SIOUX CITY MUNICIPAL AP, Iowa, 10 mi. S of Sioux City. Phone: Sioux City 2-0571. Fighter-interceptor base, ADC. Named for city.

SPOKANE INTERNAT'L AP, Wash., 6 mi. WSW of Spokane. Phone: TEmple 8-2771. Fighter-interceptor base, ADC. Formerly Geiger Field, named for Maj. Harold Geiger, WW I dirigible expert, killed in crash landing at Olmsted Field, Pa., May 1927; renamed for city.

STEAD AFB, Nev., 10 mi. NW of Reno. Phone: FIreside 9-0711. Survival training, ATC. Formerly Reno AAB, renamed for Lt. Craston Stead, Nevada ANG pilot killed in a crash at the base.

STEWART AFB, N. Y., 4 mi. NW of Newburgh. Phone: JOhn 2-1300. SAGE direction center, ADC; Reserve training, Hq. 1st Reserve Region, CONAC. Named for Lachlan Stewart, sea captain whose son provided land for the base.

SUFFOLK CO. AFB, N. Y., 3 mi. N of Westhampton Beach, L. I. Phone: WEsthampton 4-1900. Fighter-interceptor and air defense missile base, ADC.

SYRACUSE AF STATION, N. Y., 5 mi. NNE of Syracuse. Phone: GLenview 8-5500. Hq. ADC Air Division; SAGE combat center, ADC. Named for city.

TINKER AFB, Okla., 8 mi. ESE of Oklahoma City. Phone: PErshing 2-7321. Hq. Air Materiel Area, AFLC; Reserve training, CONAC. Named for Maj. Gen. Clarence L. Tinker, a Pawhuska Indian, bomber and fighter pilot; CG, 7th AF, killed in raid on Wake Island, June 1942.

TRAVIS AFB, Calif., 6 mi. ENE of Fairfield and Suisun. Phone: IDlewood 7-2211. Hq. WESTAF, MATS; heavy bomber base, 15th AF, SAC; air transport base, MATS; fighter-interceptor base, ADC. Formerly Fairfield-Suisun AFB, renamed for Brig. Gen. Robert F. Travis, bomber pilot, recipient of DSC, killed in B-29 crash in US, August 1950.

TRUAX FIELD, Wis., 1 mi. E of Madison. Phone: CHerry 9-5311. Fighter-interceptor base, ADC; SAGE combat center. Named for 1st Lt. Thomas L. Truax of Madison, pilot, killed in training flight in US, November 1941.

TURNER AFB, Ga., 4 mi. ENE of Albany. Phone: HEmlock 5-3411. Heavy bomber base, 8th AF, SAC. Named for Lt. Sullins Preston Turner of Oxford, Ga., killed in aircraft accident at Langley AFB, May 1940.

TYNDALL AFB, Fla., 8 mi. SE of Panama City. Phone: ATlantic 6-2111. Weapons employment center, ADC. Named for Lt. Frank B. Tyndall of Port Seward, Fla., WW I fighter pilot, killed in air crash in 1930; first Florida military flyer to be killed.

VANCE AFB, Okla., 4 mi. SSW of Enid. Phone: ADams 7-2121. Undergraduate pilot training, ATC. Formerly Enid AFB, renamed for Lt. Col. Leon R. Vance, Jr., WW II recipient of CMH, lost in hospital aircraft forced down at sea off Iceland, 1944.

VANDENBERG AFB, Calif., 10 mi. NW of Lompoc. Phone: WAlnut 5-8651. Hq. 1st Missile Division, SAC; Atlas and Titan ICBM sites. Formerly Cooke AFB, renamed for Gen. Hoyt S. Vandenberg, 9th AF Commander in ETO in WW II, Air Force Chief of Staff from 1948 to 1953, who died April 2, 1954.

WALKER AFB, N. M., 6 mi. S of Roswell. Phone: FIrestone 7-5411. Heavy bomber base, 15th AF, SAC; fighter-interceptor base, ADC; projected Atlas ICBM site. Formerly Roswell AAB, renamed for Brig. Gen. Kenneth N. Walker, a native of New Mexico, CG, 5th Bomber Command, WW II recipient of CMH, killed in Southwest Pacific while leading a bombing attack, 1943.

WARREN AFB. *(See Francis E. Warren AFB.)*

WEBB AFB, Tex., 1.8 mi. SW of Big Spring. Phone: AMherst 4-2511. Undergraduate pilot training, ATC; fighter-interceptor base, ADC. Formerly Big Spring AFB, renamed for 1st Lt. James L. Webb, Jr., F-51 pilot, killed off Japanese coast, 1949.

WESTOVER AFB, Mass., 3 mi. NNE of Chicopee Falls. Phone: LYceum 3-6411. Hq. 8th AF, SAC; heavy bomber base, air refueling base, SAC; fighter-interceptor base, ADC. Named for Maj. Gen. Oscar Westover, Chief of Air Corps, killed in air crash near Burbank, Calif., September 1938.

WHEELER AFB, Oahu, Hawaii, 23 mi. NW of Honolulu. Phone: 7730. Hq. Pacific Airways and Air Communications, AFCS. Named for Maj. Sheldon H. Wheeler, killed in an aircraft accident in 1921 at Luke Field, Hawaii.

WHITEMAN AFB, Mo., 3 mi. S of Knob Noster. Phone: LOgan 3-2201. Medium bomber base, projected Minuteman ICBM site, 2d AF, SAC. Formerly Sedalia AFB, renamed for 2d Lt. George A. Whiteman of Sedalia, killed in action at Pearl Harbor on December 7, 1941.

WILLIAMS AFB, Ariz., 10 mi. E of Chandler. Phone: YUkon 8-2611. Undergraduate pilot training, ATC. Formerly Higley Field, renamed for Lt. Charles L. Williams, native of Arizona, bomber pilot, killed in Hawaii, July 1927.

WRIGHT-PATTERSON AFB, Ohio, 2 mi. ENE of Dayton. Phone: CLearwater 3-7111. Hq. AFLC; ASD, AFSC; Air Force Institute of Technology, AU; fighter-interceptor base, ADC; heavy bomber base, 2d AF, SAC. Formerly separate areas including Fairfield Air Depot, Wilbur Wright Field, McCook Field, and Patterson Field; renamed for Orville and Wilbur Wright, and for Lt. Frank S. Patterson, who was killed in air crash near this base during early firing tests of synchronized machine gun, June 1918.

WURTSMITH AFB, Mich, 3 mi. NW of Oscoda. Phone: SEneca 9-3611. Fighter-interceptor base, ADC; heavy bomber base, 2d AF, SAC. Formerly Camp Skeel, later Oscoda AFB, renamed for Maj. Gen. Paul B. Wurtsmith, CG, 13th AF, who was killed in B-25 crash in North Carolina, 1946.

UNITED STATES AIR FORCE INSTALLATIONS OVERSEAS

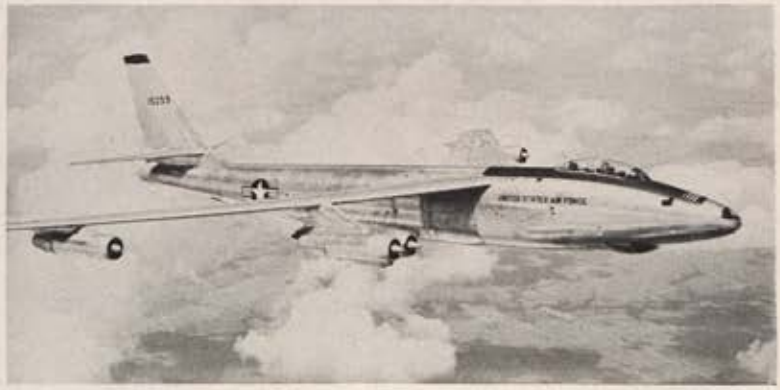
Albrook AFB, Canal Zone
Andersen AFB, Guam
Ankara AS, Turkey
Athenai AB, Greece
Aviano AB, Italy
Benguerir AB, Morocco
Bentwaters RAF Station, England
Bitburg AB, Germany
Brize Norton RAF Station, England
Bruntingthorpe RAF Station, England
Camp New Amsterdam AB, Netherlands
Chambley AB, France
Chateauroux AS, France
Chaumont AB, France
Chelveston RAF Station, England
Clark AFB, Philippines
Dhahran AB, Saudi Arabia
Dreux AB, France
Ernest Harmon AFB, Newfoundland
Etain AB, France
Evreux/Fauville AB, France
Fairford RAF Station, England
Fuchu AS, Japan
Gioia del Colle, Italy
Goose AB, Labrador
Greenham Common RAF Station, England
Hahn AB, Germany
High Wycombe AS, England
Howard AFB, Canal Zone
Incirlik AB, Turkey
Iraklion AS, Crete
Itazuke AB, Japan
John Hay AB, Philippines
Kadena AB, Okinawa
Kimpo AB, Korea
Kindley AFB, Bermuda
Kunsan AB, Korea
Lajes Field, Azores
Lakenheath RAF Station, England
Laon AB, France
Lindsey AS, Germany
Mildenhall RAF Station, England
Misawa AB, Japan
Moron AB, Spain
Naha AB, Okinawa
Nouasseur AB, Morocco
Osan AB, Korea
Rabat/Sale AB, Morocco
Ramey AFB, Puerto Rico
Ramstein AB, Germany
Rhein/Main AB, Germany
Sculthorpe RAF Station, England
Sembach AB, Germany
Seoul AS, Korea
Shemya AS, Aleutian Islands
Sidi Slimane AB, Morocco
Sondrestrom AB, Greenland
South Ruislip AS, England
Spangdahlem AB, Germany
Tachikawa AB, Japan
Tainan AS, Taiwan
Taipei AS, Taiwan
Templehof Central AP, Germany
Thule AB, Greenland
Torrejon AB, Spain
Toul-Rosiere AB, France
Upper Heyford RAF Station, England
Wheelus AB, Libya
Wiesbaden AB, Germany
Woodbridge RAF Station, England
Yokota AB, Japan
Zaragoza AB, Spain

Gallery of USAF Weapons

BOMBERS

B-52

B-57



B-47

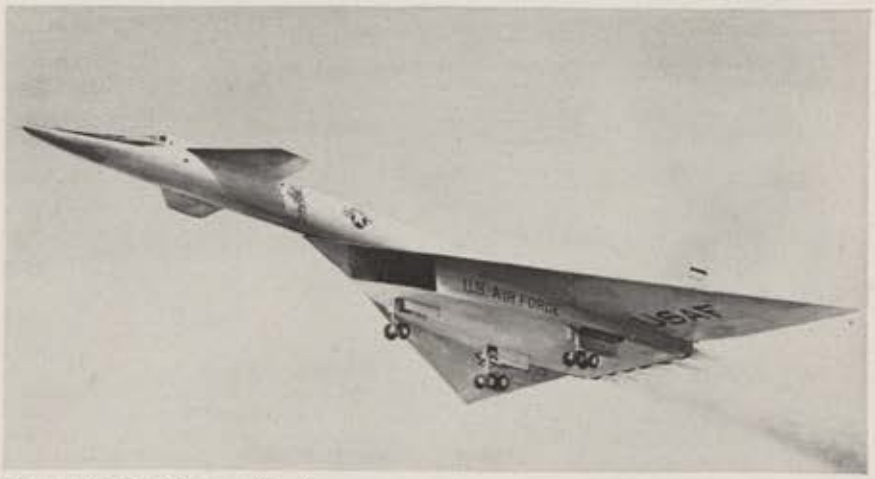
B-47 STRATOJET—medium-jet bomber; one of major components of SAC through the 1950s. Made first flight December 17, 1947; on February 8, 1949, XB-47 made record dash from Larson AFB, Wash., to Andrews AFB, Md.—2,289 mi.—in 3 hours, 46 minutes. Last production model—B-47E—flown first January 30, 1953, and photo-reconnaissance version, the RB-47E, flown first July 3, 1953. An ARDC test B-47 remained airborne for 80 hours and 36 minutes, covering 39,200 mi., to set records in both these categories on November 27, 1959; previous mark was also held by a B-47. All models have sweptback wings and provision for 33 ATO (assisted takeoff) rocket units of 1,000 lb. each. B-47 production was completed late in 1956. Program to phase B-47 fleet out of service probably will be curtailed as a result of the Berlin crisis. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** 6 General Electric J47 turbojets. **Power plant hp/thrust:** 6,000 lb. each engine. **Dimensions:** span 116 ft., length 107 ft., height 28 ft. **Speed:** over 600 mph. **Ceiling:** above 40,000 ft. **Range:** beyond 3,000 mi. **Bomb load:** more than 20,000 lb. **Armament:** 2 20-mm cannon in tail turret. **Crew:** 3—pilot, copilot, navigator/bombardier. **Maximum gross takeoff weight:** 230,000 lb. **Primary using command:** Strategic Air Command.

B-52 STRATOFORTRESS—strategic heavy bomber; primary element in SAC today. Prototype flew in April 1952; SAC took delivery of first B-52, June 29, 1954; on November 25, 1956, 8 B-52s completed nonstop 17,000-mile flight over the North Pole; 3 B-52s landed at March AFB, Calif., January 18, 1957, after flying around the world in 45 hours 19 minutes. They covered the 24,325 mi. from Castle AFB, Calif., at an average speed of 530 mph. Latest versions are the B-52G and H, designed to carry air-launched missiles, air-launched ballistic missiles, bomb loads. G model has integral tanks in wings, which essentially convert entire wing into one large fuel tank. H has turbofan engines. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** 8 Pratt & Whitney J57 turbojets. H model, 8 Pratt & Whitney TF33 turbofans. **Power plant hp/thrust:** up to 13,750 lb. each engine. H model, 17,000 lb. each engine. **Dimensions:** (Model A—F) span 185 ft., length 156 ft., height 48 ft.; (Model G and H) span 185 ft., length 157 ft., height 40 ft. 8 in. **Speed:** over 600 mph. **Ceiling:** above 50,000 ft. **Range:** (Model A—F) beyond 6,000 mi. (Model G) beyond 7,500 mi. (Model H) beyond 9,000 mi. **Bomb load:** (Model A—F) more than 20,000 lb. (Model G and H) same or two air-to-surface missiles and bombs or T-171E3 Vulcan cannon. **Armament:** 4 .50-caliber machine guns in tail. **Crew:** 6. **Maximum gross takeoff weight:** (Model A, B) more than 350,000 lb. (Model C-F) more than 400,000 lbs. (Model G and H) more than 450,000 lbs. **Primary using command:** Strategic Air Command.

B-57 CANBERRA—light bomber; adaptation of English Electric Canberra bomber. Versions of plane include RB-57 reconnaissance model, TB-57 dual-control trainer, B-57E tow-target aircraft. **Contractor:** Martin Co. **Power plant and manufacturer:** 2 Wright J65-5 turbojets. **Power plant thrust:** 7,200 lb. **Dimensions:** span 64 ft., length 65.5 ft., height 14.8 ft. **Speed:** over 600 mph. **Ceiling:** over 45,000 ft., over 55,000 in stripped-down reconnaissance version. **Range:** beyond 2,000 mi. **Bomb load:** 5,000 lb. **Armament/cameras:** bombs, 8 5-in. HVAR rockets, 8 .50-caliber machine guns, or high-altitude cameras. **Crew:** 2 seated in tandem; 1 in reconnaissance version. **Maximum gross takeoff weight:** 50,000 lb. **Primary using command:** Pacific Air Forces, Air National Guard.

B-58

B-66



B-70 (Artist's Conception)

B-58 HUSTLER—strategic medium bomber—reconnaissance plane; world's first supersonic bomber. First flight November 1956. Uses disposable pods carried beneath the fuselage which make it unnecessary to haul empty space after weapons or fuel have been expended; payload, cameras, ECM equipment, fuel can be carried in pod; struts of main landing gear, each with 8 wheels, unusually long to give ground clearance to pod. Plane in production; declared operational by SAC in August 1960; SAC crews training at Carswell AFB, Tex. During 1961, the B-58 set a number of international records—it flew 1,302 mph over a closed course of 669.4 miles, a few months later covered 5,183 miles between Carswell AFB, Tex., and Paris, France, nonstop, in 6 hours 15 minutes. This set Carswell-Washington, D. C., Washington-New York, and transatlantic records. **Contractor:** General Dynamics/Fort Worth. **Power plant and manufacturer:** 4 General Electric J79 turbojets with afterburners. **Power plant hp/thrust:** over 10,000 lbs. each plus afterburners. **Dimensions:** span 56 ft. 10 in., length 96 ft. 9 in., height 31 ft. 5 in. **Speed:** Mach 2 or 1,324 mph at 35,000 ft. **Ceiling:** above 60,000 ft. **Range:** intercontinental through mid-air refueling. **Bomb load:** nuclear weapons in disposable pod. **Armament:** 1-171E3 20-mm cannon in tail. **Crew:** 3—pilot, bombardier/navigator, defensive systems operator. **Maximum gross takeoff weight:** more than 160,000 lb. **Primary using command:** Strategic Air Command.

B-66 DESTROYER—tactical light bomber; versatile plane; fills important roles in TAC Composite Air Strike Force. First flown June 1954. Latest in the series, the WB-66D weather-reconnaissance aircraft, delivered on June 26, 1957. Destroyer is equipped with automatic electrical control system which eliminates at least 10 pilot functions, requires no manual switching. Two RB-66Bs averaged 700 mph ground speed from Tucson, Ariz., to Crestview, Fla., in March 1956. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** 2 Allison J71-A-13 turbojets. **Power plant hp/thrust:** 10,000 lb. each. **Dimensions:** span 72 ft. 6 in., length 75 ft. 2 in., height 23 ft. 7 in. **Speed:** 700 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 1,500 mi. without aerial refueling. **Bomb load:** B-66B, 15,000 lb. including nuclear weapons. **Armament/cameras:** 2 20-mm cannon in tail of all models; RB-66B, RB-66C, full range of camera equipment; WB-66D, special weather-reconnaissance equipment. **Crew:** B-66B, RB-66B, 3; RB-66C, 4; WB-66D, 5. **Maximum gross takeoff weight:** B-66B, 83,000 lbs.; RB-66, 83,000 lb. **Primary using command:** Tactical Air Command, United States Air Forces in Europe.

B-70 VALKYRIE—strategic developmental heavy bomber. In December 1957, then Secretary of the Air Force James H. Douglas announced program for Mach 3 B-70, radical aircraft far superior to any now in existence. Program cut drastically in early 1960 for economy reasons, restored later in year. Two prototypes with all systems necessary to make plane a super-bomber are slated to be built under present program. In size B-70 would be comparable to B-52; it would be able to operate from most existing heavy bomber bases. **Contractor:** North American Aviation. **Power plant and manufacturer:** 6 General Electric J93 turbojets. **Power plant hp/thrust:** classified. **Dimensions:** span 115 ft., length 170 ft. **Speed:** over 2,000 mph (Mach 3) cruise. **Ceiling:** about 70,000 ft. **Range:** intercontinental. **Bomb load:** classified. **Armament:** nuclear weapons. **Crew:** 4. **Maximum gross takeoff weight:** about 250 tons. **Primary using command:** Strategic Air Command.

Gallery of USAF Weapons

FIGHTERS

F-100C

RF-84F

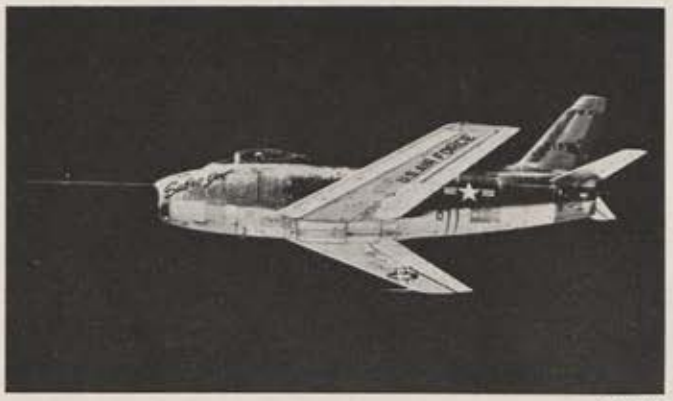
F-84F THUNDERSTREAK—sweptwing tactical fighter. First flew in 1950. Deliveries began in 1953; first TAC units were equipped in 1954. In March 1955, Lt. Col. Robert R. Scott set a speed record from Los Angeles to New York—2,445 mi.—in 3 hours 44 minutes; in August 1955, a flight of the 27th Strategic Fighter Wing, Bergstrom AFB, Tex., set nonstop jet fighter distance record of 5,118 mi. using in-flight refueling. Plane had its first flight at Edwards AFB, Calif., in spring of 1951; it has tricycle landing gear, jettisonable canopy, pilot ejection seat. Production has been completed. **Contractor:** Republic Aviation Corp. **Power plant and manufacturer:** Wright Sapphire J65 single jet. **Power plant hp/thrust:** 7,200 lb. **Dimensions:** span 33 ft. 6 in., length 43 ft. 4 in., height 14 ft. 4 in. **Speed:** over 650 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 2,000 mi. **Bomb load:** 4,000 lb. of conventional or nuclear bombs. **Armament:** 6 .50-caliber machine guns, 24 5-in. rockets. **Crew:** 1. **Maximum gross takeoff weight:** 25,000 lb. **Primary using command:** Air National Guard, NATO, SEATO.

RF-84F THUNDERFLASH—reconnaissance modification of F-84F; made maiden flight in February 1952 at Edwards AFB. Has virtually same characteristics as the fighter except air-intake ducts are situated in the wing roots rather than nose, which is elongated and enclosed to provide space for cameras, radar, electronic equipment; can carry combinations of a variety of 15 cameras; carries magnesium flares in flash ejector cartridges under the wings for night photography. Was the first reconnaissance fighter to have camera control system and a view finder for the pilot; also equipped with wire recorder which records pilot's observations during visual reconnaissance. **Contractor:** Republic Aviation Corp. **Power plant and manufacturer:** Wright Sapphire J65 single jet. **Power plant hp/thrust:** 7,200 lb. **Dimensions:** span 33 ft. 6 in., length 47 ft. 6 in., height 15 ft. **Speed:** over 650 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 2,000 mi. **Armament/cameras:** 4 .50-caliber machine guns, standard aerial cameras, dicing cameras, Tri-Metrogon camera. **Crew:** 1. **Maximum gross takeoff weight:** 25,000 lb. **Primary using command:** Tactical Air Command, Air National Guard, NATO, SEATO.

F-84G THUNDERJET—straight-wing tactical fighter. First production-line jet fighter equipped for (1) in-flight refueling and (2) to deliver nuclear bombs. Made what was considered outstanding flight of 1953 by going nonstop from Turner AFB, Ga., to Lakenheath, England—4,485 mi.—the longest flight made by jet fighter to that time. Saw extensive action in Korea in air support missions. Production of last of 4,457 F-84Gs was completed in 1953. **Contractor:** Republic Aviation Corp. **Power plant and manufacturer:** Allison J34-A-29 single jet. **Power plant hp/thrust:** 5,600 lb. **Dimensions:** span 36 ft., length 38 ft., height 12 ft. 6 in. **Speed:** over 600 mph. **Ceiling:** above 45,000 ft. **Range:** 2,000 mi. with 4 external tanks. **Bomb load:** 4,000 lb. of conventional and nuclear bombs. **Armament:** 6 M-3 .50-caliber machine guns, rockets. **Crew:** 1. **Maximum gross takeoff weight:** over 18,000 lb. **Primary using command:** Air National Guard, NATO, SEATO.

YF-84J SUPER THUNDERSTREAK—tactical fighter; basically the same as the F-84F; the J model made its first flight at Edwards AFB May 7, 1954. Major improvements included larger General Electric turbojet engine, redesigned air-intake duct, and changes in fuselage, dive brake area, and internal systems. Volume production commenced in 1953 simultaneous with completion of production of Thunderjets. **Contractor:** Republic Aviation Corp. **Power plant and manufacturer:** General Electric J73 single jet. **Power plant hp/thrust:** 9,000 lb. **Dimensions:** span 33 ft. 6 in., length 43 ft. 4 in., height 12 ft. 4 in. **Speed:** about 700 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 2,000 mi. **Bomb load:** more than 6,000 lb. conventional, nuclear bombs. **Armament:** 6 .50-caliber machine guns, rockets. **Crew:** 1. **Maximum gross takeoff weight:** over 25,000 lb. **Primary using command:** Air National Guard, NATO.

F-86 SABREJET—tactical fighter-interceptor; first flew in May 1948 and was USAF's first sweptwing fighter; in various models established and held world speed marks from 671 mph to 699 mph. The F gained world fame during the Korean War through the 14-to-1 kill ratio its pilots established over Communist flyers. Was free world's answer to Red MIG jet over Korea. **Contractor:** North American Aviation. **Power plant and manufacturer:** F-86F, General Electric J47-27; F-86D, K, L, General Electric J47-33 or 17B; F-86H, General Electric J73-GE3. **Power plant hp/thrust:** F-86F, 5,970 lb.; F-86D, K, L, 7,650 lb. with afterburner; F-86H, 8,500 lb. **Dimensions:** F-86F, span 37 ft., length 38 ft., height 15 ft.; F-86D, K, L, span 37 ft., length 40 ft., height 15 ft. **Speed:** more than 650 mph. **Ceiling:** above 45,000 ft. **Range:** F-86F, beyond 1,000 mi. maximum.



F-86H

F-89

RF-101A

Bomb load: F-86F, 2,000 lb. **Armament/cameras:** F-86F, 6 .50-caliber machine guns; F-86D, L, 24 2.75-in. Mighty Mouse air-to-air rockets; F-86K, 4 20-mm cannon. **Crew:** 1. **Maximum gross takeoff weight:** F-86F, 17,000 lb.; F-86D, 18,000 lb.; K, L, 20,000 lb. **Primary using command:** Air Defense Command, Air National Guard, NATO, SEATO.

F-89 SCORPION—all-weather interceptor; A, B, and C models of the F-89 are in use by the Air National Guard, the F-89D, H, and J models are still used by some ADC units but being phased out in favor of F-101s, F-102s, and F-106s. The F-89 is a midwing, twin-engined, all-weather interceptor, manned by a crew of 2, pilot and radar observer, seated tandem; heavy rocket armament is carried in large wingtip pods, 52 rockets to pod; can be fired in small groups or 1 giant volley; later models have advanced Hughes fire control. **Contractor:** Northrop Corp. **Power plant and manufacturer:** 2 Allison J35-A-35 turbojets with afterburners. **Power plant hp/thrust:** about 15,000 lb. with afterburners. **Dimensions:** span 56 ft. 2 in., length 53 ft. 4 in., height 17 ft. 7 in. **Speed:** over 600 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 1,000 mi. **Armament:** 104 2.75-in. folding-fin air-to-air rockets or missiles including Falcon or Genie. **Crew:** 2. **Maximum gross takeoff weight:** more than 40,000 lb. **Primary using command:** Air Defense Command, Air National Guard.

F-100 SUPERSABRE—tactical fighter; made first flight in May 15, 1953; went into production at Los Angeles plant mid-1953; first delivery made to TAC in September 1954. F-100F was first two-place jet tactical fighter ordered by Air Force; went into production in Los Angeles in 1956; in use mainly as a trainer. D model has an autopilot. C and D models have in-flight refueling systems. F-100 was first USAF aircraft able to fly supersonic in level flight. An F-100C set official world's record of 822.135 mph at Palmdale, Calif., on August 20, 1955. Plane is versatile kingpin of TAC's Composite Air Strike Force; with new, larger external tanks and ability to refuel internal and external tanks in flight, has almost unlimited range; can be zero-length launched from a mobile translauncher fully armed, fueled, and manned. F-100 production ended in 1959. **Contractor:** North American Aviation. **Power plant and manufacturer:** Pratt & Whitney J57 with afterburner. **Power plant hp/thrust:** over 10,000 lb. **Dimensions:** span 38 ft., length 47 ft., height 16 ft. **Speed:** over 1,000 mph. **Ceiling:** above 50,000 ft. **Range:** 1,800 mi. without aerial refueling. **Bomb load:** conventional or nuclear bombs. **Armament:** 4 M-39 20-mm. cannon, Sidewinder air-to-air missiles. **Crew:** 1, 2 in F model. **Maximum gross takeoff weight:** over 30,000 lb. **Primary using command:** Tactical Air Command, United States Air Forces in Europe, Pacific Air Forces, Air National Guard.

F-101 VOODOO—all-weather fighter-interceptor; F-101C has been in squadron service with TAC since May 1957. Plane was developed from the XF-88, went supersonic on first flight September 29, 1954. Models include F-101A, F-101B, two-seated long-range interceptor; F-101C, all-weather, heavily armored tactical fighter; and RF-101. Until the F-104, the F-101 was USAF's fastest tactical fighter; on December 12, 1957, F-101C set an official world's record of 1,207.6 mph at Edwards AFB. On May 22, 1958, two F-101Cs made a 5,600-mile nonstop flight originating and terminating at Bergstrom AFB; on June 28, 1958, 4 F-101Cs flew nonstop from Andrews AFB, to Liege, Belgium, at an average speed of 640 mph; in August 1958, a flight of 7 completed a 6,100-mile nonstop deployment from Bergstrom to Bentwaters, England. **Contractor:** McDonnell Aircraft Corp. **Power plant and manufacturer:** 2 Pratt & Whitney J57 jets. **Power plant hp/thrust:** 30,000 lbs. total. **Dimensions:** span 39.8 ft., length 67.5 ft., height 18 ft. **Speed:** over 1,200 mph. **Ceiling:** above 50,000 ft. **Range:** beyond 1,000 mi. without aerial refueling. **Bomb load:** conventional and nuclear bombs. **Armament:** combinations of 4 M-39 20-mm cannon, MB-1 Genie, Falcon, and Sidewinder air-to-air rockets. **Crew:** F-101A and C, 1; F-101B, 2. **Maximum gross takeoff weight:** over 40,000 lb. **Primary using command:** Tactical Air Command, Air Defense Command, United States Air Forces in Europe, Pacific Air Forces.

RF-101 VOODOO—USAF's first supersonic photo-reconnaissance aircraft; in November 1957 it set three transcontinental speed records—Los Angeles to New York, 3 hours 7 minutes; Los Angeles to New York and return, 6 hours 46 minutes; New York to Los Angeles, 3 hours 36 minutes. Can photograph from 45,000 ft. an area 217 mi. long and 8 mi. wide, plus an area mosaic equivalent to 20,000 sq. mi. Operational with TAC since May 6, 1957; plays a key role in Composite Air Strike Force; lighter than F-101 with provision for mounting 6 cameras in the nose. **Contractor:** McDonnell Aircraft Corp. **Power plant and manufacturer:** 2 Pratt & Whitney J57 jets. **Power plant hp/**

F-104

F-105

F-106

F-102

thrust: 30,000 lb. total. **Dimensions:** span 39.8 ft., length 69 ft., height 18 ft. **Speed:** over 1,200 mph. **Ceiling:** above 50,000 ft. **Range:** beyond 1,000 mi. without refueling. **Cameras:** day recon.: 1 KA-2, 12 in. F. L.; 3 KA-2, 6 in. F. L.; 2 KA-1, 36 in. F. L.; night recon.: 1 KA-2, 12 in. F. L.; 3 K-46, 7 in. F. L.; 2 KA-1, 36 in. F. L.; 4 7B or 8A flare ejectors. **Crew:** 1. **Maximum gross takeoff weight:** approximately 40,000 lb. **Primary using command:** Tactical Air Command.

F-102 DELTA DAGGER—all-weather fighter-interceptor, a major weapon of continental air defense system. Became operational with Air Force units in mid-1956, design based on XF-92A. All electronic equipment, armament, and fuel carried internally; advanced electronic fire-control system, developed by Hughes Aircraft Co., searches out target at long range, directs the pilot on attack course for missiles or rockets, at correct instant fires armament automatically. Two-place TF-102A version used mainly for transition training. B model was redesignated and developed as F-106. **Contractor:** General Dynamics/Convair. **Power plant and manufacturer:** Pratt & Whitney J57-P-23 turbojet with afterburner. **Power plant hp/thrust:** 10,000 lb. **Dimensions:** span 38 ft., length 68 ft. 5 in., height 21 ft. 3 in. **Speed:** supersonic. **Ceiling:** above 50,000 ft. **Range:** beyond 1,000 mi. **Armament:** 6 GAR-1D or -2A Falcons, plus 24 2.75-in. folding-fin rockets. **Crew:** F-102A, 1; TF-102A, 2 side-by-side. **Maximum gross takeoff weight:** over 25,000 lb. **Primary using command:** Air Defense Command.

F-104 STARFIGHTER—tactical fighter and interceptor; serves ADC as day-night interceptor armed with GAR-8 Sidewinders on wingtips; as a tactical fighter with TAC, it carries 6 barreled, 20-mm Vulcan cannon. First flight date in February 1954; set world speed record of 1,404.19 mph in May 1958, piloted by Capt. Walter Irwin. During same period set altitude record of 91,249 ft. piloted by Maj. Howard Johnson. In December 1959, Capt. Joe B. Jordan, test pilot at Edwards AFB, Calif., established two new world's records in the F-104. He raised the Navy's altitude record of 98,560 ft., to 103,395 ft., setting a time-to-climb record from takeoff to 98,424 ft. in 15 min. 4.92 sec. F-104B is tandem-seating version of the A model; F-104D 2-seat version of F-104C; both are in use by TAC. The F-104 played a prominent part in the USAF strike force development to Taiwan in September 1958. Plane being produced in Canada, Western Europe, Japan under license. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** General Electric J79 with afterburner. **Power plant hp/thrust:** 15,000 lb. **Dimensions:** span 21 ft. 11 in., length 54 ft. 9 in., height 13 ft. 6 in. **Speed:** over 1,400 mph. **Ceiling:** above 55,000 ft. **Range:** beyond 1,000 mi. **Bomb load:** conventional and nuclear weapons. **Armament:** Sidewinders, Vulcan cannon. **Crew:** F-104A and C, 1; F-104B and D, 2. **Maximum gross takeoff weight:** 20,000 lb. **Primary using command:** Air National Guard, NATO, SEATO, Tactical Air Command.

F-105 THUNDERCHIEF—all-weather tactical fighter; first flew fall 1955; volume production began in fall, 1958; first wing in service at Seymour Johnson AFB, N. C. High-speed, long-range, well armed F-105 has bomb bay longer than B-17, fire-control system which permits pinpoint bombing from extremely low level to 50,000 ft. Full arsenal of missiles and rockets. **Contractor:** Republic Aviation Corp. **Power plant and manufacturer:** Pratt & Whitney J75 with afterburner. **Power plant hp/thrust:** 23,500 lb. **Dimensions:** span 34 ft. 11 in., length 63 ft. 1 in., height 19 ft. 8 in. **Speed:** over 1,200 mph. **Ceiling:** above 55,000 ft. **Range:** beyond 1,500 mi. **Bomb load:** 4,000 lb. of conventional or nuclear bombs. **Armament:** Vulcan cannon, rockets, air-to-air missiles. **Crew:** 1. **Maximum gross takeoff weight:** 45,000 lb. **Primary using command:** Tactical Air Command.

F-106 DELTA DART—all-weather interceptor; first flight of F-106A was at Edwards AFB, December 26, 1956; F-106B followed on April 9, 1958, also at Edwards; both are supersonic and carry the same armament. F-106 is based on the F-102 but it is an altogether new aircraft; A and B are operational with ADC. Plane's fire-control and electronic-guidance systems are capable of automatically flying the aircraft through any kind of weather in darkness or daylight under direction of ground control intercept stations. December 15, 1959, Maj. J. W. Rogers broke the world's straightaway speed record with a 2-way average of 1,520.9 mph. The Soviet Union had previously set a record of 1,483.83 mph. **Contractor:** General Dynamics/Convair. **Power plant and manufacturer:** 1 Pratt & Whitney J75-9 turbojet with afterburner. **Power plant hp/thrust:** 23,500 lb. **Dimensions:** span 38 ft., length 70 ft. 9 in., height 28 ft. **Speed:** over 1,500 mph. **Ceiling:** above 60,000 ft. **Range:** about 1,500 mi. **Armament:** GAR-3 or -4 Falcons, MB-1 Genie with nuclear warhead. **Crew:** F-106A, 1; F-106B, 2 in tandem. **Maximum gross takeoff weight:** over 35,000 lb. **Primary using command:** Air Defense Command.

Gallery of
USAF
Weapons

MISSILES

Atlas

Titan

Jupiter

Snark

Thor

SM-62 SNARK—air-breathing intercontinental-cruise missile; first long-range SAC bombardment missile. High-altitude, sweptwing, single-engine jet-propelled strategic bombing missile, with self-contained, nonjammable, stellar-monitored inertial guidance, nuclear warhead. High-aspect ratio wings mounted near top of fuselage; tail consists of vertical stabilizer only. Wings have sawtooth leading edge; elevons, combination ailerons and elevators on trailing edge eliminate need for horizontal tail. Operational in squadron strength at Presque Isle AFB, Me., since 1958, missile and zero-launcher highly mobile, can be positioned anywhere in world in few hours. Decision to drop missile from inventory announced in early 1961. **Contractor:** Northrop Corp. **Power plant and manufacturer:** Pratt & Whitney J57-P-17 and 2 solid-propellant boosters. **Power plant hp/thrust:** 10,500 lb., 130,000 lb. for boosters. **Dimensions:** span 42 ft., length 69 ft., height 15 ft. **Speed:** about 600 mph. **Ceiling:** 60,000 ft. **Range:** at best altitude, 7,300 mi., at sea level 2,000 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** 50,000 lb. without boosters. **Primary using command:** Strategic Air Command.

SM-65 ATLAS—intercontinental ballistic missile, free world's first operational ICBM. Flight testing began at Cape Canaveral in 1957. Eight such flights preceded tests of complete missile, including sustainer engine and separable nose cone, beginning summer 1958. Full-range 6,000-mile flight made November 28, 1958; missile fired into orbit December 18, 1958 (talking satellite). In September 1959, following further extensive testing, Atlas declared operational at Vandenberg AFB, Calif., home of USAF's 1st Ballistic Missile Division. Thirteen Atlas squadrons with 129 missiles and 13 spares programed. Missile also slated for space missions including manned space capsule program; basic guidance radio-inertial, advanced versions all-inertial. **Contractor:** General Dynamics/Astronautics. **Power plant and manufacturer:** North American Rocketdyne, one-and-a-half stage, liquid fuel. **Power plant hp/thrust:** about 360,000 lb. take off thrust, advanced E and F models about 10% higher. **Dimensions:** length 75 to 82 ft. depending on nose cone, diameter 10 ft. **Speed:** over 15,000 mph. **Range:** more than 6,000 mi., 8,050 in later version, achieved 9,000-mile flight in early 1960. **Bomb load:** nuclear. **Maximum gross takeoff weight:** about 260,000 lb. at launch. **Primary using command:** Strategic Air Command.

SM-68 TITAN—intercontinental ballistic missile in late test stage; expected to be operational in late 1961. Will be fired from deep, concrete-lined silos at Vandenberg AFB and other sites in Midwest and Far West. Pits 155 feet deep, 40 feet in diameter; later version Titan II will be fired directly from storage position in silo; earlier version will be raised prior to firing. Titan II is generally improved missile with prepackaged liquid fuel compared to nonpackaged liquid in basic Titan; this allows faster response and salvo firing from silos. Plans call for 14 Titan squadrons of 10 missiles each. Titan, as in case of early Atlas, has radio-inertial guidance, later models all-inertial. Modified Titan II will be used as booster for suborbital flights of the Dyna-Soar. **Contractor:** Martin Co. **Power plant and manufacturer:** Aerojet-General, RP-1, two-stage liquid propellant. **Power plant hp/thrust:** first stage 300,000 lb., second stage 60,000 lb. Titan II about 10% more from all stages. **Dimensions:** length 90 ft., diameter 10 ft. **Speed:** over 15,000 mph. **Range:** more than 6,000 mi., 10,000 in later version. **Bomb load:** nuclear. **Maximum gross takeoff weight:** 222,000 lb. at launch. **Primary using command:** Strategic Air Command.

SM-75 THOR—intermediate-range ballistic missile; full production missile deployed with Royal Air Force in Britain, on station since early in 1959. First operational free-world IRBM, initially tested at Cape Canaveral, early in 1957; has been past test stage since mid-1959. Reliable and much-used space booster both singly and in combinations such as Thor-Able and Thor-Able-Star. Was also first ballistic missile fired from new Vandenberg AFB, Calif., missile facility and first to be fired by all-SAC crew. Has all-inertial guidance system; transportable by air. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** North American Rocketdyne single-stage liquid rocket engine. **Power plant hp/thrust:** 150,000-lb. takeoff thrust. **Dimensions:** length 65 ft., diameter 8 ft. **Speed:** Mach 15. **Range:** beyond 1,500 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** 110,000 lb. at launch.

SM-78 JUPITER—intermediate-range ballistic missile; was developed by Army in conjunction with Chrysler Corp. for USAF employment; to be deployed in Italy and Turkey, 15 missiles per squadron. All-inertial guidance system. **Contractor:** Chrysler Corp. **Power plant and manufacturer:** North American Rocketdyne single-stage liquid rocket. **Power plant hp/thrust:** 150,000 lb. **Dimensions:** length 60 ft. 4 in., diameter 9 ft. **Speed:** Mach 15. **Range:** beyond 1,500 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** 110,000 lb.

Minuteman

Genie

Bomarc

Matador

Mace

SM-80 MINUTEMAN — second-generation, solid-propellant ICBM; designed around concept of instantaneous, massive response to enemy attack. Small of size and easy to handle, will be mobile on railway launchers and dispersed in hardened underground sites; currently in test stage. First test launches successfully completed; should be operational in 1962. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** 3-stage solid propellant, first stage by Thiokol, second by Aerojet-General, third by Hercules Powder Co. **Power plant hp/thrust:** first stage, 170,000 lb.; second stage, 65,000 lb.; third stage, 35,000 lb. **Dimensions:** length 55 ft., diameter 5 ft. 5 in. **Speed:** Mach 22. **Range:** over 6,500 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** about 65,000 lb.

IM-99 BOMARC—ramjet surface-to-air defense intercept missile; used in conjunction with SAGE (Semi-Automatic Ground Environment) electronic system as primary control. Guided from ground to altitude and target area; then target-seeker and proximity fuse take over. Name Bomarc comes from Boeing, the manufacturer, and Michigan Aeronautical Research Center, University of Michigan, which took part in initial studies in 1949. Boeing GAPA (ground-to-air pilotless aircraft) studies of 1945-49 also contributed much to Bomarc effort. Bomarc-A operational in late 1959, advanced B model in mid-1961. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** Aerojet-General liquid- or Thiokol solid-propellant booster, two Marquardt ramjets. **Power plant hp/thrust:** ramjets over 10,000 lb. each, booster 50,000 lb. **Dimensions:** span 18 ft. 2 in., length 46 ft. 9 in., height 10 ft. 3 in. **Speed:** about Mach 3, B model about Mach 4. **Ceiling:** above 60,000 ft., B model, 100,000 ft. **Range:** IM-99A, 200-250 mi.; IM-99B, over 400 mi. **Bomb load:** conventional or nuclear, **Maximum or gross takeoff weight:** about 15,000 lb., B model 16,000 lb. **Primary using command:** Air Defense Command.

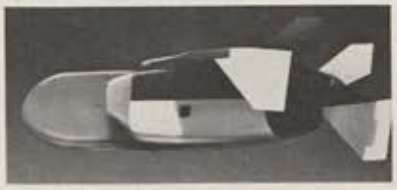
TM-61 MATADOR—air-breathing, tactical, surface-to-surface guided missile; was first operational USAF missile, with initial flight December 1950. Basic version had radar-command guidance; TM-61C has dual guidance including radar line-of-sight direction by controller, Shanicle electronic navigation system similar to Loran. Zero-launched from mobile translauncher; deployed in Europe, Far East, Mideast. **Contractor:** Martin Co. **Power plant and manufacturer:** Allison J33-A-37 turbojet plus solid-propellant booster. **Power plant hp/thrust:** 4,600 lb. and 100,000 lb. from booster. **Dimensions:** span 28 ft. 7 in., length 39 ft., 6 in. **Speed:** more than 650 mph. **Ceiling:** above 35,000 ft. **Range:** over 500 mi. **Bomb load:** nuclear or conventional. **Maximum gross takeoff weight:** about 10,000 lb. **Primary using command:** Tactical Air Command, United States Air Forces in Europe, Pacific Air Forces.

TM-76 MACE—air-breathing, surface-to-surface guided missile; improved, much-changed version of Matador. TM-76A has improved map-matching guidance system known as ATRAN; B model is inertially guided; missile has wide versatility to penetrate enemy electronic detection screens at extreme low level or in upper altitudes. Like Matador, which it is to replace totally, it is zero-launched from roadable launcher; deployed to Europe. **Contractor:** Martin Co. **Power plant and manufacturer:** Allison J33-A-41 turbojet and solid-propellant booster. **Power plant hp/thrust:** 5,200 lb. plus 100,000-lb. booster. **Dimensions:** span 22 ft. 10 in., length 44 ft., height 10 ft. **Speed:** more than 650 mph. **Ceiling:** above 40,000 ft. **Range:** A model over 650 mi., B model 1,000 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** about 14,000 lb. **Primary using command:** Tactical Air Command.

MB-1 GENIE—air-to-air rocket with atomic warhead; unguided; uses solid-propellant engine. Preliminary studies in October 1953; contract negotiated with Douglas Aircraft, July-August 1954; first tests from F-89D and YF-102, March and May 1956; ADC operational capability, January 1957. Genie has 4 fins with sloped leading edges, horizontal tips vertical trailing edges for free-flight stabilization; carried by F-89, F-101, F-102, F-106. Advanced version with guidance system under development. **Contractor:** Douglas Aircraft Co. **Power plant manufacturer:** Aerojet-General Corp. **Power plant hp/thrust:** about 36,000 lb. **Dimensions:** length 8 ft., diameter 15 in. **Speed:** about Mach 3. **Ceiling:** above 50,000 ft. **Range:** about 6 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** about 800 lb. **Primary using command:** Air Defense Command.

GAR-1, 2, 3, 4, 11 FALCON—supersonic, guided air-to-air missiles. Hughes Aircraft has produced 5 basic versions of the Falcon plus a number of improved models including the 1D, 2A, 3A, 4A; the 3, 4, and 11 versions are sometimes termed Super Falcons. The 1 and 3 are radar-homing; 2 and 4 infrared homing; 11 has a nuclear warhead and radar guidance, as such is the nation's first guided nuclear-tipped air-to-air weapon. A

Falcons and Superfalcons



Quail

Sidewinder

Hound Dog

Bullpup

Skybolt

nuclear GAR-9, originally intended as armament for the dropped F-108 fighter program, is also under development. GAR-1D and 2A have been operational since 1956 on ADC, TAC F-89, F-101, F-102, now also on F-106; can be carried internally or under aircraft wings. **Contractor:** Hughes Aircraft Co. **Power plant and manufacturer:** Thiokol solid-propellant rocket motor. **Power plant hp/thrust:** about 6,000 lb. **Dimensions:** length 6 ft. 6 in., diameter 6 ft. 5 in., span 1 ft. 8 in.; the 11 model is considerably larger. **Speed:** Mach 2. **Ceiling:** above 50,000 ft. **Range:** beyond 5 mi. **Bomb load:** conventional warhead; 11, nuclear. **Maximum gross takeoff weight:** over 100 lb. **Primary using command:** Air Defense Command.

GAR-8 SIDEWINDER—supersonic, guided air-to-air missile. Initially developed by US Navy for fleet air defense; in USAF used by TAC, ADC F-100, F-101, F-104, F-105. Considered simple, inexpensive missile with little training required for handling and use. Homes on tailpipe of target aircraft through passive infrared guidance system; has been used successfully in combat by Chinese Nationalist Air Force against Chinese Communist planes. Improved 1C version with higher speed, greater range undergoing tests. In operational use with several Allied air forces. **Contractor:** Philco Corp. and General Electric. **Power plant and manufacturer:** Naval Powder Plant solid propellant. **Power plant hp/thrust:** over 6,000 lb. **Dimensions:** length 9 ft. 4 in., diameter 5 in., span 1 ft. 7 in. **Speed:** Mach 2.5. **Ceiling:** above 50,000 ft. **Range:** at sea level 3,500 ft., at 50,000 ft. 11,000 ft. **Bomb load:** conventional. **Maximum gross takeoff weight:** 155 lb. **Primary using command:** Tactical Air Command, Air Defense Command.

GAM-72 QUAIL—air-launched diversionary bomber-defense missile designed for launch from SAC bomber when approaching target to confuse enemy radar defenses; first successful test flight August 1958, has undergone continuing launches since from B-47, B-52 aircraft; test missiles recovered by parachute and reused. Improved Quail with double the range of the original model is under development and has been flight-tested successfully. **Contractor:** McDonnell Aircraft Corp. **Power plant and manufacturer:** General Electric J85 turbojet. **Power plant hp/thrust:** 2,450 lb. **Dimensions:** length 12 ft. 10 in., tail span 5 ft. 4 in., diameter 2 ft. 1 in. **Speed:** subsonic. **Ceiling:** classified. **Range:** 200 mi. **Maximum gross takeoff weight:** 1,100 lb. **Primary using command:** Strategic Air Command.

GAM-77 HOUND DOG—air-breathing air-to-ground guided standoff missile; it is intended to increase and supplement the destructive power of long-range SAC bombers; GAM-77 operational on B-52G aircraft; guidance is inertial. Attacking B-52 would carry two Hound Dogs primarily to attack air defense targets on the ground, such as airfields and missile sites, and assist the bomber in reaching the primary target area. **Contractor:** North American Aviation Co. **Power plant and manufacturer:** Pratt & Whitney J52 turbojet. **Power plant hp/thrust:** 7,500 lb. at sea level. **Dimensions:** span 12 ft. 2 in., length 42 ft. 6 in., height 9 ft. 4 in. **Speed:** Mach 1.6 to 2.2. **Ceiling:** above 50,000 ft. **Range:** beyond 500 mi. **Bomb load:** nuclear. **Maximum gross takeoff weight:** 9,600 lbs. **Primary using command:** Strategic Air Command.

GAM-83A BULLPUP—air-to-surface guided weapon; adaptation of Navy-developed Bullpup for use by tactical fighters. Guidance provided by radio signals from launch plane's pilot. Number of advanced versions under development, one being developed for USAF with nuclear capability. Rocket power plant uses either solid or storable liquid propellant. **Contractor:** Martin Co. **Dimensions:** length 11 ft., diameter 1 ft., span 3 ft. 1 in. **Speed:** Mach 1.8. **Range:** over 15,000 ft. **Bomb load:** conventional. **Maximum gross takeoff weight:** 540 lb. **Primary using command:** Tactical Air Command.

GAM-87A SKYBOLT—air-launched ballistic missile (ALBM); now in development, designed to replace GAM-77 Hound Dog air-launched guided missile. With range comparable to an IRBM, would be able to attack many targets from airborne alert station of launch aircraft, and all targets after short redeployment flight of plane; in most cases, plane itself would not have to penetrate enemy defenses; thus Skybolt will extend range and useful life of bombers in the inventory. Two or more missiles could be carried on SAC attack aircraft, usually in addition to normal load of nuclear bombs; ALBM's ballistic trajectory and nonjammable guidance would serve well in getting through enemy defenses. Numerous feasibility tests have been conducted. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** Aerojet-General two-stage solid propellant. **Power plant hp/thrust:** first stage engine, 35,000 lb.; second stage 19,000 lb. **Dimensions:** length, 33 ft. without tail fairing, diameter about 3 ft. **Gross weight:** about 11,000 lb. **Speed:** about 9,500 mph. **Range:** about 1,150 mi. after launch from bombers, at present probably B-52s. **Bomb load:** nuclear. **Primary using command:** Strategic Air Command.

From an original painting for CECO by R. T. Handville

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TRANSPORTS

C-133

C-47

KC-97

C-54E

C-118

C-47 SKYTRAIN—cargo-troop carrier; popularly known as "Gooney Bird," a historic worldwide work horse for USAF, other services, many nations. First flight as DC-3, civil designation, February 1932; since then more than 10,000 built; a good many of them still flying somewhere. Was backbone of the Troop Carrier Command in all theaters of World War II and used extensively in the Korean War; remains in general-purpose use today. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** 2 Pratt & Whitney R1830-90-D. **Power plant hp/thrust:** 1,200 hp each. **Dimensions:** span 95 ft., length 64 ft. 4 in., height 16 ft. 10 in. **Speed:** 230 mph. **Ceiling:** 24,000 ft. **Range:** 2,125 mi. **Cargo capacity:** 7,500 lb., 21 passengers. **Crew:** 5. **Maximum gross takeoff weight:** 33,000 lb. **Primary using command:** All USAF commands.

C-54 SKYMASTER—cargo-troop carrier; made first flight February 1942; later served as a heavy cargo transport for Air Corps and Navy. Used extensively by MATS, some other commands as an administrative command aircraft. **Contractor:** Douglas Aircraft Co. SC-54 used by Air Rescue Service. **Power plant and manufacturer:** 4 Pratt & Whitney R2000-9 piston engines. **Power plant hp/thrust:** 1,450 hp each. **Dimensions:** span 117 ft. 6 in., length 93 ft. 9 in., height 27 ft. 6 in. **Speed:** 300 mph. **Ceiling:** 30,000 ft. **Range:** beyond 2,000 mi. **Cargo capacity:** 32,000 lbs., 50 troops. **Crew:** 3 to 5. **Maximum gross takeoff weight:** 82,500 lb. **Primary using command:** MATS, other USAF commands.

KC-97 STRATOFREIGHTER—strategic aerial tanker; production of 11th and final model in C-97 series, KC-97G, completed July 18, 1956. Total of 888 C-97s delivered; C-97 was transport version of B-29, then modified as version of later B-50. Until advent of KC-135, KC-97 was standard SAC aerial tanker; still widely used today, especially to fuel B-47s and MATS planes. C-97A and C also are in service as MATS and SAC freighters. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** 4 Pratt & Whitney R4360-59 Wasp Majors. **Power plant hp/thrust:** rated hp 2,650; takeoff hp 3,500. **Dimensions:** span 141 ft. 3 in., length 110 ft. 4 in., height 38 ft. 3 in. **Speed:** over 350 mph. **Ceiling:** above 35,000 ft. **Range:** beyond 4,000 mi. **Cargo capacity:** 96 troops, or 69 litter patients without refueling equipment, or more than 65,000 lb. **Crew:** 5. **Maximum gross takeoff weight:** over 160,000 lb. **Primary using command:** Strategic Air Command, Military Air Transport Service.

C-118 LIFTMASTER—cargo-troop carrier; military version of civil airlines' DC-6A; made first flight September 1949; initially designed as cargo carrier to meet requirements for swift and economical transportation of air freight; widely used in MATS today. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** 4 Pratt & Whitney R2800-CB-17 piston engines. **Power plant hp/thrust:** 2,500 takeoff hp, 10,000 hp total. **Dimensions:** span 117 ft. 6 in., length 106 ft. 6 in., height 28 ft. 8 in. **Speed:** 372 mph maximum. **Ceiling:** above 25,000 ft. **Range:** about 5,000 mi. **Cargo capacity:** 25,500 lbs., or 76 equipped troops. **Crew:** 5. **Maximum gross takeoff weight:** 107,000 lb. **Primary using command:** Military Air Transport Service, other major air command headquarters.

C-119 FLYING BOXCAR—cargo-troop carrier; improved and considerably modified version of C-82. In use since 1947; long a Tactical Air Command standby particularly for troop drops and aerial resupply, now used mainly by Air Reserve troop carrier wings. C-82 and C-119 well known for distinctive twin-tail booms, similar to World War II P-38 fighter. **Contractor:** Fairchild Engine & Airplane Corp. **Power plant and manufacturer:** 2 Wright R3350-85 piston engines. **Power plant hp/thrust:** 3,250-hp takeoff. **Dimensions:** span 109 ft. 4 in., length 86 ft. 6 in., height 26 ft. 2 in. **Speed:** 250 mph. **Ceiling:** above 30,000 ft. **Range:** 2,000 mi. with 10,000 lb. **Cargo capacity:** more than 30,000 lb., or 62 equipped troops. **Crew:** 3 to 5. **Maximum gross takeoff weight:** 74,000 lb. **Primary using command:** Tactical Air Command, Pacific Air Forces, United States Air Forces in Europe, Air Force Reserve, Air National Guard.

C-121 SUPER CONSTELLATION—cargo-troop carrier-picket aircraft; famous for unique design in which fuselage serves as airfoil as do horizontal planes, C-121 has had a long career in both military and civilian configurations. Among military versions are C-121 cargo-troop carrier; RC-121 radar early-warning picket aircraft fitted with wingtip tanks for added range and 6 tons of electronic gear, operated by ADC; VC-121 executive version operated by Special Air Missions group and including the *Columbine*, President Eisenhower's aircraft; YC-121 powered by 4 T34 turboprops with over 5,000-lb.-thrust hp each. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** 4 Curtiss-Wright R3350 turbocompound piston engines. **Power plant hp/thrust:** 3,250 hp takeoff. **Dimensions:** span 123 ft., length 116 ft., height 23 ft. **Speed:** 370 mph. **Ceiling:** above 25,000 ft. **Range:** nearly 5,000 mi., more for RC-121. **Cargo**

C-119

C-121C

C-123

C-130

C-124

capacity: 40,000 lb. or 106 passengers. **Crew:** 3 to 5, plus radar operators in RC-121. **Maximum gross takeoff weight:** 145,000 lb. **Primary using command:** Military Air Transport Service, Air Defense Command.

C-123 PROVIDER—assault transport; made first flight October 1949; designed to operate from short, unprepared landing strips to land troops and supplies, evacuate wounded. Fuselage similar to C-119; high-stepped tail assembly to permit tail-ramp loading reminiscent of C-130. YC-123J Pantobase equipped with skis for arctic operations built by the Stroukoff Aircraft Corp., has 2 J44 turbojet engines for power augmentation during takeoffs; this model never put into production. **Contractor:** Fairchild Engine & Airplane Corp. **Power plant and manufacturer:** 2 Pratt & Whitney R2800-99W piston engines. **Power plant hp/thrust:** 2,500 hp each. **Dimensions:** span 110 ft., length 76 ft. 3 in., height 34 ft. 1 in. **Speed:** 240 mph maximum. **Ceiling:** above 25,000 ft. **Range:** beyond 3,000 mi. **Cargo capacity:** 24,000 lb., or 60 equipped troops. **Crew:** 2 to 4. **Maximum gross takeoff weight:** about 60,000 lb. **Primary using command:** Tactical Air Command, United States Air Forces in Europe, Pacific Air Forces.

C-124 GLOBEMASTER II—transport; in service since 1950, until recently USAF's largest heavy cargo transport. From Korea to Operation Deep Freeze in Antarctic, has operated in all areas of globe including North, South Poles. Special features include clamshell nose door which opens to allow use of built-in ramp; 94 percent of all military vehicles can be driven up ramp, transported fully assembled; elevator located in middle of fuselage also can quickly load or unload from ground to cargo sections, which can be converted to double-deck cabin for troops. Last C-124 delivered to USAF in May 1955. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** 4 Pratt & Whitney R4360-63A piston engines. **Power plant hp/thrust:** 3,800 hp. **Dimensions:** span 174 ft. 2 in., length 130 ft., height 48 ft. 3 in. **Speed:** over 300 mph. **Ceiling:** above 30,000 ft. **Range:** 2,300 mi. with 50,000-lb. load. **Cargo capacity:** 200 fully equipped troops or 127 litters or 74,000 lb. of cargo. **Crew:** 5, plus doctors and nurses with litter patients. **Maximum gross takeoff weight:** 194,500 lb. **Primary using command:** Strategic Air Command, Military Air Transport Service, Air Force Logistics Command.

C-130 HERCULES—assault transport; A and B models in service; A has Allison T56-A-1A turboprop engines; B has more power, greater fuel capacity, increases in takeoff and landing weights. Mission of Hercules is long-range, high-speed air transport of personnel, materiel for delivery by parachute or assault landing; key support aircraft in TAC's Composite Air Strike Force, figured prominently in Mideast and Far East deployments in summer, 1958. Extreme versatility includes ski operations, high-altitude mapping, weather reconnaissance, search and rescue, aerial tanker operations in in-flight refueling. Self-contained, auxiliary power supply enables C-130 to operate from forward or remote areas independent of ground power; Lockheed has experimented with addition of 2 jet engines, boundary layer control to increase short takeoff and landing capabilities. A C-130 set a heavy-equipment paradrop record May 12, dropping 35,000 pounds in one bundle over the desert in Southern California, eclipsing an earlier RAF record. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** 4 Allison T56-A-1A turboprop engines. B model, 4 Allison T56-A-7 engines. **Power plant hp/thrust:** 3,750 equivalent shaft hp at takeoff; 3,375 equivalent shaft hp normal. B model 4,050 equivalent shaft hp. **Dimensions:** span 132 ft. 6 in., length 97 ft. 7 in., height 38 ft. **Speed:** 370 mph maximum cruise. **Ceiling:** above 30,000 ft. **Range:** beyond 2,000 mi. **Cargo capacity:** 92 troops, or 64 paratroops, 70 litters and 2 attendants, or 36,700 lb. **Crew:** 4 (5 with loadmaster). **Maximum gross takeoff weight:** 135,000 lb. **Primary using command:** Tactical Air Command, United States Air Forces in Europe, Pacific Air Forces.

C-131 SAMARITAN—cargo-troop carrier-trainer; C-131 and T-29 are military versions of the Convair 240/340/440; used variously, mainly as troop carrier, for transportation of litter patients, as trainer for bombardier/navigator/radar operators. **Contractor:** General Dynamics/Convair. **Power plant and manufacturer:** 2 Pratt & Whitney R2800-99W piston engines. **Power plant hp/thrust:** 2,500-hp takeoff each. **Dimensions:** span 91 ft. 8 in., length 74 ft. 8 in., height 27 ft. 4 in. B & D models slightly larger. **Speed:** more than 300 mph. **Ceiling:** above 25,000 ft. **Range:** beyond 1,000 mi. **Cargo capacity:** 40 passengers, 27 litters, about 12,000 lb. **Crew:** 2. **Maximum gross takeoff weight:** 47,000 lb. **Primary using command:** Military Air Transport Service, Air Training Command, Strategic Air Command, Tactical Air Command, Pacific Air Forces, United States Air Forces in Europe.

C-133 GLOBEMASTER III, or CARGOMASTER—transport; second and largest turboprop transport to be accepted by USAF; first flight of production aircraft April 23, 1956; first delivery August 28, 1957. Basically a freighter, C-133A has floor tie-down facilities that permit installation of 200 airline-type passenger seats; can transport wide variety of cargo. Has two loading

KC-135

KB-50J

C-141 (Artist's Conception)

C-140

C-131

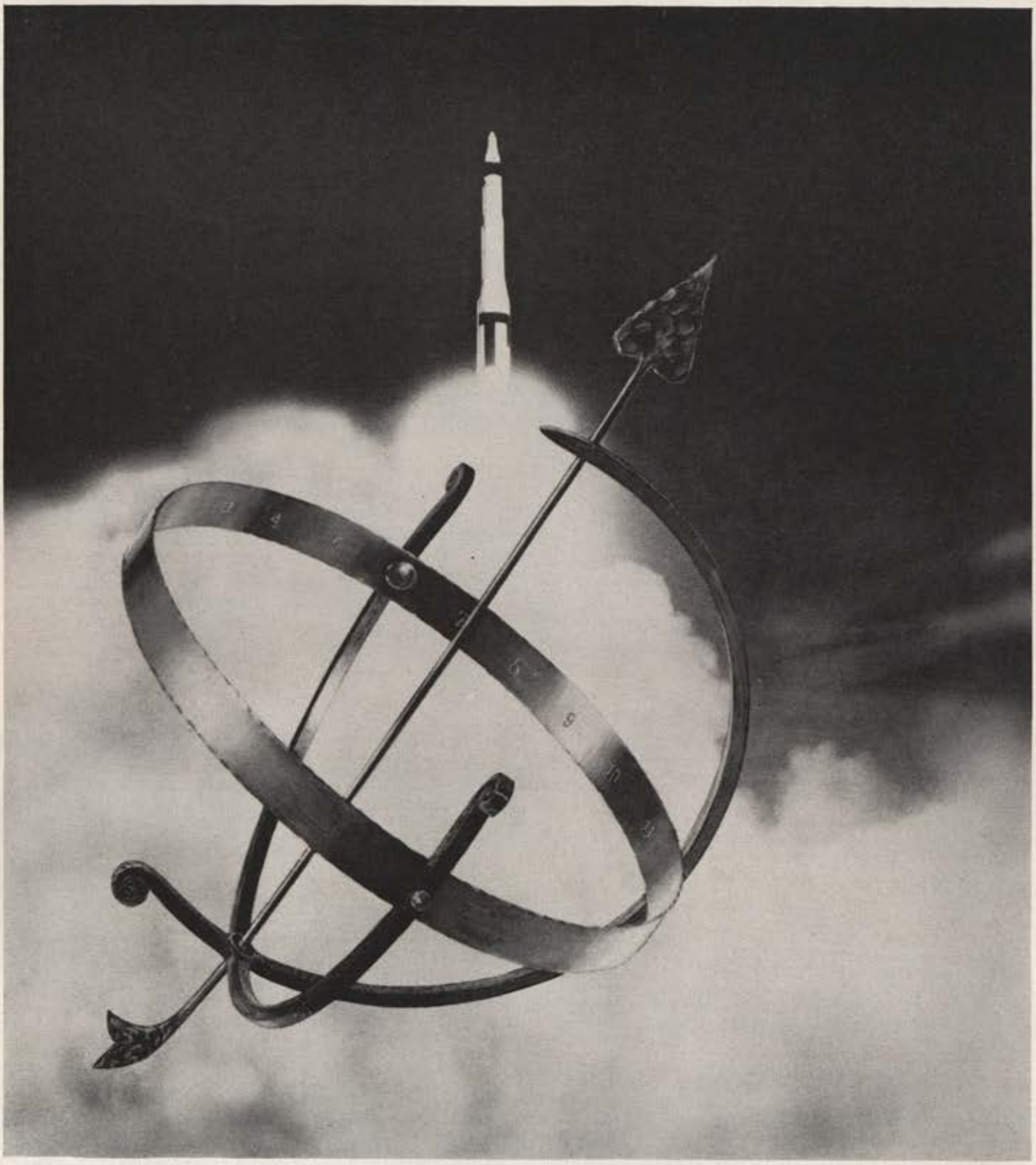
entrances, fore and aft; simultaneous loading through both doors possible. 2 C-133s can transport the equivalent cargo of 5 C-124s; in December 1959 a production model airlifted a record 117,900 lb. of cargo to an altitude of 10,000 ft. **Contractor:** Douglas Aircraft Co. **Power plant and manufacturer:** 4 Pratt & Whitney T34-9W turboprops. **Power plant hp/thrust:** 7,500 equivalent shaft hp each. **Dimensions:** span 179 ft. 8 in., length 158 ft., height 48 ft. **Speed:** over 325 mph. **Ceiling:** above 25,000 ft. **Range:** 1,000 mi. with 100,000-lb. cargo, 3,500 mi. with 41,700 lb. **Cargo capacity:** over 100,000 lb. maximum. **Crew:** 4, plus 1 loadmaster or doctors and nurses. **Maximum gross takeoff weight:** 300,000 lb. **Primary using command:** MATS.

KC-135 STRATOTANKER—jet aerial tanker; multipurpose, sweptwing tanker; transport in quantity production since October 1954; refuels B-52, B-58. First production KC-135 made maiden flight August 31, 1956, was placed in operational service with SAC June 18, 1957; will eventually supplant KC-97 as SAC's standard aerial tanker. Equipped with streamlined "flying boom" for high-speed, high-altitude refueling; somewhat larger than Boeing 707 prototype used by civilian airlines. On November 11, 1957, KC-135 set nonstop distance record of 6,325 mi.; 2 days later flew from Buenos Aires to Washington, D. C., in 11 hours and 5 minutes, averaging 469.5 mph; On April 8, 1958, one flew from Tokyo to the Azores nonstop, a distance of 10,228 mi.; another flew from New York to London in 5 hours 27 minutes at an average speed of 630 mph; on the return trip, June 29, 1958, it averaged 588 mph, completing the flight in 5 hours 51 minutes; in November 1957 served as aerial tanker enabling RF-101 Voodoo to set 3 transcontinental records. **Contractor:** Boeing Airplane Co. **Power plant and manufacturer:** 4 Pratt & Whitney J57 turbojets. **Power plant hp/thrust:** 10,000 lb. each engine. **Dimensions:** span 130 ft. 10 in., length 136 ft. 3 in., height 38 ft. 5 in. **Speed:** over 600 mph. **Ceiling:** above 50,000 ft. **Range:** beyond 4,500 mi. **Cargo capacity:** 50,000 lb. or 145 passengers. **Crew:** 4. **Maximum gross takeoff weight:** 297,000 lb. **Primary using command:** Strategic Air Command.

C-140 JETSTAR—jet utility plane; USAF ordered 5 of these planes in the summer of 1960 for use by the MATS Airways and Air Communications Service in checking on navigation aids and communications facilities; in this role high-speed, high-altitude JetStar will be able to duplicate flight paths, approaches, etc., of various large jets. First production models flew in July 1960. Prototype flew in September 1957. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** 4 Pratt & Whitney J60P-5 jets. **Power plant hp/thrust:** each 3,000 lb. **Dimensions:** span 53.7 ft., length 60.5 ft., height 20.5 ft. **Speed:** 600 mph. **Ceiling:** 45,000 ft. **Range:** 2,200 mi. **Cargo capacity:** 10 passengers, or equivalent weight in equipment as appropriate. **Crew:** 2. **Maximum gross takeoff weight:** 41,000 lb. **Primary using command:** Air Force Communications Service.

C-141—long-range, turbofan-powered, cargo transport under development by Air Force. It will be designed to meet civil airfreight standards and needs as well as military requirements. Selection of this design early in 1961 was made in conjunction with the Federal Aviation Agency to ensure that the aircraft will be attractive to the airlines in the late 1960s. Air Force funding for the project in FY 1961 was $30 million. The C-141 features truck-bed height, straight-in loading from the rear. It will be equipped with a mechanical loading system to reduce turn-around time on the ground. Its wings will be swept 25 degrees. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** 4 Pratt & Whitney TF33-P-7 turbofans. **Power plant hp/thrust:** 21,000 lb. each. **Dimensions:** span 160 ft. 7 in., length 146 ft. 2 in., height 39 ft. 1 in. **Speed:** maximum cruise 552 mph. **Ceiling:** over 45,000 ft. **Range:** maximum ferry, 7,540 mi. **Cargo capacity:** at transcontinental range, more than 85,000 lb.; transatlantic, more than 50,000 lb.; transpacific, more than 20,000 lb. **Maximum military paradrop load:** 35,000 lb. **Maximum gross weight:** 315,000 lb. **Primary using command:** Military Air Transport Service.

KB-50J SUPERFORTRESS—tactical aerial tanker; as B-50, originally a strategic bomber replacement for the B-29; was supplied to 3 SAC groups prior to Korea. Then modified for air-to-air refueling. Present models have been modified to include 2 jet engines along with 4 piston engines to provide greater speed and altitude. KB-50J is aerial tanker of TAC's Composite Air Strike Force, as such one of keys to global strike capability. WB-50 operated by MATS Air Weather Service fitted with large observation windows, special search gear, and carries remote-controlled lifeboat. **Contractor:** Boeing Airplane Co., Hayes Aircraft Co. **Power plant and manufacturer:** 4 Pratt & Whitney R4360-PW35 piston engines, two General Electric J47-GE-23 turbojets. **Power plant hp/thrust:** reciprocating engines, 3,500 hp; turbojets, 5,620 lb. **Dimensions:** span 141 ft. 2 in., length 99 ft., height 32 ft. 7 in. **Speed:** over 400 mph. **Ceiling:** about 35,000 ft. **Range:** beyond 2,000 mi. **Cargo capacity:** over 20,000 lb. **Crew:** 6. **Maximum gross takeoff weight:** 173,000 lb. **Primary using command:** Tactical Air Command.



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Gallery of
USAF
Weapons

TRAINERS

T-38

T-28A

T-29

T-33

T-34A

T-37B

T-39

T-28 TROJAN—Primary and basic pilot trainer; first flew September 1949; production completed. **Contractor:** North American Aviation. **Power plant and manufacturer:** single Wright R1300-1A piston engine. **Power plant hp/thrust:** 800 hp. **Dimensions:** span 40 ft. 7 in., length 32 ft., height 12 ft. 8 in. **Speed:** 282 mph. **Ceiling:** above 25,000 ft. **Range:** beyond 1,000 mi. **Bomb load:** 2 100-lb. bombs. **Armament:** optional, 2 .50-caliber machine guns, 6 2.25-in. rockets. **Crew:** 2—student and instructor, tandem. **Maximum gross takeoff weight:** 7,000 lb. **Primary using command:** Air Training Command.

T-29 FLYING CLASSROOM—bombardier/navigator/radar-operator trainer; T-29 and C-131 are military versions of the Convair 240/340/440; are used variously, mainly as troop carriers, for transportation of litter patients, as trainer for bombardier/navigator/radar operators. In T-29 most up-to-date Air Force navigation, bombardment, radar instruments installed; has 14 fully equipped stations for students plus radio operator's station; each student has map table, loran scope, altimeter indicator, radiocompass panel; 4 astrodomes, 5 driftmeters, 18 radio antennas, a radome plus periscopic sextant facility, T-29Ds have the complex "K" bombing system installed, space for only 6 students. T-29 made first flight September 1949. **Contractor:** General Dynamics/Convair. **Power plant and manufacturer:** 2 Pratt & Whitney R2800-99W piston engines. **Power plant hp/thrust:** 2,500 hp each. **Dimensions:** span 91 ft. 8 in., length 74 ft. 8 in., height 27 ft. 4 in. **Speed:** more than 300 mph. **Ceiling:** above 25,000 ft. **Range:** beyond 1,000 mi. **Cargo capacity:** 14 students and 2 instructors. **Crew:** 2, plus students, instructors. **Maximum gross takeoff weight:** 47,000 lb. **Primary using command:** Air Training Command, Headquarters Command, Continental Air Command.

T-33 TEE BIRD—jet pilot trainer; highly versatile trainer version of F-80 Shooting Star; has dual controls, ejection seats; made first flight in March 1948; widely used throughout Air Force for proficiency flying. **Contractor:** Lockheed Aircraft Corp. **Power plant and manufacturer:** Allison J33-A-35 turbojet. **Power plant hp/thrust:** 5,200 lb. **Dimensions:** span 38 ft. 11 in., length 37 ft. 8 in., height 11 ft. 7 in. **Speed:** 600 mph. **Ceiling:** above 45,000 ft. **Range:** beyond 1,000 mi. **Bomb load/cargo capacity:** about 200 lb. **Armament:** optional, 2 .50-caliber machine guns. **Crew:** 2—student and instructor in tandem. **Maximum gross takeoff weight:** 16,000 lb. **Primary using command:** Air Training Command, most major USAF commands.

T-34 MENTOR—primary pilot trainer; has had wide use as primary pilot trainer by USAF, Navy, air forces of foreign nations; first production deliveries to USAF late in 1952. **Contractor:** Beech Aircraft Corp. **Power plant and manufacturer:** Continental O470-13A piston engine. **Power plant hp/thrust:** 225 hp. **Dimensions:** span 32 ft. 10 in., length 25 ft. 11 in., height 9 ft. 8 in. **Speed:** about 190 mph. **Ceiling:** 20,000 ft. **Range:** 975 mi. **Crew:** 2—student and instructor in tandem. **Maximum gross takeoff weight:** 2,900 lb. **Primary using command:** Air Training Command; many also in USAF base aero club use.

T-37—primary jet pilot trainer; first flight October 1954; side-by-side seating for student and instructor; in wide use by ATC. Gives future pilots "feel" of jet flying; also provides high margin of safety. **Contractor:** Cessna Aircraft Corp. **Power plant and manufacturer:** 2 Continental J69-T-25 turbojets. **Power plant hp/thrust:** maximum 1,025 lb. each. **Dimensions:** span 33 ft. 10 in., length 29 ft. 4 in., height 9 ft. 2 in. **Speed:** over 400 mph. **Ceiling:** over 40,000 ft. **Range:** over 700 mi. **Crew:** 2—student and instructor. **Maximum gross takeoff weight:** 6,600 lb. **Primary using command:** Air Training Command.

T-38 TALON—high-speed jet pilot trainer; intended to supplant T-33 as advanced jet pilot trainer; will be used primarily by ATC, also in general USAF training in supersonic techniques, multijet handling, aerobatics, night and instrument flying, cross-country navigation, etc. **Contractor:** Northrop Corp. **Power plant and manufacturer:** 2 General Electric J85. **Power plant hp/thrust:** 3,850 lb. **Dimensions:** span 25 ft. 4 in., length 43 ft. 5 in., height 11 ft. 11 in. **Speed:** about 850 mph., or more than Mach 1.2. **Ceiling:** above 55,000 ft. **Range:** beyond 1,000 mi. **Crew:** 2—student and instructor, tandem. **Maximum gross takeoff weight:** over 11,000 lb. **Primary using command:** Air Training Command.

T-39 SABRELINER—utility plane-trainer; first flight September 16, 1958; twin-jet featuring sweptback wings, two J85 engines mounted externally on the fuselage aft of the wing. Considered suitable for single-pilot operation, has dual controls and instrumentation; passenger seats have individual reading lights and cold-air inlets. Best single-engine cruise altitude above 20,000 ft.; used in administrative roles. **Contractor:** North American Aviation. **Power plant and manufacturer:** Pratt & Whitney J60-P. **Power plant hp/thrust:** 3,000 lb. each. **Dimensions:** span 44 ft. 5 in., length 43 ft. 9 in., height 16 ft. **Speed:** over 575 mph. **Ceiling:** over 40,000 ft. **Range:** beyond 1,000 mi. Cargo capacity: 4 to 8 passengers. **Crew:** 2. **Maximum gross takeoff weight:** about 15,000 lb. **Primary using command:** Headquarters Command, Continental Air Command.

Gallery of USAF Weapons

OTHER AIRCRAFT

H-19

SH-21B

H-43B

Q-2C

U-3B

U-4B

SA-16B

XQ-4B

H-19—liaison-evacuation helicopter; in worldwide and extensive USAF use; first flight November 1942. Performed magnificently in Korea. Used also by Navy, Marines, Coast Guard, civilian firms, foreign nations. **Contractor:** Sikorsky Aircraft Div., United Aircraft Corp. **Power plant and manufacturer:** A and C models use Pratt & Whitney R1340-57; B and D use Wright R1300-3. **Power plant hp/thrust:** R1340-57, 600 hp; R1300-3, 800 hp. **Dimensions:** blade 53 ft., length 41 ft. 2 in., height 15 ft. 6 in. **Speed:** over 100 mph. **Ceiling:** above 12,000 ft. **Range:** A and C models, 400 mi.; B and D models, 360 mi. **Cargo capacity:** A and C models, 1,700 lb.; B and D models, 2,100 lb. **Crew:** 2 or 3. **Maximum gross takeoff weight:** A and C models, 7,100 lb.; B and D models, 7,500 lb. **Primary using command:** Most USAF major air commands.

H-21 WORKHORSE—troop carrier helicopter; first flight April 1952; fuselage of all-metal stressed skin, semimonocoque construction. Cockpit has side-by-side seating with the pilot on the right. In H-21 through H-21C, single Wright R1820-103 piston engine drives both rotors; in H-21D test-bed rotors driven by one General Electric T58 turbine engine apiece. **Contractor:** Vertol Div., Boeing Airplane Co. **Power plant and manufacturer:** Wright R1820-18. **Power plant hp/thrust:** 1,425 hp. **Dimensions:** blade 44 ft., length 52 ft. 6 in., height 16 ft. **Speed:** 140 mph. **Ceiling:** above 15,000 ft. **Range:** 600 mi. maximum. **Cargo capacity:** 20 troops or 12 litters plus attendant. **Crew:** 2 or 3. **Maximum gross takeoff weight:** 15,000 lb. **Primary using commands:** Tactical Air Command, Alaskan Air Command, Headquarters Command.

H-43 HUSKIE—crash-rescue, fire-fighting helicopter; H-43B, redesigned, improved version, rolled out at Bloomfield, Conn., December 1958. Improvements include lighter engine, "airplane handling" characteristics through use of rudders in the design. First delivery of B made in June 1959. In December 1959, Capt. W. J. Hodgson, test pilot, and Maj. W. J. Davis, AMC project officer, in an H-43B, set a new world's altitude record for heavy helicopters of 30,100 ft. over Brookfield, Conn. TAC Capt. Walter C. McMeen reached 25,814 ft. over Connecticut in May 1961 to set a world record for 'copters carrying 1,000 kilograms (2,205.5 lb.). Both previous records were held by Russian flyers. **Contractor:** Kaman Aircraft Corp. **Power plant and manufacturer:** Pratt & Whitney R1340-48 piston engine, H-42A; Lycoming T53-L-1A turbine, H-43B. **Power plant hp/thrust:** A model, 600 hp.; B model, 800 hp. **Dimensions:** rotor diameter, 47 ft., length 47 ft., height 12 ft. 7 in. **Speed:** over 100 mph. **Ceiling:** above 25,000 ft. **Range:** A model, 220 mi.; B model, 250 mi. **Cargo capacity:** 2,000 lb. or 7 passengers plus pilot. **Crew:** 2. **Maximum gross takeoff weight:** A model, 6,800 lb.; B model, 7,100 lb. **Primary using command:** Tactical Air Command.

SA-16 ALBATROSS—search and rescue amphibian, operational since 1947, has been extremely active around the world since. Used mainly by the Air Rescue Service, in limited numbers by major air commands with own crash-rescue units. Extremely versatile, durable aircraft. **Contractor:** Grumman Aircraft Engineering Corp. **Power plant and manufacturer:** 2 Wright R1820-76A or B piston engines. **Power plant hp/thrust:** 1,425 hp each. **Dimensions:** span 80 ft., length 62 ft. 1 in., height 24 ft. 4 in. **Speed:** 230 mph. **Ceiling:** 25,000 ft. **Range:** 2,500 mi. maximum. **Cargo capacity:** 10 passengers plus rescue and aid equipment. **Crew:** 6. **Maximum gross takeoff weight:** 30,000 lbs. **Primary using command:** MATS Air Rescue Service.

L-20 BEAVER—liaison-administration; high-wing lightplane produced in limited quantities for Air Force and Army since 1947. **Contractor:** de Havilland Aircraft Co. **Power plant and manufacturer:** Pratt & Whitney R985-AN-100-3 piston engine. **Power plant hp/thrust:** 450 hp. **Dimensions:** span 48 ft., length 30 ft. 4 in., height 10 ft. 5 in. **Speed:** 180 mph. **Ceiling:** 20,000 ft. **Range:** about 600 mi. **Cargo capacity:** 6 passengers, 1,000 lb. **Crew:** 1. **Maximum gross takeoff weight:** 4,820 lb.

U-3A—liaison-administration; low-wing, twin-engine; advanced version U-3B with more powerful engines and sweptback vertical tail also purchased; both models off-the-shelf versions of the Cessna 310 series. **Contractor:** Cessna Aircraft Co. **Power plant and manufacturer:** Continental D470-M. **Power plant hp/thrust:** 240 hp. **Dimensions:** span 36 ft., length 26 ft., height 10 ft. 6 in. **Speed:** 230 mph maximum. **Ceiling:** 21,300 ft. **Range:** 1,125 mi. **Maximum gross takeoff weight:** 4,830 lb. **Primary using command:** Air University, Hq. Com., CONAC.

U-4A—liaison-administration; high-wing, twin-engine; advanced model U-4B with larger engines and increased gross weight also purchased; both models off-the-shelf versions of the Aero Commander. **Contractor:** Aero Design and Engineering Co. **Power plant and manufacturer:** Lycoming GO-480-D1A. **Power plant hp/thrust:** 260 hp. **Dimensions:** span 49 ft. 6⅝ in., length 35 ft. 2 in., height 14 ft. 9 in. **Speed:** 222 mph maximum. **Ceiling:** 22,500 ft. **Range:** 1,625 mi. **Maximum gross takeoff weight:** 6,500 lb. **Primary using command:** Headquarters Command.

Q-2 FIREBEE—target drone; first flight April 1951; can be air- or ground-launched, has parachute-recovery system. Internal electronic system scores how close fire has come to drone. Advanced version, the Q-2C, now in production. **Contractor:** Ryan Aeronautical Co. **Power plant and manufacturer:** Continental J69. **Power plant hp/thrust:** 1,000 lb. **Dimensions:** span 11 ft. 3 in., length 17 ft. 7 in., height 6 ft. 3 in. **Speed:** 575 mph. **Ceiling:** 40,000 ft. **Range:** about 1 hour flying time maximum. **Maximum gross takeoff weight:** 1,850 lb. **Primary using command:** Air Defense Command, Systems Command.

Q-4B—target drone; improved version of the Q-4A; radar controlled Q-4A and B are air-launched from aircraft. **Contractor:** Northrop Corp. **Power plant and manufacturer:** General Electric J85 turbojet. **Power plant hp/thrust:** 2,450 lb. **Dimensions:** span 13 ft., length 36 ft. **Speed:** Mach 2. **Ceiling:** 70,000 ft. **Endurance:** about 1 hour. **Maximum gross takeoff weight:** 3,350 lb. **Primary using command:** Systems Command, Tactical Air Command, Air Defense Command.

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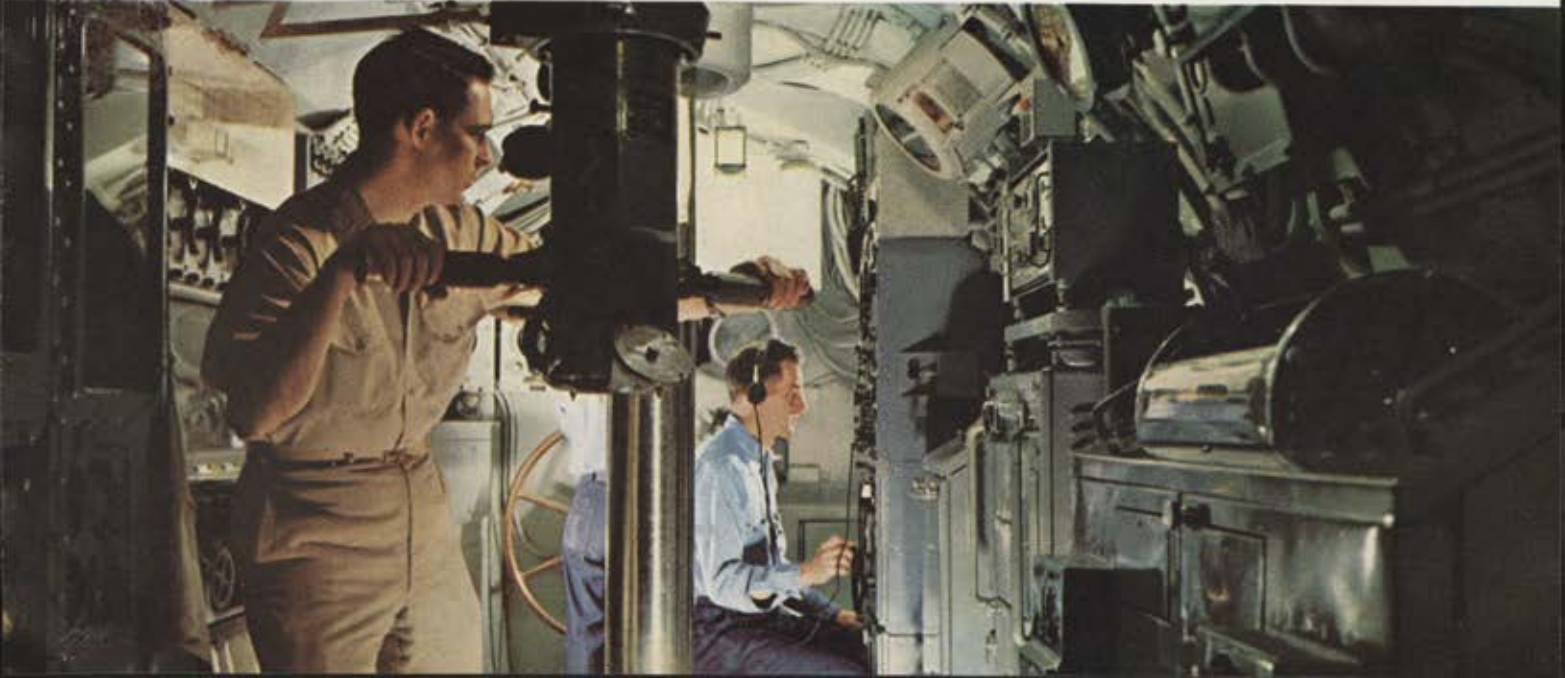

Above, APCS Color Photo of the Year. Left, runnerup. Opposite top, Black and White Photo of the Year. Below is runnerup. SSgt. Rodolfo Silva shot winning color photo of a Samos satellite, "Sunset on Pad #1," with C-6 camera, Anscochrome film with settings one-fifth second and f8. Color runnerup is SSgt. Richard Schafer's "Missile Site Surveyor," a study of fellow APCS man with theodolite, basic geodetic instrument. He used C-10 camera, Ektacolor, at one-hundredth and f22. Black and white winner, "Ham," is SSgt. Kenneth Smith's picture of space chimp seeing cover photo of himself. Camera was C-6, film Super Hypan, settings one-hundredth and f5.6. Black and white runnerup, "Discoverer at Prelaunch," was imaginative exposure series by A1C Edward Banick with a C-6, Anscochrome film, at one-twenty-fifth and f4.7.

Prize-winning USAF photos

GLOBAL PICTURE WINDOW

MATS' Air Photographic & Charting Service covers the world—with eye-opening pictorial results

CAMERAMEN of the Air Photographic and Charting Service, a part of MATS, are on hand at Air Force operations around the world.

On these pages are the four best photos taken this year by this far-flung band of APCS men and women. Each month APCS staff judges at the service's headquarters, Orlando, Fla., choose the best black and white and the best color print sent in by APCS photographers. These four pictures, two in each category, were judged the best of the monthly selections.

APCS, whose 5,000 personnel are commanded by Maj. Gen. Clifford H. Rees, has a lot to do. It conducts geodetic surveys vital to missile programing, processes thousands of miles of aerial mapping film, supplies high-speed closeups of rocket and missile operations for research and development purposes, films USAF operations and exercises to provide commanders with solid visual performance reports, and produces Air Force training and orientation films. The command received AFA's Arts and Letters Trophy in Miami Beach, Fla., in 1959.

APCS's photographic mission provides a view through a picture window of the global Air Force.—END

dead center

Kelsey-Hayes thrust vectoring systems give missiles proper directional control.

Kelsey-Hayes is contributing substantially to the design, development and production of new thrust vector control systems for solid fuel propulsion.

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KH

July 1, 1960 – June 30, 1961

HIGHLIGHTS OF THE YEAR IN THE US AIR FORCE

July 1, 1960—A Soviet MIG attacked and shot down an RB-47 in the open sea off the Barents Sea coast. The United States lodged a strong protest and, on the basis of evidence provided by secret monitoring devices, offered to provide documentation to the United Nations that this attack had occurred over international waters.

July 1, 1960—The Eniwetok Proving Ground in the mid-Pacific was added to the Pacific Missile Range, marking the shift of important test activities from Cape Canaveral, Fla., to Vandenberg AFB, Calif.

July 1, 1960—The first operational prototype of the Titan "J" series veered sharply out of control and was destroyed by the Cape Canaveral range safety officer about 300 feet above the launching pad. The fiery explosion ended a string of six straight successful test flights for Titan, which had been making good progress since being delayed by mishaps in 1959.

July 2, 1960—The Harmon International Trophies for 1960 were awarded to USAF Capt. Joe B. Jordan, who flew a Lockheed F-104 Starfighter to a world jet altitude record of 103,395.5 feet (nearly twenty miles up), and Capt. Joseph Kittinger, Jr., for his record 76,400-foot parachute drop from an open-gondola balloon. Kittinger survived severe autorotation in a drop of 64,000 feet when his main parachute malfunctioned. His second chute opened at about 12,000 feet and took him safely down. Later in 1959, he made a second parachute descent from 74,800 feet in which his equipment functioned perfectly.

July 2, 1960—An inertially-guided Atlas was successfully fired downrange from Cape Canaveral. Before it landed 5,000 miles away at a predetermined destination, tests were made to check performance of the new guidance system and to assess its ability to receive and to react to steering commands.

July 5, 1960—The second weeklong Minuteman mobility test railroad train began its run in the western US.

July 7, 1960—President Eisenhower signed the Defense Appropriation Bill for FY 1961 providing $39,996,608,000, including $661,608,000 more than the Administration had requested of Congress. The Act provided $265 million for the B-70 ($190 million more than requested); $145.7 million for Samos, Midas, and Discoverer programs which had not been requested. Permissive authority was granted the DoD to divert $100 million from Bomarc to procure additional fighters if the IM-99 was dropped.

July 7, 1960—The Air Force was authorized under a new law to have its own decorations and awards, including an Air Force Cross and an Airman's Medal to take the place of the Distinguished Service Cross and Soldier's Medal. USAF had been seeking its own decorations since unification in 1947.

July 8, 1960—Atlas ICBM base construction was officially acknowledged to have fallen four to five months behind schedule. Secretary of Defense Thomas S. Gates made this disclosure along with a promise that Air Force, Army engineer, and contractor management procedures would be tightened up to eliminate further "slippages."

July 8, 1960—A Bomarc-B streaked 170 miles over the Gulf of Mexico to intercept a Regulus II target missile. This third consecutive interception marked a milestone in the improvement of the IM-99B guidance system.

July 8, 1960—The Air Force Reserve program underwent major reorganization in a move to give Reservists a greater voice in the management of their affairs. Six Air Force Reserve regions were established to replace the Fourth, Tenth, and Fourteenth Air Forces which were inactivated. CONAC continued to control Reserve activities to be distributed on a geographic basis.

July 11, 1960—A model "B" Mace was launched from a Cape Canaveral hard site in a "cocked-pistol" demonstration. The test of the forty-four-foot rocket from a "hot-hold" concrete shelter determined noise and vibration effects upon inertial guidance in a closed area. The TB-76B is to be deployed in the Pacific area late in 1961.

July 14, 1960—The USAF Congo Airlift of UN troops from Evreux, France, began scarcely an hour after word was received of fighting there. The first Operation Safari plane carried forty-four Tunisian troops and a cargo of flour to Leopoldville. Plans were made to transport 1,800 tons of foodstuffs by air to be distributed by Ralph Bunche, UN Representative in the Congo.

July 17, 1960—A container sent aloft in a balloon carried sixteen black mice to 133,000 feet to determine the effects on them of cosmic rays. The mice were safely recovered near Bemidji, Minn. The container was designed by the Bioastronautics Division of the USAF School of Aviation (now Aerospace) Medicine. NASA sponsored the flight.

July 18, 1960—USAF air defense plans involving jet fighters and radar warning sites in twenty-three states were revised on the assumption that missiles rather than manned weapons were becoming the greater military threat against the US. Changes emphasized smaller forces and more modernization of supersonic interceptor units. The USAF cut back on projected units that would not be ready when missiles presumably would become the principal threat to the US.

July 20, 1960—An ARDC (6511th Parachute) Test Group made a drop of 40,500 pounds from a Lockheed C-130 flying near El Centro, Calif. The paradrop broke the existing world record by 5,500 pounds.

July 20, 1960—AMC was assigned top management responsibility for ballistic missile site activation, a move which pointed up the emphasis upon completion of more operational launching sites as ICBMs began to come off assembly lines in numbers.

July 25, 1960—US Ambassador to the UN Henry Cabot Lodge told a Security Council meeting of evidence that a Soviet fighter had tried to force the shot-down RB-47 into Soviet airspace before attacking it on July 1. The USSR, on July 26, vetoed a US proposal for an independent investigation of the incident by the United Nations.

July 28, 1960—A Titan plunged into the Atlantic Ocean eighty miles from Cape Canaveral due to a premature first-stage shutdown. Planned range for the test was 5,000 miles.

July 29, 1960—A Project Mercury MA-1 capsule test failed when an Atlas booster exploded sixty-five seconds after blastoff. The mishap set back the US man-in-space program.

July 31, 1960—Official USAF figures estimated costs of bases and production-line missiles (excluding R&D costs): each Titan squadron at about $138 million; each hardened Atlas squadron at $152

(Continued on following page)

million; and each hardened Minuteman squadron at about $58 million.

August 1, 1960—A SAC B-52 triple-launched three GAM-72 Quail decoys into free flight over the Eglin AFB, Fla., test range, in a noteworthy multiple launch of Quail, which in operation would be released in this manner to confuse enemy air defenses and permit penetration to target.

August 1, 1960—Twelve B-58 Hustlers, America's first operational supersonic bombers, joined the 43d Bomb Wing, SAC. In September, Hustlers bested B-47s and B-52s at a bombing competition at Bergstrom AFB, Tex., to win the SAC Bombing Trophy for 1960.

August 2, 1960—A Hound Dog missile was launched from a B-52 at high altitude off Cape Canaveral and flew 500 miles to impact in the Atlantic Ocean with extremely good accuracy. The Hound Dog has an important role to play in USAF readiness planning for the immediate future.

August 4, 1960—The X-15, flown by NASA pilot Joe Walker, streaked across the Mojave Desert in a ten-minute test that attained a peak speed of 2,196 mph, eclipsing the 1956 record of the late Capt. Milburn G. Apt, USAF, who was killed when his X-2 crashed after a speed run of 2,156 mph.

August 5, 1960—A Bomarc IM-99A intercepted a pilotless B-47 at a range of 172 miles from electronic computers at Gunter AFB, Ala., at an altitude of seven miles over the Eglin AFB test range. The "enemy" ship was making a 700-mph simulated sneak attack on the Florida coast.

August 9, 1960—An Atlas testing an operational-type reentry vehicle flew over 7,000 statute miles into the South Atlantic Ocean, the second longest flight by a US missile. The first was the 9,000-mile flight by another Atlas into the Indian Ocean off the tip of South Africa on May 20, 1960.

August 9, 1960—Francis E. Warren AFB, Wyo., became the first exclusively operational launching base for ICBMs when three Atlas launch pads were declared operational by formal SAC Headquarters order and assigned to the 564th Strategic Missile Squadron.

August 10, 1960—A Mark I Titan "J" carried a dummy warhead 5,000 miles downrange into the South Atlantic Ocean in the first full success of an operational model. A recovery ship retrieved a data capsule which recorded the tactical-type nose cone's performance.

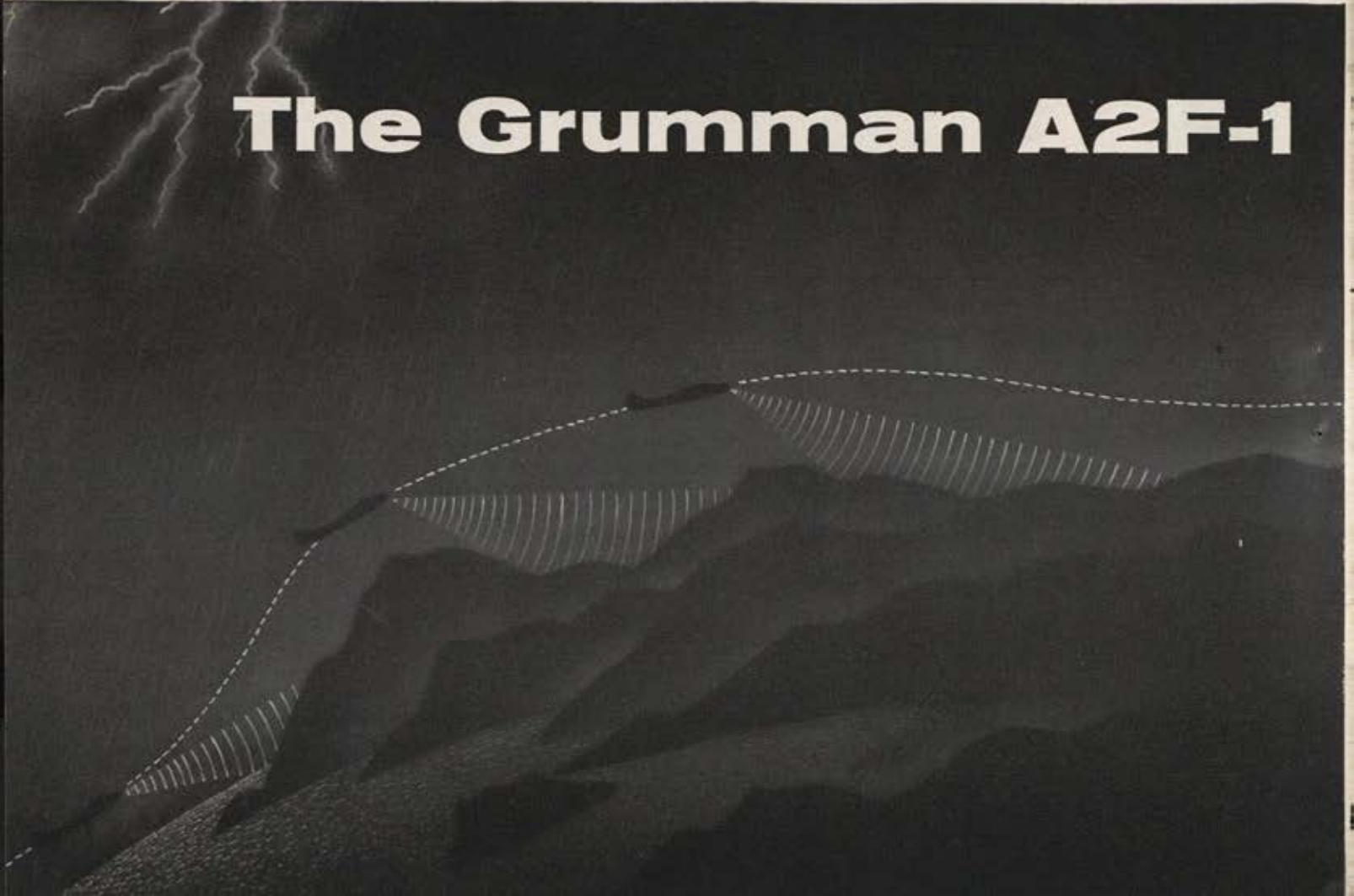
August 10-11, 1960—The US achieved history's first recovery of a man-made object from orbit when a 300-pound capsule was sent spinning back to earth from Discoverer XIII by prearranged signal after seventeen passes. The capsule was recovered at sea 330 miles NW of Hawaii, brought to Washington, and displayed by President Eisenhower.

August 11, 1960—A Bomarc-B intercepted a target missile traveling at over 1,000 mph off the Eglin AFB test range. Intercept occurred 172 miles from the launch site at a closing speed of 2,700 mph (more than Mach 4). Two other Bomarcs intercepted a B-47 target drone an hour apart. All scheduled near-misses were directed by the SAGE computer at Montgomery, Ala.

August 12, 1960—The X-15 attained a record altitude of 136,500 feet, at the very rim of the stratosphere. The flight, by Maj. Robert White, broke the four-year-old record of Capt. Iven Kincheloe, who had flown the X-2 to 126,200 feet in 1956.

August 13-27, 1960—Exercise Bright Star/Pine Cone III, involving fifteen troop carrier wings of the USAF Reserve, was carried out to test airlifting of an Army division to a brush-fire war. Over 800 planes, 25,000 Reservists, thousands of active-duty USAF personnel, and 10,400 men of the 101st Airborne Division, flown from Camp Campbell, Ky., to Fort Bragg, N. C., were involved in the largest peacetime maneuver on record.

August 14, 1960—Lt. Gen. Bernard A. Schriever, Commander, ARDC, estimated that the Minuteman ICBM would be so well protected in new underground



launching sites that Russia would not stand a chance of knocking it out in a single surprise blow. General Schriever said it would take fifteen to twenty Soviet missiles with five megatons force to assure knocking out one Minuteman.

August 16, 1960—Captain Kittinger descended from a balloon record of 102,800 feet over the New Mexico desert in a parachute. Kittinger plummeted from the highest altitude attained by a human being in nonpowered flight in free fall for four minutes, attaining a velocity of 614 mph. At 18,000 feet, his regular chute opened automatically. In January 1961, Captain Kittinger received the IAS John Jeffries Award, given annually to the individual who has contributed most to the advancement of aerospace medicine during the previous year.

August 17, 1960—Defense Secretary Thomas Gates established a Joint Strategic Targets Planning Section that would fix military targets on a worldwide basis. In steering a middle course between those who preferred the *status quo* and those who urged a new "Strategic Command," Secretary Gates called the establishment of the new target agency "the most important military decision" he had taken since coming to the Pentagon in 1953. Gen. Thomas S. Power, SAC Commander in Chief, was given a "second hat" as director of the group.

August 17, 1960—The USAF declared the Atlas MA-2 Rocketdyne engine operational. The "X" designation, used in conjunction with all engines up to the receipt of full operational status, was ended. and the straight LR (Liquid Rocket) terminology was adopted.

August 18-19, 1960—USAF's Discoverer XIV was sent into polar orbit and the next day spun off a 300-pound data capsule that was snagged in the air over the Pacific Ocean. The first successful air catch of an orbited capsule was made by a C-119 rigged with a trapezelike hook and directed by a beacon signal emanating from the parachuting capsule.

August 27, 1960—Eight USAF personnel who landed a cargo of signal equipment at Stanleyville in support of the UN effort to stabilize the chaotic Congo were attacked by enraged tribesmen who mistook them for Belgians. They barely escaped with their lives and were flown out to Leopoldville.

August 30, 1960—A Titan "J" was launched 5,000 miles downrange from Cape Canaveral. The ejected capsule carrying instruments to record performance of the nose cone attained an altitude of 600 miles but was lost at sea despite an intensive search by USAF.

August 30, 1960—Six Atlas missiles comprising the 564th Strategic Missile Squadron, the first fully operational ICBM squadron in the US, were declared operational at Warren AFB, Wyo.

August 31, 1960—Brig. Gen. Richard B. Curtin was appointed Special Assistant to the Secretary of the Air Force for Satellite Systems, thus giving strong new emphasis to the development of the Air Force's satellite systems. At Air Force Ballistic Missile Division level, Brig. Gen. R. E. Greer was named Vice Commander.

August 31, 1960—Project Tattletale was begun with the launching of a tiny radio transmitter 300 miles into the ionosphere via a thirty-two-foot Aerobee rocket to determine the feasibility of establishing an Air Force emergency communications system in the event existing ground networks were destroyed by enemy attack.

September 10, 1960—Operation Sky Shield was conducted by NORAD to test defense readiness on a continent-wide basis. The exercise involving the entire radar and electronics systems of the US and Canada was considered a success.

September 13, 1960—Discoverer XV was launched into polar orbit, but an attempt to recover a third consecutive satellite capsule failed, partly due to radio failure at the moment of separation. A Hawaiian radar tracking station got a fix on the capsule but recovery ships and aircraft lost visual and instrument contact with the capsule, which

(Continued on page 245)

A MANAGEMENT REPORT FROM MR. RICHARD A. WILSON, CORPORATE VICE PRESIDENT AND GENERAL MANAGER, ELECTRONICS GROUP

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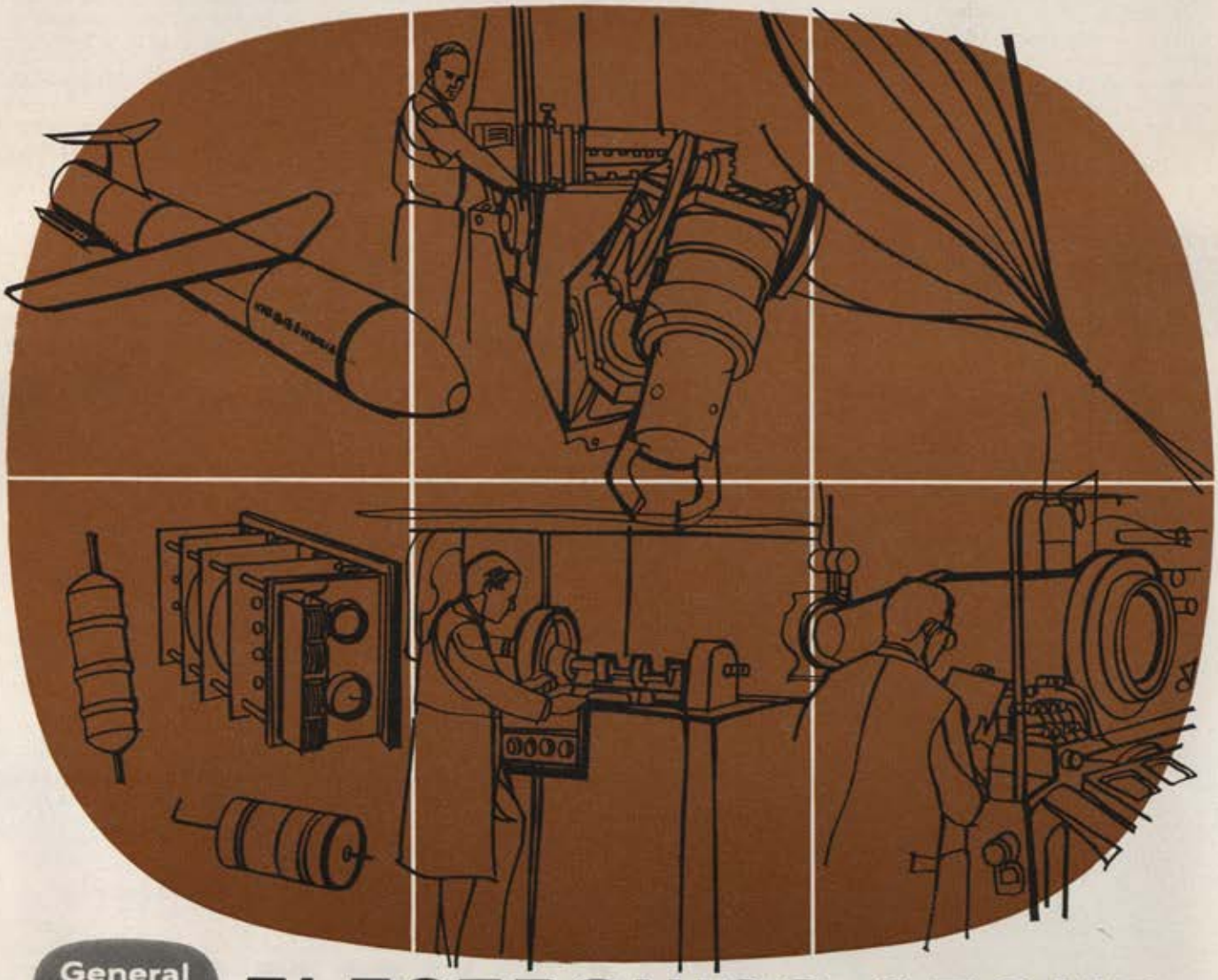
. . . and, to properly identify our mission of greater service and broad diversification, a *new name:* the General Mills ELECTRONICS GROUP. It's the "new look" of a company with an established record of service to science, industry and defense . . . from idea concept to production and operational check-out of complex systems; including over-all systems management. The Electronics Group was formed recently by the reorganization of operating departments and wholly-owned subsidiaries having more than 20 years experience in the design and production of precise electro-mechanical and electronic systems and components. This arm of the company, an out-growth of the former Mechanical Division, provides a well integrated package combining the talents of some 3,200 personnel employed in many diverse, yet complementary fields. A quick look at the varied activities of the Electronics Group is provided in the adjoining column. For more detailed information about the many ways they might serve you, write for a copy of the illustrated booklet, "*Broad Spectrum Capabilities to Serve the Aerospace Age.*"



General Mills

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See the Electronics Group display at 1961 Aerospace Panorama, Booths 845, -7, -9.

HIGHLIGHTS OF THE YEAR — CONTINUED

presumably sank into the Pacific Ocean.

September 15, 1960—Col. John A. Ryan, Jr., USAF, received $100,000 from the US government for his 1951 invention of a low-level bomb-sighting system used by American and allied aircraft in the Korean War. Payment was made in accordance with Private Law 86492. Colonel Ryan perfected his invention outside of official working hours.

September 15, 1960—The National Aeronautic Association announced that the year's Collier Trophy was to be awarded to USAF, Convair, and the Space Technology Laboratories for development of the Atlas.

September 15, 1960—USAF Capt. William Habluetzel and Lt. John J. Hargreaves emerged from a record thirty-day-and-eight-hour stay in a twelve-by-eight-foot cabin at Brooks AFB, Tex., which simulated a round trip to the moon and a thirteen-day stay. The two USAF pilots subsisted on eighty-five pounds of dehydrated food and twenty-two gallons of water supplemented by recycled urine.

September 16, 1960—An Atlas with a special nose cone coated with heat-resistant materials to enable the warhead to withstand temperatures up to 12,000 degrees Fahrenheit during reentry was sent 5,000 miles downrange from Cape Canaveral. Flight objectives were attained by the bull's-eye scored by the new inertial guidance, but the 1.5-ton nose cone was not recovered by search ships and planes.

September 19, 1960—An Atlas was fired 9,000 miles into the Indian Ocean to match a previous US record flight of May 1960. Soviet Premier Nikita S. Khrushchev arrived in New York City to attend sessions of the General Assembly at the United Nations the same day.

September 21, 1960—The Tactical Air Command formally accepted the Republic F-105D all-weather fighter at Nellis AFB, Nev. Automatic and electronic aids built into the F-105D enable its pilot to serve as pilot, bombardier, navigator, gunner, and radar operator.

September 21, 1960—A pencil-shaped USAF Blue Scout rocket attained an altitude of 17,000 miles in a three-and-a-half-hour flight that was powered by four solid-fuel stages. The test was only partially successful as the payload radio system failed just before the final stage exhausted its fuel supply.

September 22, 1960—Minuteman's operational configuration was publicly unveiled at the AFA National Convention at San Francisco. Col. Harry Goldworthy, formerly of SAC, was named Deputy Wing Commander at Malmstrom AFB, Mont., and became the first site activation task force commander for Minuteman.

September 27, 1960—The US and Britain signed an agreement to make available the Skybolt ALBM to the latter. The Skybolt will be sold outright to the British, who will use it with their strategic "V-bomber" force.

September 28, 1960—A third Titan "J" winged its way 5,000 miles into the South Atlantic from Cape Canaveral. A data capsule was recovered by the *Coastal Crusader*, a range ship.

September 29, 1960—Premature shutdown of the second-stage engine caused a Titan missile to fall about 4,000 miles short of its 10,000-mile objective well into the Indian Ocean.

September 30, 1960—Gen. Nathan F. Twining, Chairman of the JCS and former USAF Chief of Staff, retired due to ill health after forty-four years of distinguished service, including key air commands in the Mediterranean and Pacific theaters during World War II. He succeeded General Vandenberg on June 30, 1953, as USAF Chief and played a key role in the modernization of the USAF to a mixed manned bomber-missile force. He was appointed Chairman of the JCS on August 15, 1957.

October 1, 1960—The Thule, Greenland, BMEWS radar sentry began regular operations. It was the first of three planned stations that could provide warning up to fifteen minutes of a ballistic missile attack.

October 3, 1960—MATS inaugurated jet passenger service with a flight of 166 passengers carried from McGuire AFB, N. J., to Frankfurt, Germany. It was the largest passenger load ever to cross the Atlantic.

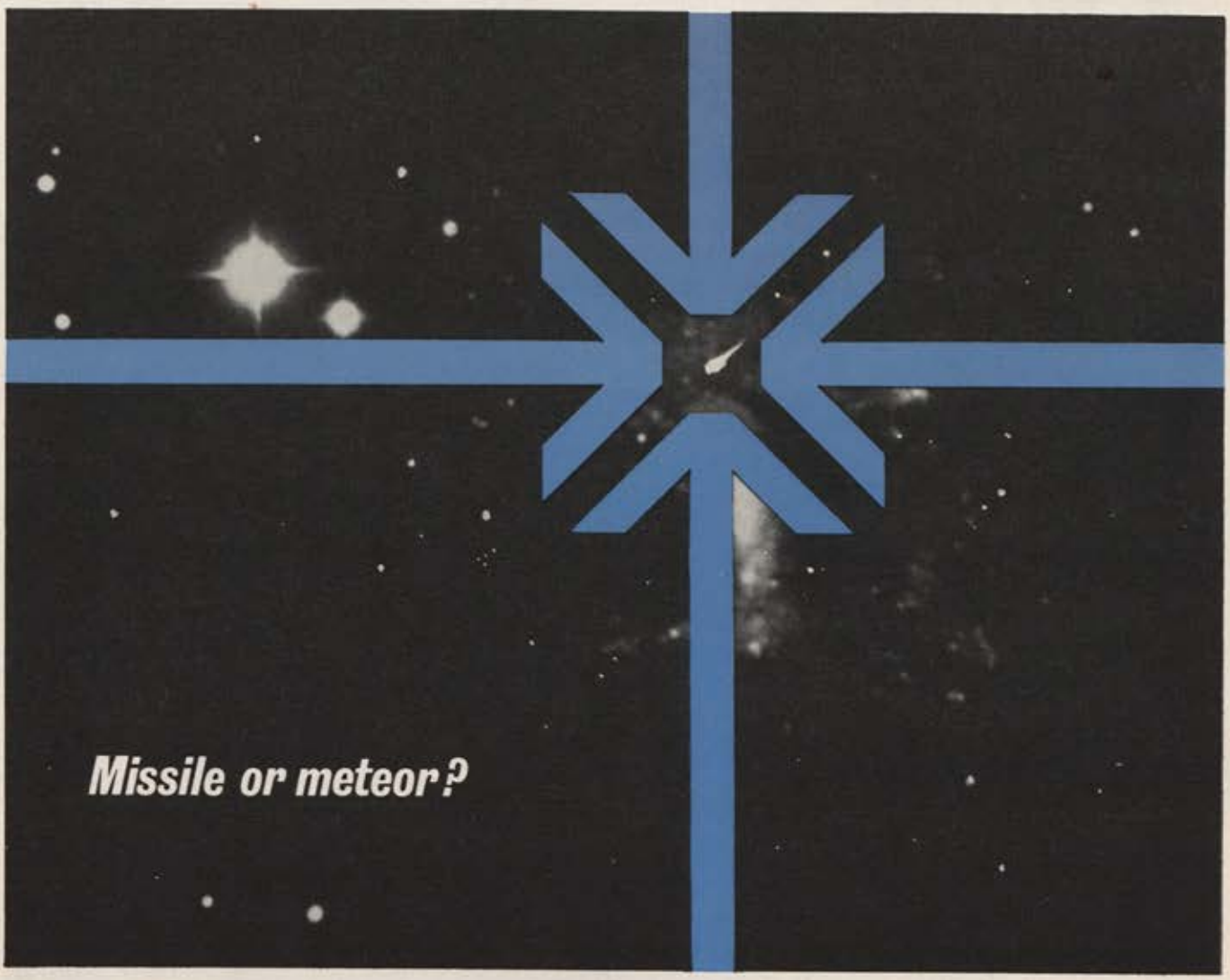
October 4, 1960—A four-stage Blue Scout vehicle was launched from Wallops Island, Va., and carried a radiation monitoring payload to a 3,700-mile altitude. The test was intended to determine the feasibility of detecting nuclear explosions in space. Payload telemetry was received at six stations downrange to Ascension Island. Usable signals were received for over sixty minutes, about ninety-five percent of the predicted flight time.

October 6, 1960—The USAF and Western Union signed contracts to begin construction of a communications system to make possible instantaneous nationwide information. Computers, radio, and wire relays will expedite the movement of supplies and the exchange of financial, medical, personnel, and statistical data that formerly required 24,000,000 communications in one day.

October 7, 1960—A Titan lofted a data capsule in a higher-than-scheduled trajectory en route 5,000 miles downrange from Cape Canaveral. Two and a half hours later, an ocean range vessel recovered the capsule containing vital reentry data on the nose cone, which had been subjected to severe conditions.

October 10, 1960—The USAF Command & Control Development Division (C^2D^2) presented the "Winter Study Group" report along with recommendations for: (1) greater emphasis upon austere "backbone" command centers that could ride out a nuclear assault; (2) study of the effort being given to optical, radar, infrared, and other "sen-

(Continued on page 247)



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sor" systems designed to perform reconnaissance and to provide attack warning; (3) consolidated management of many projects into automated command centers to enable commanders to make decisions; (4) investigation of the desirability of a single automated warning center to provide the President and the JCS with immediate indications of impending or actual attack.

October 11, 1960—The first attempt to orbit a Samos developmental satellite failed when an Atlas-Agena rocket fired southward from Point Arguello, Calif., did not attain the planned polar orbit.

October 11, 1960—The first prototype control station meeting East-West specifications for detecting underground nuclear explosions was announced as completed at a location in the Wichita Mountains near Lawton, Okla. The new seismic research station has equipment that can measure a movement in the earth as small as one-billionth of an inch.

October 11, 1960—An Atlas "E" missile fell far short of its planned 5,000-mile flight due to an early shutdown of the sustainer and vernier engines. The test was planned to check out advanced equipment designed to increase range and payload capacity.

October 12, 1960—The first Atlas was delivered to the 565th Strategic Missile Squadron at Site Two, Warren AFB, Wyo. Site One, with six missile sites of the 564th Squadron, located twenty miles NW, has been operational for some time.

October 13, 1960—A 2,800-pound Atlas RVX-2A nose cone containing a 600-pound instrument package, including three mice, was recovered 5,000 miles downrange from Cape Canaveral. This most successful experiment measured radiation effects and weightlessness. The recovered nose cone provided data on tests conducted for the USAF Special Weapons Center, NASA, the Los Alamos Scientific Laboratory, and the Wright Air Development Center.

October 13, 1960—The Bomarc-B was accepted by the Air Force for military service. The USAF had invested about $270 million in production outlay for this interceptor missile.

October 18, 1960—The Hound Dog underwent test flights to determine its accuracy in straight-line, high-level flight. One weapon launched from a B-52 went a few miles off at a range of 275 nautical miles due to autonavigator malfunction.

October 21, 1960—An advanced Mace-B tactical missile capable of carrying a nuclear warhead for more than 1,200 miles was fired at Cape Canaveral from a simulated operational site.

October 22, 1960—An Atlas steered by a jam-proof inertial guidance mechanism was successfully fired 7,000 miles downrange from Cape Canaveral just 225 miles short of its planned initial operational range of 6,325 miles. In this longest Titan flight, a data cassette was ejected from the nose cone after reentry and recovered in the South Atlantic about ninety-seven minutes after launching.

October 24-31, 1960—Operation South Wind, a joint Army-USAF exercise, tested the combat readiness of TAC and MATS, which flew 100 airplanes to transport 10,000 troops in 142 Strategic Army Command (STRAC) units.

October 25, 1960—The US and Britain revised their agreement concerning USAF bases in Britain. Prime Minister Macmillan advised Parliament the US would keep the British government fully advised concerning military flights. The revision was made necessary by the political storm which followed charges that U-2 reconnaissance flights had originated in Britain.

October 26, 1960—Discoverer XVI failed to orbit because the first and second stages failed to separate. This satellite included a twenty-five-foot-long Agena-B second stage designed to carry monkeys into space or to house reconnaissance or detection gear.

October 29, 1960—A Bomarc-B veered off course in a test flight at Eglin AFB and was destroyed in flight. It was the first failure after six successful launchings of the forty-seven-foot interceptor missile.

October 31, 1960—The B-70 development program was fully restored when $155 million was given to the USAF, making a total of $265 million authorized.

November 3, 1960—Dudley C. Sharp, Secretary of the Air Force, signed an agreement to supply Atlas test missiles for detection trials by the Army's Nike-Zeus which are scheduled for 1961, and for interception trials scheduled for 1962.

November 4, 1960—USAF unveiled an airborne tactical command post and communications center designed to keep military commanders in remote areas in touch with their theater commanders. It consists of a C-97 aerial tanker stripped of fuel tanks and packed with communications gear.

November 4, 1960—Readiness of the first Minuteman was advanced from 1963 to mid-1962. The updating was reinforced by the successful silo development during eight tests that had just been completed.

November 8, 1960—The US agreed to release five military bases in the British West Indies. These bases, along with others in Newfoundland and Bermuda, had been obtained in 1941, on a ninety-nine-year lease as part of the historic "lend-lease" agreement with Britain in exchange for fifty destroyers.

November 10, 1960—The JCS assigned the Space Surveillance Detection Net (SPASUR) and the National Space Surveillance Control Center (SPACE-TRACK) to the Continental Air Defense Command at Colorado Springs, Colo. SPASUR was developed by the US Navy to detect satellites by means of radar

(Continued on page 249)

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devices that act as an electronic "fence" in space. SPACETRACK was established by the USAF to analyze and catalogue orbital data about satellites received from SPASUR and other sources. The new directive integrated SPASUR and SPACETRACK with other systems in the surveillance network under command of Gen. Laurence S. Kuter, Commander in Chief of NORAD.

November 11, 1960—The silver anniversary of a record-breaking balloon flight by Capt. Orvil A. Anderson and the late Capt. Albert W. Stevens was observed by the USAF and the National Geographic Society. This precursor to modern spaceflight was made in a balloon, Explorer II, which rose thirteen miles above the Black Hills, S. D., and broke the then-world altitude record.

November 12, 1960—USAF's Discoverer XVII was blasted into a polar orbit from Vandenberg AFB, Calif. Two days later, the satellite's data capsule was ejected from the Discoverer upon command signal from the ground and caught in midair over the Central Pacific by one of a team of waiting C-119 catchplanes.

November 15, 1960—The X-15, with Scott Crossfield at the controls, made its first flight with the new XLR-99 engine. Despite being throttled back, the research plane still reached 2,000 mph and 80,000 feet altitude before landing at Edwards AFB.

November 15, 1960—An Atlas launched from Cape Canaveral, with a new Mark IV nose cone, landed a data capsule 5,000 miles downrange which was recovered within an hour of impact by a range vessel.

November 18, 1960—The USAF became the first of the armed services to carry into effect President Eisenhower's order requiring a reduction of 284,000 dependents living abroad. All overseas travel after February 1, 1961, was canceled for Air Force dependents. The cutback program was later rescinded by President Kennedy.

November 19, 1960—An interim reorganization of the Department of Defense was submitted to President-elect Kennedy by Senator Stuart Symington, who had headed a task force established by Kennedy. The plan called for a beefing up of the role of Secretary of Defense, elimination of the offices of the separate service secretaries, and a reorganization of military roles and missions along more functional lines.

December 3, 1960—A Titan I exploded in a Vandenberg AFB silo during a fueling exercise. The accident caused by failure in a launcher elevator hydraulic system left the launch pad a smoldering wreck.

December 6, 1960—A B-47 out of Pease AFB, N.H., scored two direct hits within a ten-foot area during a bombing training mission. The feat was perhaps equivalent to getting two holes in one during a single round of golf.

December 6, 1960—The Army Corps of Engineers opened bids for 150 Minuteman hardened launching sites to be built around Malmstrom AFB, Mont., to be operated by fifteen launch-control centers. The sites, clustered in fifteen "flights," were to be designated by letters from "A" through "O."

December 7, 1960—Discoverer XVIII was launched into polar orbit with a capsule carrying human bone marrow, eyelid tissue, gamma globulin, and cancer cells. Reentry after forty-eight passes was triggered by ground command overriding a preset timer. Recovery was made in the air over the Pacific Ocean on December 10. Examination revealed dosages of from thirty to thirty-five rads (measure of radiation) during the fifty hours the specimens were in space, indicating that man may be able to withstand heavy solar flares with a minimum of shielding.

December 13, 1960—Robert S. McNamara, Ford Motor Company President, was chosen to be Secretary of Defense by President-elect Kennedy.

December 14, 1960—A B-52G Superfortress completed a 10,000-mile, nonstop, nonrefueled flight in nineteen hours and forty-five minutes and landed with enough fuel aboard for another 1,000 miles of flight. The long-distance mission emphasized once more that aircraft of the Strategic Air Command can strike targets anywhere on the globe.

December 16, 1960—A SAC crew from the 576th Strategic Missile Squadron tested a mechanism to arm a nuclear device in an ICBM nose cone with a TNT charge. An Atlas launched from Vandenberg AFB sent the nose cone 5,041 statute miles to Eniwetok Lagoon, where the TNT charge aboard exploded.

December 16, 1960—Two Bomarc-B missiles overtook a B-47 drone flying at an altitude of 30,000 feet and a speed of 500 mph. The interception was made possible by long-range radars which spotted the target and instantaneously relayed the information to a SAGE computer at Montgomery, Ala., whence electronic launch commands sent the Bomarcs downrange from Eglin AFB, Fla., to make the interception.

December 20, 1960—Discoverer XIX went into elliptical orbit via a Thor-Agena booster. It was reported to carry infrared scanners to gather data for the Midas early-warning satellite program to be telemetered to ground stations. No recoverable capsule was programed, and after 525 revolutions of the earth in forty days, the satellite burned up.

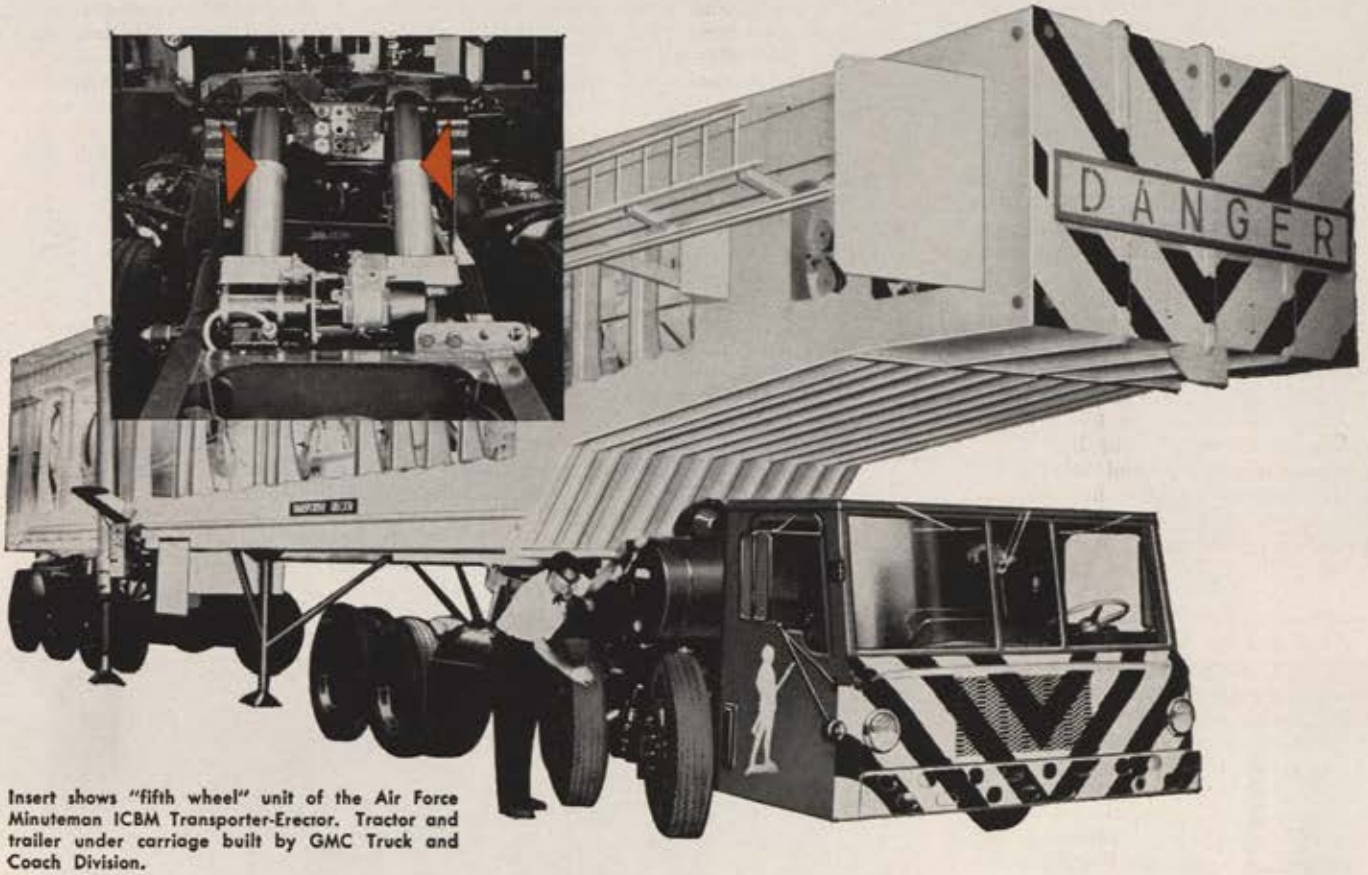
December 21, 1960—Roswell L. Gilpatric, former Undersecretary of the Air Force, and strong advocate of more unification, was named Deputy Secretary of Defense by President-elect Kennedy.

December 22, 1960—The Skybolt development program was stretched out

(Continued on page 251)

Hefting a Heavyweight

...A SNAP with SAGINAW b/b SCREWS



Insert shows "fifth wheel" unit of the Air Force Minuteman ICBM Transporter-Erector. Tractor and trailer under carriage built by GMC Truck and Coach Division.

Low-friction Saginaw Ball Bearing Screws allow a small electric motor in the "fifth wheel" unit to rapidly raise and lower the forward end of this transporter of a 65,000 pound missile . . . allows the transporter to pass under highway overpasses and other low clearance obstacles en-route to underground launching sites.

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Saginaw ball bearing Screw

and scaled down by DoD because of fund availability. Skybolt had an original 1964 target date for battle readiness.

December 31, 1960—USAF completed its safest flying year in 1960 with an accident rate of 5.7 accidents for each 100,000 hours of flying, a reduction of thirty percent from 1959. Fatal accidents and destroyed aircraft each dropped forty percent. Dollar losses were reduced by nineteen percent.

January 1, 1961 — The Air Force grounded 1,651 officers, including Gen. Thomas D. White, Chief of Staff, and 237 other general officers, to comply with a congressional ceiling of less than 100,000 military personnel of all the services eligible to draw flight pay in 1961. Over-all, in DoD, 3,153 officers were taken off flying pay. This action marked the shifting emphasis from manned weapons to guided missiles.

January 1, 1961—Project Ice Way was established near Thule by the Geophysics Research Directorate of the Cambridge Research Laboratories to test the feasibility of landing heavy aircraft such as the B-52 and KC-135 on ice runways. The tests, completed in June 1961, demonstrated the strength and other engineering qualities of the ice runways wholly constructed of natural sea water or reinforced with strands of fiberglass.

January 5, 1961 — The first B-52H rolled off the Boeing production line at Wichita, Kan. The eighth generation of the Superfortress is powered by eight new turbofan engines and will carry four Skybolt air-launched ballistic missiles in addition to nuclear weapons in its bomb bay. These engines were expected to give the B-52H a 650-mph speed at ranges over 10,000 miles, an increase of twenty percent over the "G" model.

January 7, 1961—The Blue Scout I was launched by the USAF 1,200 miles downrange from Cape Canaveral with a ninety-pound capsule containing information-gathering devices for eight experiments, including measurements of radiation, aerodynamic turbulence, ion density.

January 12, 1961—The first carry-flight of GAM-87 Skybolts, scheduled for this date a year earlier, was completed. Four inert Skybolts carried aloft in a B-52G checked carrier-missile compatibility, including directional stability, handling qualities, and aerial refueling. The flight was considered to be a highly successful one.

January 12-13, 1961 — SAC B-58s streaked over the desert near Edwards AFB, Calif., to set six records. One Hustler averaged 1,284.73 mph over a 621-mile course with a 4,408-pound load. The crew members received the 1960 Thompson Trophy, aviation's most coveted award for speed flying. Another B-58 averaged 1,061.808 mph on a 1,242-mile course with the same payload. These marks surpassed flight records previously held by Russian planes.

January 15, 1961—Texas tower radar site Number Four collapsed into the storm-tossed Atlantic Ocean with the loss of twenty-eight personnel—thirteen USAF men and fifteen civilians. TT-4 was not to be replaced. The officer in charge was subsequently brought before a court-martial to face charges of negligence.

January 18, 1961—SAC announced an airborne-alert training program for all B-52 bomber units involving a round-the-clock operation, during which an undisclosed number of heavy bombers flying from twenty-four bases would be airborne at all times.

January 20, 1961—A Titan I plummeted into the Atlantic Ocean 100 miles off Cape Canaveral when its second stage failed to ignite. This was the second consecutive failure of the Titan second stage.

January 23, 1961—The last Atlas "D" test-landed a nose cone "well within two miles of the target" off Ascension Island about 5,000 miles distant from Cape Canaveral. Its record in forty-nine launchings showed thirty-five successes, eight partials, six failures.

January 24, 1961—Eugene M. Zuckert was sworn into office as Secretary of the Air Force.

January 24, 1961—A B-52 attached to the 4241st SAC Wing crashed near Seymour Johnson AFB, N.C., with an unarmed nuclear weapon aboard. There was no spread of radiation. Four crew-members escaped.

January 24, 1961—A new Atlas "E" failed for the third straight time when a premature engine shutdown sent it spiraling into the ocean off Cape Canaveral. The Atlas "E" has a thrust of 389,000 pounds.

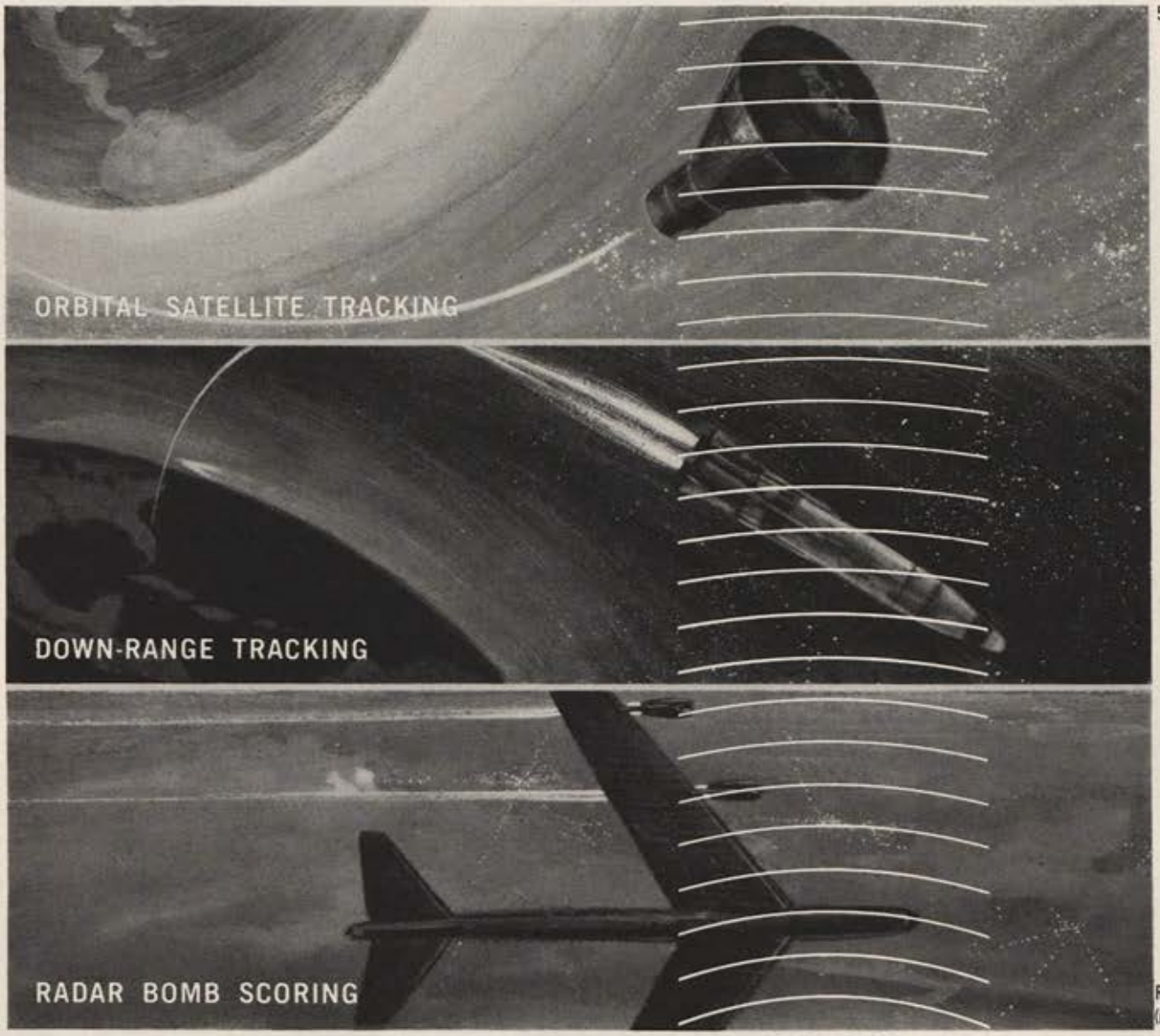
January 25, 1961—Titan II was chosen by the Air Force over Titan I to launch the piloted Dyna-Soar space vehicle because it possesses a simplified propulsion system and will be powered by fuels that have greater boosting power and can also be stored for longer periods than the earlier missile's fuel.

January 25, 1961—Capts. Freeman B. Olmstead and John R. McKone, two surviving Air Force flyers of the RB-47 shot down by the Russians on July 1, 1960, were released and returned home. President Kennedy dramatically announced their return in the first televised news conference after he took office.

January 26, 1961—Emergency airlift of food to the famine-stricken Congo began as four USAF C-130s left Evreux, France, for Norway to pick up a hundred tons of dried food for transport to Luluaborg, Congo. The US scheduled air delivery to the Congo of 9,500 tons of corn meal, 500 tons of corn, 10,000 tons of rice, and 2,000 tons of dried milk.

January 30, 1961—A global USAF Communications Service was established to place all hitherto divided com-

(Continued on page 253)



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munications and navigational aids responsibilities into one worldwide network. The Communications Service was to become effective on July 1, 1961, under the command of Maj. Gen. Harold W. Grant, with headquarters at Scott AFB, Ill.

January 31, 1961—Samos II was launched into orbit from Point Arguello, Calif., with a load of test photographic equipment. Samos was propelled into orbit by an Atlas first stage and a 4,100-pound Agena second stage.

February 1, 1961—Minuteman scored a spectacular success in its first test flight. All three solid-fuel stages ignited perfectly to propel the sixty-foot-long ICBM about 4,600 miles downrange from Cape Canaveral. The test came two years and six months after the requirement for Minuteman was established.

February 7, 1961—USAF Maj. Robert White piloted the X-15 to a new unofficial world speed record of 2,275 mph. The test flight engines generated 16,000 pounds of thrust to enable the X-15 to surpass the previous record of 2,196 mph established by test pilot Joe Walker on August 4, 1960.

February 9, 1961—Gen. Thomas D. White, USAF Chief of Staff, ordered space surveillance functions transferred from ARDC to the Air Defense Command at Ent AFB, Colo., as technology in this field moved from research and development to an operational stage. The ADC established SPADATS—the initials stand for Space Detection and Tracking System.

February 10, 1961—A Titan "J" carried the Mark II nose cone, primarily designed for Atlas, 5,000 miles downrange from Cape Canaveral in a test of interchangeability of major ICBM subsystems. The first success in three tries of the Titan "J" series also carried a twenty-two-million-candlepower strobe light to aid in optical tracking as it coursed through the atmosphere.

February 10, 1961—The US and the West Indies Federation signed a treaty governing the use of military bases granted to the United States during World War II under a 1941 lend-lease agreement with Great Britain. Under the new pact, the Federation will reoccupy eighty percent of the land granted to the United States principally for air installations.

February 13, 1961—The 1st Aerospace Surveillance and Control Squadron was activated by the USAF and assigned to the ADC to operate the Space Detection and Tracking System (SPADATS), a worldwide network of 100 stations to locate and identify manmade objects in space.

February 13, 1961—GAM-83B, a new US Air Force solid-propellant air-to-surface missile, was successfully launched at supersonic speed by an F-100 Supersabre. GAM-83B, a modification of the Navy's Bullpup, can carry a nuclear weapon that is guided to target by the pilot with a miniature control stick mounted in the cockpit of his plane.

February 14, 1961—SAC established a continuous airborne command post in converted KC-135 tankers equipped with advanced communications gear to permit quick and extensive communications with the JCS, any SAC base, or other SAC aircraft. The airborne command posts, established after six months of testing, will serve as standby units in the event that underground control centers or alternates are knocked out.

February 16, 1961—An unattended thirty-five-ton crane toppled into an underground missile silo at Walker AFB, N. M., and exploded, killing six workmen and injuring fourteen more.

February 17, 1961—Discoverer XX was orbited from Vandenberg AFB by a Thor-Agena booster. The planned recovery of a capsule four days later was abandoned due to a malfunction of the satellite mechanism.

February 18, 1961—Discoverer XXI, a 2,100-pound satellite, was launched into orbit from Vandenberg. On its first circuit, the Agena-B engine was restarted by radio command, changing course and lengthening the Discoverer XXI orbit by four minutes. Maneuvering the satellite by radio is a vital step in producing military spacecraft.

February 18-19, 1961—Operation Long Pass, an Army-Air Force logistic maneuver to test reinforcement of the Philippines from the US, employed 120 MATS planes in a successful operation averaging fourteen minutes off-loading time for cargo and troops.

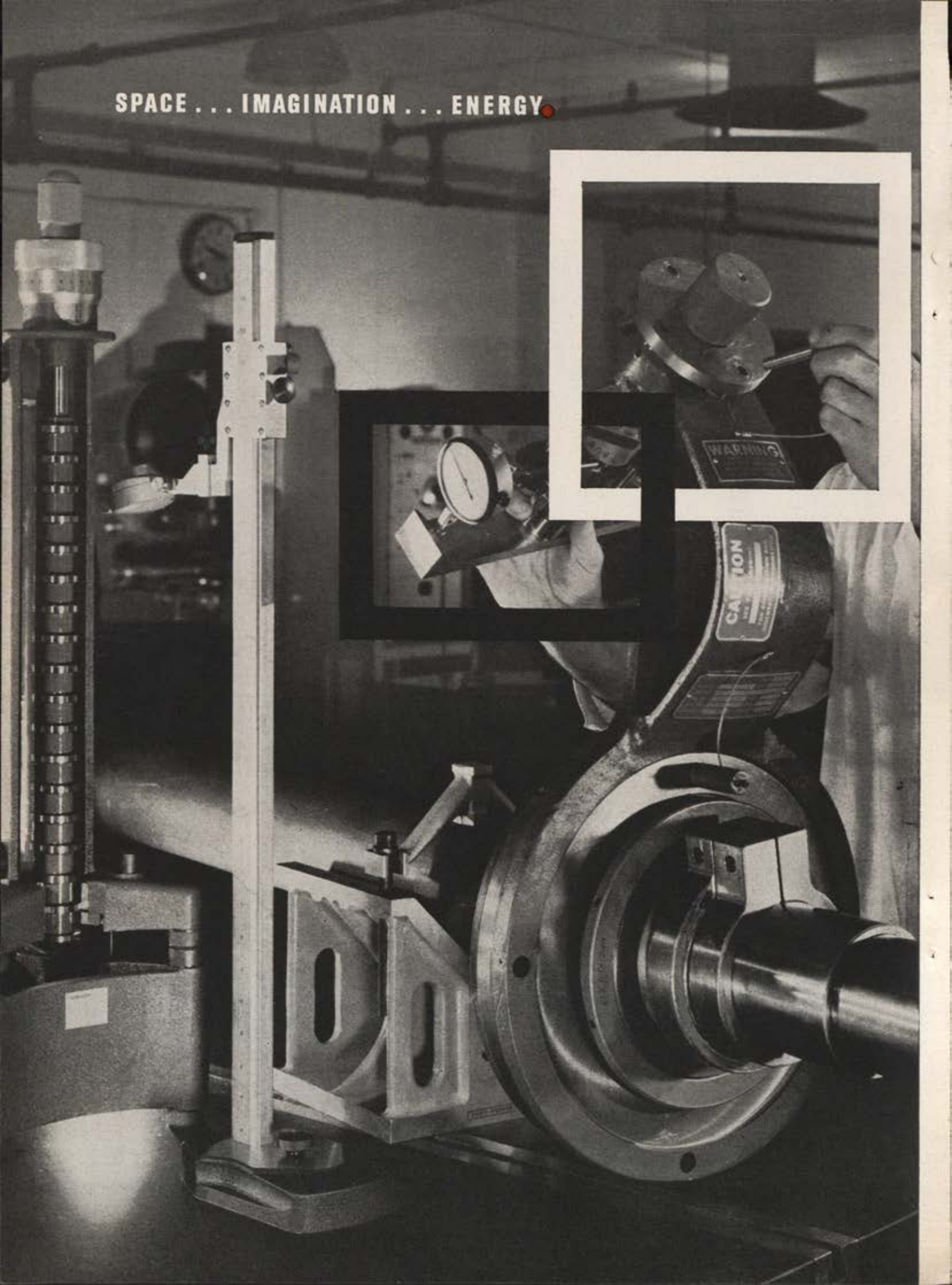
February 21, 1961—Another Titan "J" was fired 5,000 miles into the South Atlantic from Cape Canaveral, marking the second consecutive success for this near-operational ICBM after a number of previous failures.

February 24, 1961—An Atlas "E," powered by liquid-fueled MA-3 engines delivering 389,000 pounds of thrust, the most powerful in the western world, fired a dummy warhead to a target 400 miles west of Cape Town, South Africa. Total flight distance was 7,000 miles. The missile was directed by an all-inertial guidance system impervious to jamming.

March 3, 1961—Captains Olmstead and McKone, the two surviving RB-47 airmen released by the Soviet Union, held a news conference and described the attack by a Soviet MIG which crossed to the rear of their plane and opened fire. Two RB-47 automatic cannon returned the fire. The plane was hit and went out of control. The men were picked up by a Soviet trawler and subsequently imprisoned in Lubyanka. They refused to sign statements that they had been ordered to fly over the USSR. The captains told newsmen they had been promised pardons if they would confess

(Continued on page 256)

SPACE . . . IMAGINATION . . . ENERGY



Millionth-Inch Accuracies For Million-Mile Journeys

The Primary Standards Laboratory at Hercules' Bacchus plant has a fundamental accuracy of four one-millionths of an inch. This is second order only to the National Bureau of Standards in Washington. Here is the calibration point for all measuring, gaging, machining, and assembly of the third-stage motor for Minuteman, the advanced second-stage motor for Polaris, and in development of the ultraprecision retrorocket for Ranger.

There is good reason for such stringent physical accuracy. Missiles or space vehicles—whether they are to travel hundreds or thousands of miles, or into far distance—must traject with pin-point precision. And, unless the final stage is manned, or under cybernetic control, the governors of its final course are purely ballistic: the force, time, and direction with which its motor was originally endowed.

The factors of force and time are subject to chemical prediction; precision and dependability in this area are the backbone of Hercules' current contributions to missilry. Direction of application, however, is a purely physical thing, and calls for new orders of accuracy in manufacture. It is for this reason that the Primary Standards Laboratory at Bacchus is one of the key units of the Chemical Propulsion Division.

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HIGHLIGHTS OF THE YEAR

their flight was linked to the U-2 program.

March 6, 1961—The B-52H, equipped with turbofan engines, made its first flight at Wichita, Kan., preparatory to initial delivery to SAC.

March 6, 1961—Secretary of Defense Robert S. McNamara ordered a review of national defense policy. These included many studies on diverse facets of United States military organization, management, and strategy.

March 7, 1961—GAM-72A Quail, a diversionary missile to be carried by B-52 bombers and reflecting identical radar images to the Superfortress, became operational with SAC after a year of final testing at Eglin AFB, Fla.

March 7, 1961—The first flight readiness firing of Titan from a 146-foot-deep silo at Vandenberg AFB was successful. The test involved a short duration static firing of the first-stage engine.

March 7, 1961—Maj. Robert White flew the X-15 to a new record of 2,905 mph (Mach 4.43) exceeding his previous top speed set in an X-15 with a smaller engine.

March 8, 1961—The US Air Force received virtually exclusive responsibility for military space development. The Department of Defense decision indicated that perfected military space vehicles would be assigned to each service which demonstrated an operational need for them.

March 10, 1961—The 565th Strategic Missile Squadron attained operational status at Warren AFB, Wyo., raising SAC's war-ready ICBM strength to eighteen missiles comprising two squadrons.

March 13, 1961—An Atlas intended for a journey of over 9,000 miles into the Indian Ocean plunged into the Atlantic only 200 miles from Cape Canaveral after a sustainer engine malfunction caused an early shutdown of the main engine.

March 13, 1961—The last F-101 Voodoo was delivered to ADC by the McDonnell Aircraft Corporation, which had produced 807 in the past decade.

March 13, 1961—Lockheed Aircraft was selected to build more than 100 high-speed jet-cargo and troop carrying aircraft for MATS. The new plane will be designed to carry loads up to 60,000 pounds at speeds up to 500 mph for a range over 3,000 miles.

March 16, 1961—Ground was broken for the Minuteman launching complex at Malmstrom AFB, Mont., where 150 underground launching silos and fifteen concrete underground launch control centers will be built at an estimated cost of $61 million.

March 17, 1961—The first Northrop T-38 supersonic jet trainer was delivered to the Air Training Command at Randolph AFB, Tex. The Mach 1.2 Talon will allow student pilots to step almost directly from a basic trainer into high-speed combat aircraft without extensive retraining.

March 22, 1961 — Dr. Edward C. Welsh, a former aide to Senator Symington, was nominated by the President to be the Executive Secretary of the National Aeronautics and Space Council. His principal job was to develop a pattern of firm cooperation between NASA and the DoD in space developments.

March 23, 1961—A Bomarc-B scored a major success in intercepting a Regulus II target missile at speed Mach 2.0, altitude 55,000 feet, and 250 miles away from its Eglin AFB, Fla., launch site. Upon approach it was signaled by SAGE control to ignore the first target and to intercept another at 100,000 feet farther downrange. The second successful interception was made 375 miles from the launch site.

March 24, 1961—An Atlas "E" with a dummy warhead was aimed 9,000 miles SE from Cape Canaveral. The advanced ICBM traveled only half the distance because the booster engines failed to separate from the nose cone.

March 24, 1961—Joseph S. Imirie, a former Deputy Assistant Secretary of the Air Force, was nominated by the President to be Assistant Secretary of the Air Force (Materiel). The Senate Armed Services Committee approved the nomination on April 7.

March 28, 1961—President Kennedy's revised FY 1962 defense budget called upon Congress to appropriate $1.954 billion more for a total of $43.8 billion. Air Force projects affected included a highly important Minuteman program speedup, the deferral of the mobile Minuteman, and cancellation of the last two Titan squadrons. More money was asked for Skybolt, the SAC air alert, and air defense research. The ANP (aircraft, nuclear propulsion) and Snark programs were cut out, the B-47 phaseout was speeded, and the B-70 was markedly cut back to preclude development of the whole weapon system.

March 28, 1961—An advanced Titan was sent 5,000 miles downrange from Cape Canaveral, the third success in the past four launchings of this improved model.

March 28, 1961—Geodetic and mapping responsibilities in the DoD were reassigned. The Army was directed to set up and maintain a worldwide master geodetic control system and to provide all data and maps required in the DoD. The USAF was made responsible for R&D and operation of all DoD reconnaissance satellite systems and for instrumentation and equipment to process reconnaissance data from satellite sources. The Navy was assigned all oceanographic functions.

March 29, 1961—The year's Cheney Award for heroism went to Capt. Alfred S. Despres, Jr., a SAC pilot. In January 1960, he rescued a pilot from the flaming wreckage of a B-47 which crashed on takeoff at Eielson AFB, Alaska.

March 30, 1961—An X-15, piloted by Joe Walker, attained an altitude of 169,200 feet (over thirty-two miles), the highest attained in manned flight. At a speed of 2,590 mph (Mach 3.9), Walker

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was subjected to 120 seconds of weightlessness at the top of his climb along a path similar to that of a ballistic missile.

March 30, 1961—Discoverer XXII was launched from Vandenberg AFB with second-stage ignition occurring as scheduled sixteen minutes after launch. The satellite did not orbit, however, due to a mechanical malfunction.

March 30, 1961—The USAF announced reduction of the B-70 program contract commitments to North American, Westinghouse, and other firms. Five major subcontracts were canceled and four others sharply reduced.

March 31, 1961—The 566th Strategic Missile Squadron launching complex in the Omaha-Missouri Valley region was declared operational.

March 31, 1961—A Titan missile intended for an Indian Ocean target 10,000 miles away, SE of Madagascar, aborted into the Atlantic Ocean off Cape Canaveral.

April 1, 1961—The Systems Command and Logistics Command replaced the ARDC and the AMC, respectively, in a major reorganization of the Air Force development and production programs, the principal objectives of which were to simplify and centralize management and purchase of major missile, aircraft, space, and electronic equipment. ARDC Commander Lt. Gen. Bernard A. Schriever, became AF Systems Commander; Lt. Gen. William F. McKee was later appointed Logistics Commander to succeed AMC Commander Gen. Samuel E. Anderson. Basic and applied research were reassigned to a new Office of Aerospace Research under the direct control of the Chief of Staff, USAF. Changes in the reorganization were to be completed by July 1, 1961.

April 2, 1961—The 551st Strategic Missile Squadron was activated by SAC at Lincoln AFB, Neb. It will assume control of twelve Atlas missile sites in that area when they are completed.

April 6, 1961—Maj. Robert S. Fitzgerald, leader of USAF's "Thunderbird" aerobatic team, was killed in a crash of his F-100F fighter on a dry lake bed near Las Vegas, Nev. Major Fitgzerald held the DFC, was a veteran of 5,000 hours in the air, including World War II and Korean conflict service.

April 7, 1961—An Air National Guard F-100 accidentally fired a heat-seeking Sidewinder into a B-52 and shot it down. Three of eight crewmembers were lost. An Air Force inquiry subsequently exonerated the F-100 pilot and ascertained that an electrical malfunction caused a short circuit and a freak accidental firing of the missile.

April 8, 1961—Discoverer XXIII was orbited from Vandenberg. The capsule was separated on its thirty-first pass by signal, but did not return to earth due to a stabilization malfunction.

April 12, 1961—Blue Scout II was fired into space by the USAF in a quest for radiation information that could lead

(Continued on following page)

HIGHLIGHTS

to a new system for detecting high-altitude nuclear tests.

April 12, 1961—The USSR attained a major space first when Yuri Gagarin was sent into space in an orbital vehicle weighing 10,395 pounds. The spaceship reached a minimum altitude of 109.5 miles and a maximum altitude of 203 miles.

April 21, 1961—The X-15, guided by Maj. Bob White, attained a record speed of 3,040 mph at 79,000 feet, after sixty-seven seconds, using 100 percent thrust. The X-15 coasted up to 105,100 feet before leveling off and nosing downward toward a desert landing.

April 24, 1961—Dr. Leonard S. Sheingold was named by the President to be Chief Scientist, USAF. Dr. Sheingold had previously been the Director of Applied Research at Sylvania Electronic Systems, Inc.

May 3, 1961—An ICBM was fired from an underground silo for the first time when a Titan was launched from Vandenberg. The silo launch was designed to provide hardened sites to permit instant use of retaliatory missiles, while at the same time affording maximum protection against attack. The range safety officer destroyed the Titan after 140 seconds as part of the programed flight.

May 5, 1961—Cmdr. Alan B. Shepard, Jr., USN, crossed the frontier into space when he was boosted into space for a fifteen-minute flight that took him 302 miles downrange to a maximum altitude of 115 miles. His Project Mercury capsule parachuted safely into the sea. Both he and the capsule were retrieved by helicopter and taken to a nearby aircraft carrier. USAF Capt. Virgil Grissom and Marine Lt. Col. John Glenn were scheduled behind Shepard for US Astronaut shots.

May 10, 1961—A B-58 piloted by Maj. Elmer E. Murphy qualified the USAF for permanent possession of the Blériot Cup awarded by the Aero Club of France for exceeding 1,243 mph for thirty minutes. Major Murphy's B-58 sustained flight over a closed course of 669.4 miles at a speed of 1,302 mph for thirty minutes and forty-five seconds. Major Murphy and his crew from SAC's 65th Bomb Squadron, 43d Bomb Wing, lost their lives when they crashed on June 3 while participating in the Paris air show.

May 11, 1961—The first B-52H, with considerably more takeoff and climb power than the "G," was delivered officially to the 378th Bomb Wing at Wurtsmith AFB, Mich. The B-52H carries a six-man crew and will be armed with four Skybolt missiles.

May 15, 1961—Congress moved to extend production of the B-52 and B-58, contrary to the desires of the Administration, when the Senate approved S. 1852 to include authorization for such production beyond the scheduled termination date of July 1, 1962. Nine days later, the House also voted H.R. 6151 to extend this production.

May 16, 1961—Brockway McMillan, a

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Bell Laboratories scientist, was nominated by the President to be Assistant Secretary of the Air Force (Research & Development). Dr. McMillan, a native of Minneapolis, Minn., holds a Ph.D from MIT.

May 16, 1961—The first F-105 fighter-bombers arrived at Bitburg Air Base in Germany, about 300 miles from East Germany. These Mach 2 planes were assigned to the 36th Fighter-Bomber Wing. They will provide USAFE with the nucleus of an integrated all-weather tactical arm, so badly needed over frequently overcast West Germany.

May 19, 1961—The second Minuteman test ended in failure after the first stage successfully burned out and the second stage ignited. The range officer pushed the destruct button ninety seconds after liftoff when the intercontinental missile veered off course.

May 22, 1961—Gen. Curtis E. LeMay was nominated by the President for Chief of Staff, USAF. He succeeded retiring Gen. Thomas D. White on June 30, 1961. Gen. Frederic H. Smith, Commander, USAFE, was named to succeed General LeMay as Vice Chief of Staff.

May 23, 1961—A Titan containing nearly all operational components was successfully fired downrange from Cape Canaveral to a South Atlantic Ocean target 5,000 miles away.

May 24, 1961—A SAC strategic missile crew demonstrated its efficiency by raising and firing an Atlas from a "coffin complex" launcher. The name derives from the coffin-shaped steel and concrete building which houses the missiles. Before firing, the top is rolled back, the missile elevated to a vertical position, fueled, and fired.

May 25, 1961—The X-15, under pilot Joe Walker, set a speed record of 3,370 mph in a seventy-three-second full-thrust test of his engine. At an altitude of 110,000 feet, Walker became the first hypersonic pilot of a winged vehicle to fly Mach 5. Although Yuri Gagarin and Alan Shepard had traveled faster, both flew ballistic trajectories and were unable to control the direction of their craft.

May 25, 1961—A Kaman H-43B helicopter, flown by Capt. W. C. McMeen (TAC), established a new world's record with a 2,205.5-pound payload lifted to an altitude of 25,814 feet, exceeding the record of 24,491 feet by a Russian MI-4, a helicopter about twice the size of the Air Force H-43B.

May 26, 1961—A B-58 Hustler spanned the Atlantic Ocean just under three hours and twenty minutes, averaging 1,095.9 mph. The flight to Le Bourget Field, Paris, followed the Lindbergh flight route of thirty-four years before, but took one-tenth the time of thirty-three and a half hours. However, the "Lone Eagle" made it in one filling of gas. The Hustler required two aerial refuelings en route from Carswell AFB, Tex.

May 26, 1961—An Atlas "E" was fired

(Continued on following page)

HIGHLIGHTS

5,000 miles into the South Atlantic in the second straight success for this model which generates a thrust of 389,000 pounds. Built-in inertial guidance will permit all "E" missiles in a squadron to be fired in salvo.

May 31, 1961—The first successful test of a two-component bomb and fuel pod was made by the Air Force B-58 at the Nevada-New Mexico missile range. Test drops were made at altitudes of from 1,000 feet to 40,000 feet, at both subsonic and supersonic speeds.

June 1, 1961—The ten-year Matador test and training program came to an end with the firing of four of the swept-wing guided missiles, the last of 286 fired at Cape Canaveral since June 1951. Matador was the first Air Force missile to attain operational status, which it did in 1954. Matador divisions are still deployed in West Germany, South Korea, and Formosa.

June 1, 1961—The first Bomarc-B site at Kincheloe AFB, Mich., achieved operational readiness. Six US sites in all are slated to receive the second-generation interceptor missile. Bomarc-A went operational in September 1959.

June 3, 1961—The most powerful solid-fuel rocket engine now known to scientists was test-fired for the USAF at Sacramento, Calif. About forty-seven tons (94,000 pounds) of propellant produced over 500,000 pounds of thrust, exceeding by 40,000 pounds the Titan II engine thrust, the most powerful being tested in the US right now. The solid-fuel engine was made up of three segments joined together just before firing, pointing the way to transportable powerplants that can be readily assembled to meet the requirements of various payloads.

June 6, 1961—The Air Force launched a "flytrap" Aerobee-Hi rocket to an altitude of 101 miles. The rocket was equipped with a mechanism similar to the Venus flytrap plant that folds its petals around insects and slowly devours them. The experiment, conducted at White Sands Proving Grounds, N.M., captured micrometeorites for the first time. They will be studied to determine whether a potentially hazardous "dust cloud" at an altitude of 100 miles could imperil spaceflight.

June 7, 1961—An Atlas "E" exploded and crumbled in flames in its first test launch from a "coffin launch pad." The Atlas was scheduled for a long-distance flight from Vandenberg AFB, but it malfunctioned after lifting a few feet off its pad.

June 8, 1961—Discoverer XXIV, a Thor-Agena rocket, was launched from Vandenberg AFB. It failed to orbit due to an electrical power failure.

June 9, 1961—MATS received the first of thirty Boeing C-135 Stratolifter jet cargo aircraft, piloted by Lt. Gen. Joe W. Kelly, Jr., Commander of MATS, in a flight from Seattle, Wash., to McGuire AFB, N. J. The 500-mph C-135s were the first aircraft in the MATS modernization program to update the fleet of 480

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aircraft, previously all propeller driven.

June 12, 1961—The US and Canada signed a three-part agreement to bolster continental defense against air attack. Canada agreed to produce $200 million in US-designed aircraft and to operate most of the radar-warning stations along the Pinetree Line. The US agreed to provide sixty-six F-101B jet interceptors to the RCAF. Reciprocally, Canada will produce F-104G fighters for NATO countries for which the US will underwrite $150 million, seventy-five percent of the cost.

June 18, 1961—The Harmon International Aviator's Trophy was jointly awarded to three X-15 pilots—Joe Walker of NASA, Maj. Bob White of USAF, and Scott Crossfield of North American Aviation, for their outstanding achievements in piloting the X-15 to speed and altitude records during 1960.

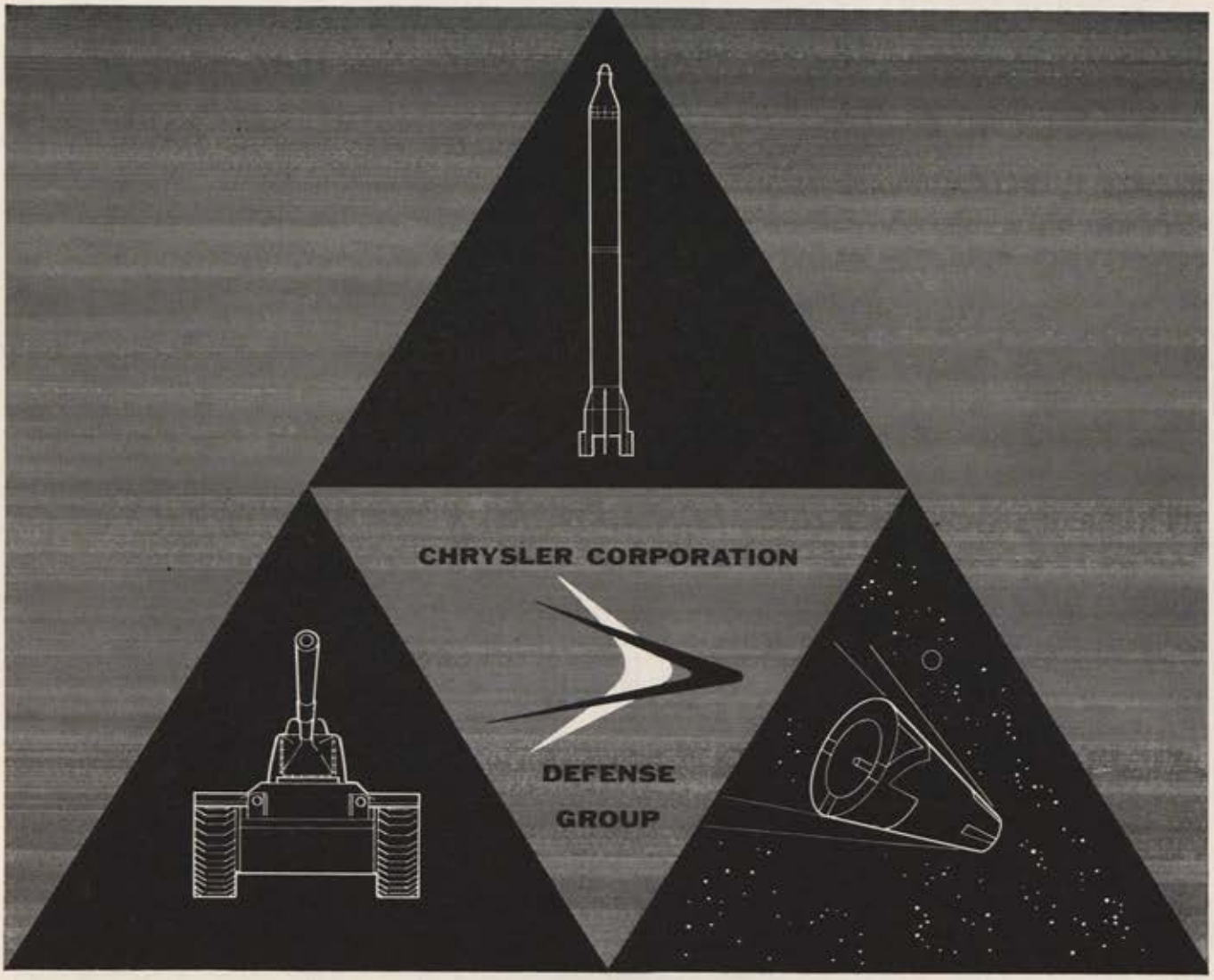
June 18, 1961—Discoverer XXV was orbited out of Vandenberg AFB and recovered after its thirty-third global revolution. The packet—the fifth to be recovered—fell outside the C-119 catch-plane area, was recovered from the sea by skindivers. Discoverer XXV carried samples of rare and common metals plus instrumentation to study cosmic radiation and the effects of meteorites.

June 22, 1961—An Atlas "E" exploded shortly after liftoff from Cape Canaveral to mark the seventh failure in ten attempts with this advanced ICBM.

June 22, 1961—The President signed S.1852 authorizing $12.571 billion for procurement of aircraft, missiles, and ships in FY 1962. Funds were provided to include $525 million for SAC aircraft, $2,792 million for Air Force missiles, $606.4 million for Navy missiles, and $550.8 million for Army missiles.

June 23, 1961—An advanced Titan employing an all-weather, jam-proof guidance system failed to achieve its flight objective after liftoff from Cape Canaveral due to early engine cutoff. This model has the advantage over ones directed by a radio-command guidance system which employs a group station to send the missile signals after it is airborne.

June 23, 1961—The X-15 flashed to a new speed record of 3,603 mph—more than a mile a second—in a test under control of Maj. Bob White, USAF. The 57,000-pound-thrust engine performed at full throttle for only seventy-five seconds as the X-15 approached its design speed of 4,000 mph. —MURRAY GREEN



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Chrysler's MISSILE DIVISION is responsible for the Redstone-Jupiter family of large ballistic missiles, as well as other missile and space programs.

ADVANCED PROJECTS ORGANIZATION is responsible for operations research, for technical planning and for new systems concepts . . . anticipating the future needs of the military and civilian services, with emphasis in missile and space exploration fields.

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The Year in Aerospace Power Books

More than 260 aerospace books appeared this year. Most of them dealt with air history, missilry, rocketry, or space.

Some 200 of these volumes featured the Air Force in one degree or another. Eighty hard-cover and thirty-seven paperback titles dealt exclusively or predominantly with the Air Force or Air Force topics, an increase over last year's record crop.

Here are the year's highlights in aerospace publishing:

History

Black Thursday, by Martin Caidin (Dutton, $4.95). The story of the historically rugged October 14, 1943, mission to Schweinfurt. (An AeroSpace Book Club selection.)

Bomber Parade, by C. B. Colby (Coward-McCann, $2.50). Bombers, from early days to B-52. For young adults.

Fighter Parade, by C. B. Colby (Coward-McCann, $2.50). Photo-history of aviation from Wright Flyer to supersonic Delta Dart. For young adults.

Flights That Made History, by David C. Cooke (Putnam's, $2.50). Photo-narrative of thirty-seven epic flights of history. For young adults.

Jet and Rocket Planes That Made History, by David C. Cooke (Putnam's, $2.50). Photo-narrative of famous experimental high-speed, high-altitude aircraft. For young adults.

The United States Air Force in Korea, 1950-1953, by Dr. Robert Frank Futrell (Duell, Sloan & Pearce, $12.50). The official history of Air Force combat in Korea, prepared by the USAF Historical Division.

The Aeroplane: An Historical Survey, by Charles H. Gibbs-Smith (Her Majesty's Stationery Office, $6.53). An over-all survey tracing flight in detail from early beginnings. An excellent reference reader.

Famous Bombers of the Second World War, Vol. II, by William Green (Hanover House, $3.95). Continuation of photo-narrative study of principal bombardment aircraft of all nations involved in WW II.

Journey of the Giants, by Maj. Gene Gurney, USAF (Coward-McCann, $4.95). The story of the B-29 from drawing board through combat in the Pacific in WW II. (An AeroSpace Book Club selection.)

The Service of Chaplains to Army Air Units, 1917-1946, by Chaplain (Maj.) Daniel B. Jorgensen, USAF (Government Printing Office, $3). History of AF Chaplaincy from WW I through WW II.

Combat Cameraman, by Jerry J. Joswick and Lawrence A. Keating (Chilton, $3.95). The first-person story of an enlisted combat cameraman and his role in WW II.

Great American Fighter Pilots of World War II, by Robert D. Loomis (Random House, Landmark, $1.95). Dramatic narrative of fighter pilots and epic air encounters in WW II. For young adults.

The Wild Blue: The Story of American Airpower, edited by John F. Loosbrock and Richard M. Skinner (Putnam's, $5.95). Anthology of the best from forty-two years of Air Force Magazine, traces growth and development of the USAF from 1907 to present. (An AeroSpace Book Club selection.)

Strike from the Sky, by Alexander McKee (Little, Brown, $4.75). An account of the Battle of Britain, with emphasis on the role of the operational flyers.

The Sky Suspended: The Story of the Battle of Britain, by Drew Middleton (Longmans, Green, $4.50). An account of this historic air battle, largely from the experiences of the people who went through it.

The Aces, by Frederick Oughton (Putnam's, $4.95). Highly readable, popular history of men, airplanes, actions of WW I's air war.

This Was Air Travel, by Henry R. Palmer (Superior Publishing, $11.95). Picture history of air transport, military and civilian, from early days to present.

Spitfire: The Story of a Famous Fighter, by Bruce Robertson (Harleyford, $8.50). Definitive history of this historic aircraft, its role in WW II, the men, and the units. Highly illustrated.

Air Bombardment: The Story of Its Development, by Air Marshal Sir Robert Saundby (Harper, $5). A brief, summary history of air bombing in both World Wars, told largely from the British point of view. (An AeroSpace Book Club selection.)

Early Air Pioneers, by Maj. James F. Sunderman, USAF (Franklin Watts, $4.95). Dramatic and unusual stories of the men, the deeds, the machines that mark the course of early aviation history.

But Not in Shame, by John Toland (Random House, $6.50). The story of the war in the Pacific in the first six months after Pearl Harbor.

I'll Take the High Road, by Sholto Watt (Brunswick, $4.95). History of the Atlantic ferry in early days of WW II.

The Strategic Air Offensive Against Germany, by Sir Charles Webster and Noble Frankland (British Information Services, 4 vols., $7.85 ea.). Official British history of the strategic bombing offensive in WW II.

NOTE: Any book reviewed in Airman's Bookshelf may be obtained, postpaid, from the AeroSpace Book Club, 7801 Old Georgetown Rd., Washington 14, D. C. Full payment must accompany order. Information on the Book Club may be obtained from the same source. Club members are eligible for substantial savings on Club selections.

Biography

Always Another Dawn: The Story of a Rocket Test Pilot, by A. Scott Crossfield with Clay Blair (World, $4.95). The autobiography of test pilot Crossfield, with emphasis on his role and activities as North American's X-15 test pilot.

First of the Spacemen: Iven C. Kincheloe, Jr., by James J. Haggerty (Duell, Sloan & Pearce, $3.50). Biography of one of the Air Force's top test pilots.

Dick Bong, Ace of Aces, by Gen. George C. Kenney, USAF (Ret.)

(Continued on following page)

(Duell, Sloan & Pearce, $2.95). A biography of America's top ace in WW II, forty-plane Dick Bong. (An AeroSpace Book Club selection.)

Three Years off This Earth, by Col. Alexis Klotz, USAFRes. (Doubleday, $4.95). Adventurous autobiography of an Air Force and commercial airline pilot.

Boring a Hole in the Sky, by Brig. Gen. Robert L. Scott, Jr., USAF (Ret.) (Random House, $5.95). A seething autobiography.

Men of Space, Vols. I, and II, by Shirley Thomas (Chilton, $3.95 ea.). Biographical essays on prominent figures in astronautics, pioneers whose work made possible major advances in space science.

Fiction

The Cross and the Star, by Chaplain (Maj.) Connor B. Cole, USAF (Vantage, $4.95). Novel about three chaplains—a minister, rabbi, and priest, in WW II and the Korean War.

Jet Tanker, by Lt. Col. Grover Heiman, USAF (Holt, Rinehart & Winston, $3.50). Novel about a SAC KC-135 jet tanker crew. For young adults.

The Grave of the Twin Hills, by Maj. Bowen Hosford (Norton, $3.95). Novel about the return of an Air Force B-29 bombardier to Japan ten years after WW II.

Sabres over Brandywine, by Lt. Col. David McCallister, ANG, and Lindy Boyes (Hesperian House, $3.95). Novel about the recall of an Air Guardsman during the Korean War, his problems and experiences.

Mission Intruder, by Rutherford Montgomery (Duell, Sloan & Pearce, $3). Third in the series of "Kent Barstow" Air Force adventure novels. For young adults.

Kent Barstow: Space Man, by Rutherford Montgomery (Duell, Sloan & Pearce, $3). Fourth in the "Kent Barstow" Air Force adventure novels. For young adults.

Sweeney Squadron, by Donald J. Plantz (Doubleday, $3.95). A novel about a fighter squadron in WW II, from its training days through combat in the Pacific.

Combat in the Sky, by Arch Whitehouse (Duell, Sloan & Pearce, $3.50). Collection of fiction based on air combat stories about WW I and II.

Service Topics

Air Force Bases (Stackpole, $3.75). Revised, updated edition of this directory of USAF installations worldwide.

The Airman's Guide (Stackpole, $3.50). New revised edition.

The Air Officer's Guide (Stackpole, $5). New revised edition.

The Endless Hours, by Capt. Wallace L. Brown, USAF (Norton, $3.95). The story of a B-29 crew's capture and two-and-one-half-year imprisonment by the Chinese Communists during the Korean War.

Thunderbirds! by Martin Caidin (Dutton hard-cover, $4; Bell, paperback, 50¢). The dramatically written story of the Air Force Thunderbird jet demonstration team.

Discoverer: The Story of a Satellite, by Michael Chester and Saunders B. Kramer (Putnam's $2.50). The AF's Discoverer space project from conception to orbiting of Agena satellites. For young adults.

Straight Up: The Story of Vertical Flight, by Richard Hubler (Duell, Sloan & Pearce, $5). History of helicopters from early days to present and stories of their wide use today.

Strategic Air Command, by Mel Hunter (Doubleday, $4.95). Picture story of SAC today, told in more than 225 photos and narrative. (An AeroSpace Book Club selection.)

Tactical Air Command, by Leverett G. Richards (John Day, $4). The story of TAC today.

Space Ship: The Story of the X-15, by Irwin Stambler (Putnam's, $2.50). About the men who developed and fly the X-15. For young adults.

Flying Saucers and the US Air Force, by Lt. Col. Lawrence J. Tacker, USAF (Van Nostrand, $3.50). An analysis of the official position on the "flying-saucer" controversy; maintains there is no evidence to prove UFOs are real.

This Is the Air Force Academy, by Marian Talmadge and Iris Gilmore (Dodd, Mead, $2.75), Photo-narrative of the life in a Cadet wing at the AF Academy. For young adults.

Missiles and Space

Aerospace Medicine, edited by Maj. Gen. Harry G. Armstrong, USAF (Ret.) (Williams & Wilkins, $18). Complete study of thirty-two aerospace medical topics.

Combat Missilemen, by James Baar and William E. Howard (Harcourt, Brace, $4.50). Story of the AF missile program and the men in uniform who man the missiles at operational sites today.

Seven into Space, by Joseph N. Bell (Hawthorne, $3.95). A history of Project Mercury and the training of the seven Astronauts.

CONTINUED

Ninety Seconds to Space: The Story of the X-15, by Jules Bergman (Doubleday, $4.50). A close look at the X-15 program and rocketplane test flight.

Long-Range Ballistic Missiles, by Eric Burgess (Macmillan, $5). An incisive summary of the US long-range ballistic-missile program.

The Astronauts: The Story of Project Mercury, America's Man-in-Space Program, by Martin Caidin (Dutton, $3.95). A look at how the seven Astronauts were selected, trained, and the over-all program which will put a man into orbit. (An AeroSpace Book Club selection.)

Messages from Space, by Clive Davis (Dodd, Mead, $2.75). How we get back information from our missile and space probes, sounding rockets, satellites. For young adults.

Handbook of Geophysics, by Geophysics Research Directorate, AFSC (Macmillan, $15). Commercial reprint of official study—the first comprehensive reference on this subject.

Handbook of Thermophysical Properties of Solid Materials, 4 vols., by Alexander Goldsmith and Thomas E. Waterman (Macmillan, $90 set). Commercial reprint of official USAF study of the physical properties of engineering materials.

Space Biology: The Human Factors in Space Flight, by Dr. James S. Hanrahan and Dr. David Bushnell (Basic Books, $6). Surveys the AF's R&D in human factors experimentation from early days to present and discusses current programs.

The Mighy Thor: Missile in Readiness, by Julian Hartt (Duell, Sloan & Pearce, $4.50). The dramatic story of the USAF Thor missile, from drawing board to operational readiness in Europe and its use as the space vehicle "work horse" for US space probes.

Ballistic Missile and Space Technology, 4 vols., edited by Donald P. LeGalley (Academic, $9 ea.). Reprint of the proceedings of the fifth AFBMD-STL Aerospace Symposium on all aspects of ballistic missile and related scientific fields.

Man Alive in Outer Space, by Henry B. Lent (Macmillan, $3). The work of the USAF and NASA aerospace medical scientists in preparing man for survival in space.

International Missile and Spacecraft Guide, by Frederick I. Ordway, III and Ronald Wakeford (McGraw-Hill, $25). Encyclopedic reference to American and foreign rockets, missiles, and space vehicles.

(Continued on following page)

BOOKSHELF

Russia's Rockets and Missiles, by Dr. Albert Parry (Doubleday, $4.95). A look at Soviet space technology, from Russia's rocket beginnings to present.

The Manned Missile: The Story of the B-70, by Ed Rees (Duell, Sloan & Pearce, $3.50). The complete story of the AF's proposed Mach 3 bomber, forerunner of future aerospace craft. (An AeroSpace Book Club selection.)

Human Factors in Jet and Space Travel: A Medical-Psychological Analysis, edited by Dr. S. B. Sells and Lt. Col. Charles A. Berry, USAF (Ronald, $12). Fourteen essays, each by a specialist, dealing with the psychological, physiological, medical, and mechanical problems of high-speed flight and space travel.

X-15 Diary, by Richard Tregaskis (Dutton, $4.95). A detailed, comprehensive study of the X-15 project, the men, research, development, and test flights.

Alive in Space, by Robert Wells (Little, Brown, $3.75). The science of bioastronautics. For young adults.

Outward Bound for Space, by David O. Woodbury (Little, Brown, $3.95). Survey of man's preparation for spaceflight. For young adults.

Airmanship and Reference Texts

The Air Force Blue Book, Vol. II (Military Publishing Institute, paperback, $1.50, Bobbs-Merrill, hardback, $4.95). Complete reference guide to the USAF with historical facts and articles on current AF commands and operations.

The Air Force Pictorial Yearbook (Taylor, $6). Yearbook-type picture coverage of the AF by major commands and bases.

Our Air Force, by the editors of AIR FORCE/SPACE DIGEST (Putnam's, $2.50). Quick photo-narrative reference to all USAF inventory aircraft and missiles.

The Saga of Flight, by Neville Duke and Edward Lanchbery (John Day, $5.95). Anthology of flight literature, from early dreams to present jet and rocketplanes.

Fighters: War Planes of the Second World War, Vols. I and II, by William Green (Hanover House, $2.75 ea.). Illustrated history of all aircraft of combatant countries in WW II.

1961 Aerospace Yearbook, edited by James J. Haggerty (American Aviation Publications, $10). Forty-second annual edition of this valuable encyclopedia of American civil and military aviation and industry.

CONTINUED

Air Force Combat Units of World War II, edited by Dr. Maurer Maurer (Government Printing Office, $2.50). Official comprehensive, historical encyclopedia of AF combat groups active during WW II and their predecessors: bombers, fighters, reconnaissance, troop carriers.

Every Serviceman's Lawyer, by Maj. Earl Snyder, USAF (Stackpole, $3.50). A guide book to legal matters for the AF man on the base.

Aircraft Annual, 1961, by John W. R. Taylor (Sport Shelf, $3.25). Aircraft and aviation feats of 1960.

Warplanes of the World, by John W. R. Taylor (Sport Shelf, $3.25). Photos and captions to 250 operational and second-line aircraft in military use today.

World Aircraft Illustrated, edited by John Underwood (Aero Publishers, $8.50). Photos-captions-statistics of 1960-61 civil and military aircraft of the world.

Modern Airmanship, by Brig. Gen. Neil D. Van Sickle, USAF (Van Nostrand, $9.75). Revised second edition of this airman's bible.

American Combat Planes, by Ray Wagner (Hanover House, $9.95). Comprehensive, illustrated history of American military aircraft from WW I to the B-70.

Related Professional Topics

The Fifteen Decisive Battles of the United States, by O. K. Armstrong (Longmans, Green, $4.95). Analysis of fifteen battles that have affected the US growth and development from Revolutionary War through WW II.

America—Too Young to Die!, by Maj. Alexander P. de Seversky (McGraw-Hill, $4.95). Another plea for strong airpower and determination to use it. Critical attack on current national defense strategy.

Foreign Policy: The Next Phase; the 1960s, by Thomas K. Finletter (Harper, $4). Incisive discussion and analysis of America's position and policy proposals for the next decade.

War in the Desert: An RAF Frontier Campaign, by Sir John Bagot Glubb (British Book Center, $6.25). Record of exploits of the RAF desert service in Saudi Arabia, Syria, Iraq, Jordan, other parts of the Middle East in the 1920s.

Now It Can Be Told: The Story of the Manhattan Project, by Lt. Gen. Leslie R. Groves, USA (Ret.) (Harper, $5.95). Wartime development of the atomic bomb by the man who headed the project.

(Continued on following page)

BOOKSHELF

American Strategy for the Nuclear Age, edited by Walter F. Hahn and John C. Neff (Anchor, Doubleday, $1.45). Collection of essays by top authorities on the aspects of our national strategy.

Organizing for Defense, by Paul Y. Hammond (Princeton, $7.95). A study of the DoD, and review of organization which led up to it, with an analysis of the influence of DoD on national policy.

Combat Intelligence in Modern Warfare, by Lt. Col. Irving Heymont, USA (Stackpole, $6). Extremely thorough text and reader on techniques, use, and equipment of intelligence in modern military forces.

The Economics of Defense in the Nuclear Age, by Charles J. Hitch and Roland N. McKean (Harvard, $9.50). A study of nuclear military problems in relation to economic problems.

On Thermonuclear War, by Herman Kahn (Princeton, $10). A definitive study of strategy and concepts of national defense within the perspective of thermonuclear war. (An AeroSpace Book Club selection.)

The Necessity for Choice, by Henry A. Kissinger (Harper, $4.50). Defines foreign policy and defense issues facing America in the 1960s.

Strategic Intelligence and the Shape of Tomorrow, by William M. McGovern (Regnery, $4). Examines intelligence gathering and evaluation.

Countdown for Decision, by Maj. Gen. John B. Medaris, USA (Ret.) (Putnam's, $5). Retired Army general's opinions of how America's missile programs should have been handled and a sharp attack against USAF missile efforts and hardware.

A Forward Strategy for America, by Robert Strausz-Hupé, S. T. Possony, and Col. William R. Kintner, USA (Harper, $5.95). A penetrating look into American foreign policy, defense strategy, and the needs for the next decade of cold war.

Paperbacks

The First Man in Space (Crosscurrents, 50¢). A collection of English translations of Russian press dealing with Yuri Gagarin's historic first venture into space.

What's Ahead in Space (Grosset & Dunlap, $1.95). Reprint of a congressional report on our progress in space exploration and a look to the future.

ABC of Satellites and Space Travel, by Maurice Allward and John W. R. Taylor (Sport Shelf, $1.25). Survey of earth satellites.

The First War Planes, by William

CONTINUED

E. Barrett (Fawcett, 75¢). Photo-history of the men, planes, and air operations of WW I.

Man into Orbit, by Joseph N. Bell (Avon, 50¢). Report on Project Mercury and the selection and training of the seven US Astronauts.

The Great Escape, by Paul Brickhill (Crest, 35¢). Epic tunnel escape of American and British airmen POWs from Stalag Luft III, WW II.

The MIG Killers, by A2C Arnold J. Buttner, USAF (Fugi, Tokyo, Japan, 95¢). Novel based on the men who flew the F-86 Sabrejets in Korea.

A Torch to the Enemy, by Martin Caidin (Ballantine, 50¢). Vivid historical narrative of the B-29 fire-bomb raids against Japan, WW II.

Man into Space, by Martin Caidin (Pyramid, 50¢). A vivid, second-by-second account of Alan Shepard's sub-orbital flight and of Project Mercury. Includes a speculative account of Yuri Gagarin's orbital flight.

Thunderbirds!, by Martin Caidin (Dell, 50¢). Fascinating story of the AF's precision flight demonstration team.

The Exploration of Space, by Arthur C. Clarke (Fawcett, 50¢). Non-technical preview of what space travel will be like.

They Flew the Atlantic, by Robert de la Croix (Monarch, 50¢). Dramatic stories of early flyers who pioneered flight over the Atlantic.

Operation Sea Lion, by Peter Fleming (Ace, 50¢). Story of Hitler's planned invasion of England, 1940.

Alas, Babylon, by Pat Frank (Bantam, 50¢). Novel of survival after USSR thermonuclear attack on US.

The Rise and Fall of Hermann Goering, by Willi Frischauer (Ballantine, 50¢). Story of the leader of the Luftwaffe, WW II.

Air Rescue!, by Lt. Col. C. V. Glines, Jr., USAF and Lt. Col. Wendell F. Moseley, USAF (Ace, 35¢). A history of air rescue and the Air Rescue Service from early WW II to present and a collection of true dramatic air rescue stories from all wars.

Rocket Development, by Robert H. Goddard, edited by Esther C. Goddard and G. Edward Pendray (Prentice-Hall, $2.45). Dramatic personal account of early stages of rocket development in US from 1929 to 1941.

Five Down and Glory: A History of the American Air Ace, by Maj. Gene Gurney, USAF (Ballantine, 50¢). History of US aces, AF, Navy, Marine from WW I through Korea with definitive listings and scores.

Project Mercury, by James J. Hag-

(Continued on following page)

AIRMAN'S BOOKSHELF — CONTINUED

gerty, Jr. (Teen Age Book Club, 25¢). Photo-narrative story of the Astronauts and Project Mercury.

The War Lover, by John Hersey (Bantam, 75¢). Novel about the crew of a B-17 during the bomber offensive over Europe, WW II.

The Divine Wind, by Rikihei Inoguchi (Bantam, 50¢). The story of the Japanese Air Force Kamikaze corps, employed against US forces in the Pacific in WW II.

Blitz on Britain, by Wing Commander Asher Lee (Four Square Books, 50¢). Story of RAF heroism during the Battle of Britain.

Shoulder the Sky, by George Leonard (Berkley, 50¢). Novel of AF flying instructors who spent WW II at stateside training base.

Man into Space, by Lloyd Mallan (Fawcett, 75¢). Comprehensive picture narrative on astronautics, spaceflight, the preparations of man for orbital and interplanetary flight, the R&D plans, hardware, and experimentation now under way.

Space Science, by Lloyd Mallan (Fawcett, 75¢). Photo-narrative of America's missile and space programs.

The Dawning Space Age, by H. E. Nehrens (Civil Air Patrol, $2). Thorough account of missiles, their components, and military applications for use as text by Civil Air Patrol Cadets.

A Primer of Space Medicine, by Martin Philip (Van Nostrand, $3). The known problems of spaceflight and human factors, and how to deal with them in spacecraft design.

ABC of US Military Aircraft, by John W. R. Ransom (Sport Shelf, $1). Photo-narrative of US military aircraft.

The Longest Day, by Cornelius Ryan (Crest, 50¢). Story of D-Day through the personal experiences of men of all services in the invasion of France, WW II.

The Big X, by Hank Searls (Dell, 50¢). Novel about test pilots who challenge the unknown frontiers of speed, stress, and space.

The Crowded Sky, by Hank Searls (Dell, 50¢). Novel about an airliner flying a collision course with a Navy plane at night.

First American into Space, by Robert Silverberg (Monarch, 35¢). Story of the Astronauts and of Alan Shepard's suborbital flight.

Kriegie, by Kenneth W. Simmons (Hillman, 35¢). The personal story of an AF POW in WW II.

Man High, by Lt. Col. David G. Simons, USAF, with Don A. Schanche (Avon, 40¢). Absorbing account of an AF doctor's experiences on being sent aloft in a balloon to spend thirty-two hours at 102,000 feet in space.

American Aces in Great Fighter Battles of World War II, by Edward H. Sims (Ballantine, 50¢). Authentic account of the most exciting missions flown by the top twelve Air Force surviving aces of WW II.

Battle: The Story of the Bulge, by John Toland (New American Library, 75¢). Authentic story of the great ground-air battle of WW II, Europe.

—MAJ. JAMES F. SUNDERMAN, USAF

Exclusively for members

AFA Insurance Programs

These programs are constantly reviewed to provide maximum protection at minimum cost. Taken as a whole they offer a full shield of protection to AFA members and their families.

NO AMOUNT of insurance can make up for the real loss when the head of a family is disabled or dies. Nor can insurance minimize the hazards that we all accept as a normal part of our everyday lives.

But insurance can and does ward off the pinch of financial hardship when trouble strikes. An adequate insurance program provides money or goods or services when they are needed most. It is the one sure way of guaranteeing security and protection for those we love.

In recognizing these services that are rendered by insurance programs, AFA not only attempts to make them available to members but also keeps its programs under constant review, making revisions and changes as they are deemed necessary. The latest example of this never-ending review program is the new *all*-accident insurance program which has replaced the former policy covering only travel accidents. This and other programs are briefly described below.

All-Accident Insurance

This new program, available to all AFA members, offers full twenty-four-hour protection against all accidents, regardless of how or where they occur. It is offered in units of $5,000 up to a maximum of $50,000 and is available either singly or in the popular new family plan at unbelievably low rates.

Coverage under the family plan provides insurance for each member of the family, under one policy. Under this plan the wife of the policyholder is insured for 50% of his coverage and each child, regardless of number, is insured for 10% of his coverage.

Coverage is also provided for nonreimbursed medical expenses of over $50, up to a maximum of $500. Under the family plan each member of the family is provided this extra coverage. In addition, policyholders receive an automatic 5% increase in the face value of their policy each year (at no increase in cost) for each of the first five years of coverage.

Life Insurance

AFA Group Life Insurance is available to all active duty officers and NCOs of the first three grades. It provides a graded amount of coverage, with a top amount of $20,000, depending on age and flying status. The death benefit is increased by 50% of the policy's face value if death is caused by any kind of accident.

As an additional benefit policyholders may keep their insurance in force at the low group rate after they leave the service, provided their coverage has been in effect for more than a twelve-month period immediately prior to the date they leave the service.

Flight Pay Insurance

Guaranteed flight pay protection is available to rated personnel on active duty. Protection is guaranteed, even against pre-existing illnesses, after a policy has been in force for more than twelve consecutive months. This plan was first introduced in 1956 and since that time AFA has paid more than $1,800,000 in claims. Each month checks go to between 100 and 150 grounded flyers.

Benefits are such that a grounded policyholder receives 80% of his lost flight pay (tax free) for up to twenty-four months for groundings due to aviation accidents . . . up to twelve months for illnesses or other accidents.

AIR FORCE ASSOCIATION

Insurance Division, 1901 Penna. Ave., N.W., Washington 6, D. C.

Please send me complete information about the AFA Insurance Program(s) I have checked below. 9-61

- ☐ All-Accident Insurance
- ☐ Group Life Insurance
- ☐ Flight Pay Insurance

NAME_____ RANK_____

ADDRESS_____

This has been an active year for Air Force Association units across the nation. New emphasis through these months has been placed on aerospace education activities . . .

AFA on Main Street

Gus Duda

LATE this month Philadelphia, the city famous for its Main Line, will attract international attention for four days as the Aerospace Capital of the World. During this period, September 21 through 24, AFA will hold its annual National Convention and Aerospace Panorama. Some 6,000 persons are expected to participate in the fifteenth annual meeting of the nation's largest independent aerospace organization.

It will be the Association's first visit to Philadelphia, the first time since 1957 that the meeting has been held in the East. AFA members, educators, Air Force Reservists and Air National Guardsmen, active-duty USAF personnel, top aerospace industry representatives, and interested members of the general public will combine to make this *the* aerospace meeting of the year.

Plans for the gathering have been under way since the 1960 Convention closed in San Francisco. But, while all this has been taking place, activities in a similar vein but on a smaller scale have been taking place in communities all across the land—from Boston, Mass., to San Diego, Calif., from Miami, Fla., to Portland, Ore. These are the daily efforts of AFA squadrons, propelling themselves into the community bloodstream with projects designed to educate the public in the objectives of AFA. This is AFA on Main Street. It is here that a lion's share of AFA's accomplishments are recorded.

This has been a dynamic year for the Air Force Association. In every area in which AFA units are exerting effort, outstanding projects have been completed and additional ones begun.

The **Erie, Pa., and Ogden, Utah, Squadrons** sponsored highly successful Air Fairs. Attendance at each far exceeded the total population of the host city. The **Billy Mitchell Squadron in Milwaukee** again presented its annual Billy Mitchell Award to a Wisconsin native who had made a distinguished contribution to the advancement of aerospace understanding. This year's recipient was AFA Executive Director James H. Straubel. In New Jersey, the

Front Range, Colo., Squadron's education program features presentation of awards to outstanding students to develop interest in space age.

Union-Morris Squadron dedicated a Memorial to the military dead of World War II and Korea.

Many AFA units participated in programs in connection with the Air Force Academy, which graduated its third class of future Air Force leaders in June 1961. Some AFA Squadrons and numerous individual AFA leaders contributed funds toward the building of an athletic stadium at the Academy. Our **Maryland Wing** was a major contributor, with a check for $1,000. Other ingenious methods of creating public interest in the Academy and its affairs included a speaking tour of Syracuse, N.Y., schools by a team of Academy instructors. Our **Syracuse Squadron** sponsored the tour. The speakers explained Academy life to the students—prospective Cadets. The **California Wing,** at its annual Mid-Year Conference, featured a "pre-victory" dinner-dance the night prior to the Academy football game with UCLA. The event was a fine success. Unfortunately, weather and the opposition dampened the enthusiasm next day. **Wing Commander Bob Gerlach** and **Milwaukee Squadron Commander Gary Ortmann** represented all AFA members in Wisconsin in presenting honorary AFA Cadet memberships to Wisconsin Cadets in the graduating class at the Academy. A fitting windup to AFA's Academy activities took place during June Week. The **Colorado Springs Airpower Council** and the Association cosponsored the second annual banquet in tribute to the Academy Honor Squadron. USAF Chief of Staff Gen. Curtis E. LeMay, Arthur Godfrey, and Jimmy Doolittle were featured speakers.

Utah AFA leaders are shown with AU Briefing Team at seminar sponsored for state educators by Ogden Squadron.

Programs and projects designed to encourage the youth of the nation in the aerospace field received much emphasis from AFA units in the past twelve months. Our **Chico, Calif., Squadron,** continuing the outstanding programs that last year won it a national AFA award, encourages its members to bring students to monthly luncheon meetings. Many youths have been on hand for the lunches. Farther south, the **Los Angeles Squadron's** annual Aircraft Model Design Competition is attracting more and more attention. Led by **Carl Alford, Wing Education Committee Chairman,** the contest encourages initiative and ingenuity in youngsters interested in aerospace matters. This year the competition drew a record number of entries competing for cash awards. A host of Squadrons annually sponsor tours of nearby Air Force installations for Explorer Scouts and other youth groups. In **Pittsburgh** two Squadron members, **Bob and Kay Patterson,** again instructed weekly meetings of the Falcons, a group of Hamilton Junior High School students, in the theory and application of flight principles. The youths constructed flying aircraft models which later competed in a fly-off to determine the most successful builders.

Aerospace Education Seminars were sponsored by AFA units in **Boston, Mass.; Pittsburgh, Pa.; St. Louis, Mo.; Ogden, Utah; Las Vegas, Nev.; and Shreveport, La.** An Aerospace Briefing Team from Air University was featured. Most successful of all these was the event in Pittsburgh. The seminars received full and effective support from the **Arnold Air Society,** AFA's college affiliate. Seminars are now being planned for the coming year on a regional basis.

Hudson, N.J., AFA Squadron cosponsored a Science Fair and included a tour of ANG base as one of the top awards.

Many of our units planned and programed projects to emphasize the impact that the aerospace age has on education and the curriculum. Among these were community sym-

(Continued on page 276)

Right, all Wisconsin Cadets in Academy Class of '61 got AFA memberships from Wisconsin, Milwaukee AFAers.

AIR FORCE ASSOCIATION'S 15TH ANNIVERSARY CONVENTION AND AEROSPACE PANORAMA

Philadelphia, Pennsylvania

September 20-24, 1961

WEDNESDAY

SEPTEMBER 20

10:00 AM
REGISTRATION OPENS
CONVENTION HALL

10:30 AM
FINISH OF RICKS FLIGHT
PHILA. INT'L AIRPORT

2:00 PM
AFA DIRECTORS MEETING
SHERATON HOTEL

4:00 PM
EXHIBITOR RECEPTION & BRIEFING
CONVENTION HALL

7:30 PM
AFA LEADERS MEETING
SHERATON HOTEL

THURSDAY

SEPTEMBER 21

8:00 AM
REGISTRATION OPENS
CONVENTION HALL

8:00 AM
CONTINENTAL BREAKFAST
CONVENTION HALL

9:00 AM
RESERVE FORCES SEMINAR
CONVENTION HALL
"The New Challenge"

Speakers:
MAJ. GEN. HAROLD R. MADDUX
Vice Commander, CONAC
LT. GEN. JOE W. KELLY
Commander, MATS
LT. GEN. ROBERT M. LEE
Commander, ADC

GEN. FRANK F. EVEREST
Commander, TAC

LT. GEN. WILLIAM E. HALL
Commander, CONAC

Panel:

MAJ. GEN. ROBERT E. L. EATON
ACS/Reserve Forces

MAJ. GEN. WINSTON P. WILSON
Dep. Chief, National Guard Bureau

MAJ. GEN. CHESTER E. McCARTY, Dep. for Air Force Reserve, ACS/Reserve Forces

MR. JOHN A. LANG, JR., Dep. for Reserve & ROTC Affairs, Office, Secretary of AF

Moderator:

JACKSON V. RAMBEAU
Director, Military Relations, AFA

9:30 AM

Briefing:

AEROSPACE MANPOWER REQUIREMENTS
CONVENTION HALL

Speakers:

LT. GEN. EDWARD J. TIMBERLAKE
Deputy Chief of Staff, Personnel, USAF

and

DIRECTORS, DCS/PERSONNEL

12:30 PM

15TH ANNIVERSARY LUNCHEON
CONVENTION HALL

Speaker:

GENERAL CURTIS E. LeMAY
Chief of Staff, USAF

Toastmaster
ARTHUR GODFREY

3:00 PM

1ST AFA BUSINESS SESSION
SHERATON HOTEL

Keynote Address:

GILL ROBB WILSON
Publisher, *Flying* Magazine

3:00 PM

AIR STAFF BRIEFING
CONVENTION HALL

Panel:

GENERAL CURTIS E. LeMAY
Chief of Staff, USAF

and

THE DEPUTY CHIEFS OF STAFF, USAF

Moderator:

MAJ. GEN. ARNO H. LUEHMAN
Director of Information, USAF

7:00 PM

AEROSPACE PANORAMA PREVIEW AND RECEPTION
CONVENTION HALL

FRIDAY

SEPTEMBER 22

8:00 AM

REGISTRATION OPENS
CONVENTION HALL

8:00 AM

CONTINENTAL BREAKFAST
CONVENTION HALL

8:30 AM

MEMORIAL SERVICE
SHERATON HOTEL

9:00 AM

2D AFA BUSINESS SESSION
SHERATON HOTEL

Briefing:

AEROSPACE FORCE OF TODAY
CONVENTION HALL

Speakers:

GEN. THOMAS S. POWER
Commander in Chief, SAC

GEN. FRANK F. EVEREST
Commander, TAC

LT. GEN. ROBERT M. LEE
Commander, ADC

LT. GEN. JOE W. KELLY
Commander, MATS

Moderator:

LT. GEN. JOHN K. GERHART
Deputy Chief of Staff, Plans & Programs, USAF

AEROSPACE EDUCATION SEMINAR
SHERATON HOTEL

Panel:

DR. LEONARD S. SHEINGOLD
Chief Scientist, USAF

DR. GEORGE E. VALLEY
Professor of Physics, MIT

DR. IVAN A. GETTING
President, Aerospace Corporation

Moderator:

DR. LINDLEY STILES, Dean
College of Education
University of Wisconsin

11:00 AM

Briefing:

AEROSPACE FORCE OF TOMORROW
CONVENTION HALL

Speakers:

GEN. BERNARD A. SCHRIEVER
Commander, AFSC

GEN. WILLIAM F. McKEE
Commander, AFLC

LT. GEN. JAMES E. BRIGGS
Commander, ATC

BRIG. GEN. THEODORE C. BEDWELL, JR.
Commander, AF Aerospace Medical Center

Moderator:

LT. GEN. ROSCOE C. WILSON
Deputy Chief of Staff, Research & Technology, USAF

12:00 N

AEROSPACE EDUCATION LUNCHEON
By Special Invitation
SHERATON HOTEL

Speaker:

GENERAL FREDERIC H. SMITH, JR.
Vice Chief of Staff, USAF

Toastmaster:

DR. LAWRENCE G. DERTHICK
Assistant Executive Secretary
National Education Association

12:00 N

AEROSPACE PANORAMA OPEN TO REGISTRANTS
CONVENTION HALL

12:00 N

AIR FORCE-INDUSTRY BUFFET LUNCH
CONVENTION HALL

2:30 PM

ANNUAL SYMPOSIUM
"Space and National Security"
(Speakers to be announced)
CONVENTION HALL

7:45 PM

ANNUAL AWARDS BANQUET
CONVENTION HALL

Speaker

HONORABLE EUGENE M. ZUCKERT
Secretary of the Air Force

Toastmaster:

HOWARD T. MARKEY
Chairman of the Board, AFA

SATURDAY

SEPTEMBER 23

8:00 AM

REGISTRATION OPENS
SHERATON HOTEL

8:00 AM

ARNOLD AIR SOCIETY ASSEMBLY
By Special Invitation
BELLEVUE STRATFORD

9:00 AM

REUNION BRUNCH
SHERATON HOTEL

Toastmaster:

MILTON CANIFF

12:00 N

OUTSTANDING AIRMEN'S LUNCHEON
By Special Invitation
SHERATON HOTEL

Toastmaster:

JOSEPH J. FOSS
Former Governor of South Dakota

Remarks:

HONORABLE EUGENE M. ZUCKERT
GENERAL CURTIS E. LeMAY

12:00 N

AEROSPACE PANORAMA OPEN TO REGISTRANTS & PUBLIC
CONVENTION HALL

2:00 PM

3D AFA BUSINESS SESSION
SHERATON HOTEL

2:00 PM

AEROSPACE EDUCATION WORKSHOP
ADELPHIA HOTEL

Panel:

M. MARCUS KILEY
Deputy Supt. of Schools
Springfield, Mass.

DR. WILLIAM B. EDWARDS
Supt. of Schools
Lakewood, Ohio

DR. PAUL H. MASONER, Dean
School of Education
University of Pittsburgh

Moderator:

DR. IRBY CARRUTH, President-Elect,
American Association of School Administrators

9:30 PM

REUNION BALL
USAF Airmen of Note
CONVENTION HALL

9:30 PM

ARNOLD AIR SOCIETY BALL
By Special Invitation
BELLEVUE STRATFORD

SUNDAY

SEPTEMBER 24

12:00 N

AEROSPACE PANORAMA OPEN TO REGISTRANTS & PUBLIC
CONVENTION HALL

Annual Model and Design competition sponsored by the California Wing is a product of Carl Alford's ingenuity. He is shown above with the 1961 winner. The program features incentives for originality of designing and building, and also places emphasis on the student maintaining top scholastic grades. Competition is several years old.

posia held by our **Boise and Twin Falls, Idaho, Squadrons** with the complete support of the State Superintendent, **Dr. Delmer F. Engelking,** who has participated in several of AFA's national programs. The annual **Utah Wing Symposium** again ran the **Intermountain Conference on Aerospace Education.** This once more attracted a record crowd. The event has earned AFA a coveted reputation in state educational circles.

Our **San Diego, Calif., and Union-Morris, N. J., Squadrons** continue to sponsor their **Aerospace Library** programs. Top books dealing with aerospace matters are donated to local schools for the use of students.

As the world moves forward on the road to space, a clear understanding of the problems involved, and a better picture of the technological changes that have been made, becomes increasingly important. Educators and the public need an organization to bring before them the topics concerned with this field. AFA units possess the unique capability of filling this need. We expect to see an even greater increase in educational programs in the coming years. AFA's hope is to lay this information before communities through the length and breadth of the nation.

This is the Association's **Fifteenth Anniversary year.** The yearlong emphasis on anniversary programs gave us an opportunity to examine our past and rededicate ourselves to the future. Celebrations such as were sponsored by our **Tucson, Ariz., Squadron,** which attracted an audience of over 700; or the "Crystal Ball," a large dinner-dance sponsored by the **Beaver Valley, Pa., Squadron,** were not sponsored with an eye to making them projects unto themselves. In the words of **President Thos. F. Stack,** "We look back only to better see ahead."

In this Fifteenth Anniversary year of the Association, communities all over the nation owe a great debt to unselfish AFA members and squadrons for their dedicated efforts to bring the aerospace message to the public. As another successful year draws to a close, we can only think back to the first national meeting of the Association in Columbus, Ohio, when some 600 stalwart members gathered together and dedicated themselves to the objectives AFA still supports. When AFA gathers in Philadelphia in 1961 to rededicate itself to these aims, the words of an airpower statesman who was a registrant in Columbus, and who still does a bit of writing, will be remembered: "The Air Force Association is the only group that is intellectually equipped to do the job of enlightenment . . . that is so necessary these days." The speaker was Maj. Alexander P. de Seversky. His remarks still serve as a challenge fifteen years later.—END

Pittsburgh AFA programs included panel discussions and direct telephone hookups with USAF bases, such as above.

Now GUARANTEED Flight Pay Insurance!

An extra AFA benefit at no extra cost . . .

Now AFA Flight Pay Insurance is a better investment than ever, because it offers *guaranteed protection*, even against preexisting illnesses, after the first year's coverage.

There's no extra charge for this new, liberal provision and no change in the regular benefits of the policy—

- *Coverage for* both *illnesses and accidents.*
- *Payments for up to 24 months if your grounding is the result of an aviation accident — up to 12 months if for illness or ordinary accident.*

Remember, payment for a single 90-day grounding reimburses you for the whole cost of 10 years' protection.

NOTE:

All policies are dated on the last day of the month in which the application is postmarked, and protection against accidents begins as of that date; protection against groundings due to illnesses begins 30 days later. Of course, coverage cannot be immediately extended to include illnesses which existed prior to the time at which you insured your flight pay, but after 12 months you are fully covered against all illnesses.

To be eligible for protection, you must have passed your last annual physical . . . be presently in flying status . . . and be a member of the Air Force Association.

Most claims are routine. Where a difference of opinion exists, the Air Force Association has the right to request a review of medical records and other claim evidence by appropriate medical authorities—normally the office of the Surgeon General, USAF.

There are also some exclusions that affect your coverage under the Flight Pay Protection Plan. They are designed primarily to protect your investment in the Plan—restrictions that you'd normally expect, such as groundings due to insanity, court-martial, attempted suicide, etc. Here they are in detail:

EXCLUSIONS:

The insurance under the policy shall not cover loss to any Member resulting in whole or in part from or due to any of the following:

1. Criminal act of the Member or from injuries occasioned or occurring while in a state of insanity (temporary or otherwise).
2. "Fear of flying," as officially certified by responsible authority of the Member's Service and approved by the head of the Service in accordance with applicable regulations.
3. Caused by intentional self-injury, attempted suicide, criminal assault committed by the Member, or fighting, except in self-defense.
4. Directly or indirectly caused by war, whether declared or not, if act of an enemy in such war is the direct cause of loss insured hereunder, hostile action, civil war, invasion, or the resulting civil commotions or riots.
5. Failure to meet flying proficiency standards as established by the Member's Service unless caused by or aggravated by or attributed to disease or injuries.
6. Inability of a member to continue to meet physical standards for Hazardous Flight Duty because of a revision in those standards, rather than because of preceding injury or disease causing a change in the physical condition of such member.
7. Mental or nervous disorders.
8. Alcohol, drugs, venereal disease, arrest, or confinement.
9. Willful violation of flying regulations resulting in suspension from flying as a punitive measure, or as adjudged by responsible authority of the Member's Service.
10. Suspension from flying for administrative reasons not due to injuries or disease, even though the Member may have been eligible for or was being reimbursed at the time of the administrative grounding because of a previously established disability.
11. Loss of life shall not be deemed as loss for purposes of this insurance.
12. Primary duty requiring parachute jumping.
13. Voluntary suspension from flying.
14. A disease or disability preexisting the effective date of coverage, or a recurrence of such a disease or disability, whether or not a waiver has been authorized by appropriate medical authority in accordance with regulations or directive of the service concerned, *unless the Member was insured under the master policy issued to the Air Force Association for 12 continuous months immediately prior to the date disability (grounding) commenced.*

Underwritten by Mutual Benefit Health & Accident Association (Mutual of Omaha).

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Send me my Flight Pay Protection Policy.

BILL ME FOR:

$_____ semiannual premium (1% of annual flight pay, plus $1 service charge)

$_____ for full payment of annual premium (2% of annual flight pay)

I ENCLOSE:

$_____ semiannual premium (1% of annual flight pay, plus $1 service charge). Bill me every 6 months

$_____ in full payment of annual premium (2% of annual flight pay)

This insurance is available for AFA Members only ☐ I am an AFA Member ☐ I enclose $6 for annual AFA membership

Rank (please print) Name Address

City Zone State $ Annual Flight Pay Years Service for pay purposes

I understand the conditions and exclusions governing AFA's Flight Pay Protection Plan, and I certify that I am currently on flying status and entitled to receive incentive pay and that to the best of my knowledge I am in good health, and no action is pending to remove me from flying status for failure to meet physical standards. I authorize AFA, or AFA representatives, to examine all medical records pertinent to any claim I may submit.

Signature of Applicant Date

Underwritten by Mutual of Omaha 9-61

This Is AFA

The Air Force Association is an independent, nonprofit airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946; incorporated February 4, 1946.

Objectives

• To assist in obtaining and maintaining adequate airpower for national security and world peace. • To keep the AFA members and the public abreast of developments in the field of aviation. • To preserve and foster the spirit of fellowship among former and present personnel of the United States Air Force.

Membership

Active Members: Individuals honorably discharged or retired from military service who have been members of, or either assigned or attached to, the USAF or its predecessor services, or who are currently enrolled in the Air Force Reserve or the Air National Guard, $6.00 per year.
Service Members (nonvoting, nonofficeholding): Military personnel now assigned or attached to the USAF. $6.00 per year.
Cadet Members (nonvoting, nonofficeholding): Individuals enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, or Cadets of the US Air Force Academy. $3.00 per year.
Associate Members (nonvoting, nonofficeholding): Individuals not otherwise eligible for membership who have demonstrated their interest in furthering the aims and purposes of the Air Force Association. $6.00 per year.
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