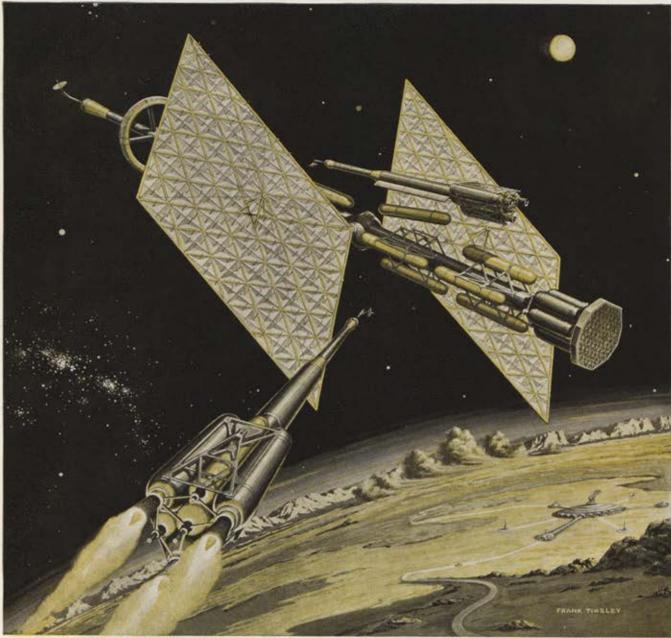
AIR FORCE

and SPACE DIGEST

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



AIR FORCE ALMANAC 1960



STEPS IN THE RACE TO OUTER SPACE

Mars Supply Fleet

When man first sets up colonies on Mars, his life will depend on a Mars Supply Fleet, shuttling from Earth at regular intervals with supplies, equipment and personnel.

The fleet will be comprised of two basic vehicle types, both shown in the illustration above. The large ships with rectangular solar reflectors will be the long-range backbone of the fleet. Assembled in orbit of prefabricated sections rocketed up from Earth, these high-capacity carriers will have a low-thrust electro-particle drive. Their operating current will come from thermionic converters, heated by the concentrated rays of the reflectors.

The Solar Ships will be loaded and un-

loaded, at both ends of the voyage, by work-horse Ferry Rockets (foreground) launched by booster. The ferries will be designed to carry the long yellow cargo containers within a bay just forward of their engines. In the nose of the Ferry Rocket is the passenger and operating section with a universally mounted spherical guidance compartment. This guidance unit will be fitted with directional radar, an optical telescope, and full astrogational equipment.

The Mars Supply Fleet will complete each assigned mission in one to two Earth years, depending on whether or not the Solar Ships are equipped with auxiliary boosters for extra initial speed.

ARMA, now providing all-inertial guidance systems for later models of the Air Force ATLAS ICBM, is in the vanguard of the race to outer space. At ARMA, privately funded research programs in space technology are studying super-sensitive inertial devices for navigation and satellite instrumentation. For this effort, ARMA seeks scientists and engineers experienced in astronautics. ARMA, Garden City, New York. A Division of American Bosch Arma Corporation.

AMERICAN BOSCH ARMA CORPORATION

TEMOO

DEDICATED
TO A
PENETRATION
AIDS MIX
...THE KEY
TO HIGH
TARGET KILL



Koch Global Survival Kits, in full production since 1956, have already proved themselves to be miracles of life-saving precision.

Housed in a compact Fiberglas case beneath the pilot, the kit is ejected in emergencies with the pilot as he parachutes to safety. It contains an emergency 20minute oxygen supply for high-altitude escape; selfinflating life raft; essential food, survival, signalling and rescue supplies.

Koch Survival Kits were first to meet specification MIL-27750B (USAF) and are also manufactured under MIL-S-26676 (USAF). Today they are standard equipment on USAF F-101, F-102, F-106, B-58, T-38 and F-105 aircraft, and the new experimental rocket powered aircraft X-15.

OVER 250,000 KOCH FIBERGLAS CASES PROTECT COSTLY EQUIPMENT...

Manufactured under MIL-C-4150E (USAF), Koch's air-tight, water-tight, shock-proof Fiberglas carrying cases save literally millions of dollars in equipment loss and damage.

Mildew-proof and fungus-proof, Koch cases will not dent, will withstand submersion indefinitely, and have a zero moisture and vapor transmission rate. They are permanent, re-usable. They are a Method II-D package and require no outer packaging for overseas shipment. They may be used for permanent storage.

NEW KOCH DIVISION FOR **AERONAUTICAL** HARDWARE

Koch's Oxygen-Electrical Quick Disconnect is one of a growing list of aircraft and missile accessories from Koch's high-precision Aero Hard-ware Division, and is now standard equipment on the F-102, F-106 and Convair's B-58.

Koch is in current production on such other items as Missile Recovery Sys-tem Timers, Ejection Seat Lap Belt Snaps and Fittings, and Parachute Automatic Pack

Visit our display booth #134 at the 1960 Aerospace Panorama in San Francisco. We will be glad to place our fifty-one years experience at your disposal in solving your most difficult problems of Fiberglas fabrication, materiel development, packaging, or intricate hardware design.



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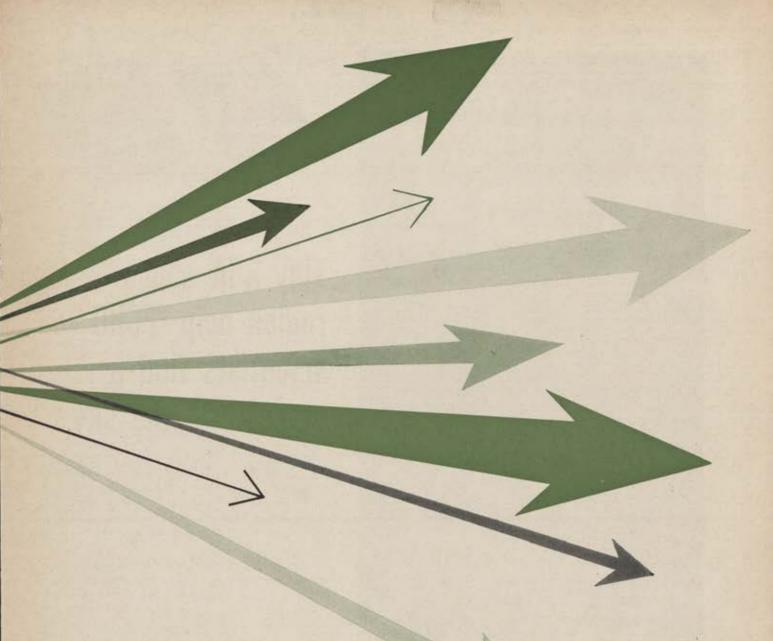
BOX 77

CORTE MADERA, CALIFORNIA

Pioneers in Fiberglas Fabrication

Originator of Koch Fiberglas Luxury Luggage-Approved for world travel by T.W.A.





As the world's weapons systems increase in sophistication, no one weapon in America's arsenal of defense can "do it all." Among our strategic attack forces, there is a strongly growing philosophy that a proper mix of penetration aids is our only adequate answer. Temco is firmly dedicated to this philosophy. Engineers and scientists in Temco's Missiles & Aircraft Division have made their own studies in depth on the probabilities of a penetration aids mix. They have mathematically proved its high increase in effective kill. Their answer to the argument about the multiplicity of support problems attendant to this mix is this: the pay off is so fantastically big, it is the only answer. As a leader in the development and production of penetration aids, Temco has long been an active supplier to the Department of Defense. Two of its major products are the Corvus penetration missile and a video correlator — products vital to the mix.

TEMCO

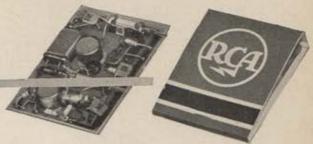
MISSILES & AIRCRAFT

A Division of TEMCO ELECTRONICS & MISSILES COMPANY . P. O. Box 6191 . Dallas 22, Texas.

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ELECTRONICS DIVISION . OVERHAUL & AEROSYSTEMS DIVISION . INDUSTRIAL DIVISION . FENSKE, FEDRICK & MILLER, INC., SUBSIDIARY





Radio beacon transmitters no bigger than a matchbook—another RCA contribution to space-age technology.

Tiny RCA space radios help "ECHO" scientists find a pinpoint in the sky

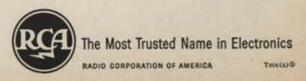
The pinpoint is the 100-foot aluminized plastic balloon now orbiting about a thousand miles above the earth. Its purpose: to establish the feasibility of longdistance communications by bouncing radio waves off an object in space to distant points on the earth's surface.

The balloon carries two RCA radio beacon transmitters, each scarcely larger than a matchbook, yet capable of being heard for two thousand miles or more. They send signals earthward, telling scientists where to find the balloon at night or when clouds obscure the sky. Because the radios are sunpowered, they are expected to broadcast throughout the life of the balloon satellite.

These amazing radio transmitters were designed and built by the Astro-Electronics Division at RCA's Space Center at Princeton, N. J.—birthplace of the satellite and ground-based radio equipment for the "Talking Atlas" satellite, the TIROS "weather-eye" satellite system, and other space-age achievements.

This program—called "Project ECHO"—is sponsored by the National Aeronautics and Space Administration as the first step towards a new system of global communications. Eventually, television programs may be viewed around the world through the use of these orbiting "radio mirrors."

The same RCA engineering and manufacturing skills that are helping man conquer space assure the dependability of the RCA Victor black-and-white and color television sets, radios and high-fidelity systems you enjoy in your home.





AIR FORCE AND SPACE DIGEST

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Volume 43, Number 9 • September 1960

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Politics in the partisan sense is outside the purview of the Air Force Association and this magazine. But the question of national security is the focal point of AFA interest, and, under our form of government, the quality, scope, and direction of national defense policies are essentially political matters and cannot be isolated from the political arena. Hence, free and open public discussion of defense topics becomes an essential prerequisite of intelligent political debate in a presidential election year.

AFA, therefore, was pleased when it was invited by the platform committees of both the Republican and Democratic parties to present its views at the hearings which preceded the drafting of the party platforms. Identical presentations were made to both groups—at a Democratic advance hearing in Philadelphia last April by the Editor of AIR FORCE/SPACE DIGEST and before the defense subcommittee of the Republicans in Chicago, immediately before their convention, by AFA President Howard T. Markey.

AFA's presentations were received with courtesy and interest by both parties. And it has become clear that national defense is getting a high priority on the list of campaign issues, as reflected in the party plat-

forms and the statements of both candidates.

Herewith we present the national defense planks from both platforms.

Democratic National Defense Plank

"The new Democratic Administration will recast our military capacity in order to provide forces and weapons of a diversity, balance, and mobility sufficient in quantity and quality to deter both limited and general aggressions.

"When the Democratic Administration left office in 1953, the United States was the preeminent power in the world. Most free nations had confidence in our will and our ability to carry out our commitments to

the common defense.

"Even those who wished us ill respected our power and influence.

"The Republican Administration has lost that position of preeminence. Over the past seven and a half years, our military power has steadily declined relative to that of the Russians and the Chinese and their satellites.

"This is not a partisan election-year charge. It has been persistently made by high officials of the Republican Administration itself. Before congressional committees they have testified that the Communists will have a dangerous lead in intercontinental missiles through 1963—and that the Republican Administration has no plans to catch up.

"They have admitted that the Soviet Union leads in the space race—and that they have no plans to catch

up.

"They have also admitted that our conventional military forces, on which we depend for defense in any nonnuclear war, have been dangerously slashed for reasons of 'economy'—and that they have no plans to reverse this trend.

"As a result, our military position today is measured in terms of gaps—missile gap, space gap, limited-war gap.

WHAT THE SAY ABOUT

"To recover from the errors of the past seven years will not be easy.

"This is the strength that must be erected:

"1. Deterrent military power such that the Soviet and Chinese leaders will have no doubt that an attack on the United States would surely be followed by their own destruction.

"2. Balanced conventional military forces which will permit a response graded to the intensity of any threats

of aggressive force.

"3. Continuous modernization of these forces through intensified research and development, including essential programs now slowed down, terminated, suspended, or neglected for lack of budgetary support.

"A first order of business of a Democratic Administration will be a complete reexamination of the or-

ganization of our armed forces.

"A military organization structure, conceived before the revolution in weapons technology, cannot be suitable for the strategic deterrent, continental defense, limited war, and military alliance requirements of the 1960s.

"We believe that our armed forces should be organized more nearly on the basis of function, not only to produce greater military strength, but also to eliminate duplication and save substantial sums.

"We pledge our will, energies, and resources to

oppose Communist aggression.

"Since World War II, it has been clear that our own security must be pursued in concert with that of many other nations.

"The Democratic Administrations which, in World War II, led in forging a mighty and victorious alliance, after the war took the initiative in creating the North Atlantic Treaty Organization, the greatest peacetime alliance in history.

"This alliance has made it possible to keep Western Europe and the Atlantic Community secure against

Communist pressures.

"Our present system of alliances was begun in a time of an earlier weapons technology when our ability to retaliate against Communist attack required bases all around the periphery of the Soviet Union. Today, because of our continuing weakness in mobile weapon

PARTIES

DEFENSE

systems and intercontinental missiles, our defenses still depend in part on bases beyond our borders for planes and shorter range missiles.

"If an alliance is to be maintained in vigor, its unity must be reflected in shared purposes. Some of our allies have contributed neither devotion to the cause of freedom nor any real military strength.

"The new Democratic Administration will review our system of pacts and alliances. We shall continue to adhere to our treaty obligations, including the commitment of the UN charter to resist aggression. But we shall also seek to shift the emphasis of our cooperation from military aid to economic development, wherever this is possible.

"We commend the work of the civil defense groups throughout the nation. A strong and effective civil defense is an essential element in our nation's defense.

'The new Democratic Administration will undertake a full review and analysis of the programs that should be adopted if the protection possible is to be provided to the civilian population of our nation."

Republican National Defense Plank

"The future of freedom depends heavily upon America's military might and that of her allies, Under the Eisenhower-Nixon Administration, our military might has been forged into a power second to none. This strength, tailored to serve the needs of national policy, has deterred and must continue to deter aggression and encourage the growth of freedom in the world. This is the only sure way to a world at peace.

"We have checked aggression. We ended the war in Korea. We have joined with free nations in creating strong defenses. Swift technological change and the warning signs of Soviet aggressiveness make clear that intensified and courageous efforts are necessary, for the new problems of the 1960s will of course demand new efforts on the part of our entire nation. The Republican Party is pledged to making certain that our arms, and our will to use them, remain superior to all threats. We have, and will continue to have, the defenses we need to protect our freedom.

"The strategic imperatives of our national defense

policy are these:

· "A second-strike capability, that is, a nuclear retaliatory power that can survive surprise attack, strike back, and destroy any possible enemy.

 "Highly mobile and versatile forces, including forces deployed, to deter or check local aggressions and 'brush-fire wars' which might bring on all-out nuclear war.

 "National determination to employ all necessary military capabilities so as to render any level of aggression unprofitable. Deterrence of war since Korea, specifically, has been the result of our firm statement that we will never again permit a potential aggressor to set the ground rules for his aggression; that we will respond to aggression with the full means and weapons best suited to the situation.

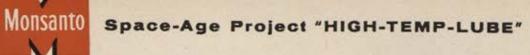
'Maintenance of these imperatives requires these actions:

- "Unremitting modernization of our retaliatory forces, continued development of the manned bomber well into the missile age, with necessary numbers of these bombers protected through dispersal and airborne alert.
- "Development and production of new strategic weapons, such as the Polaris submarine and ballistic missile. Never again will they be neglected, as intercontinental missile development was neglected between the end of World War II and 1953.
- · "Accelerate as necessary, development of hardening, mobility, dispersal, and production programs for long-range missiles and the speedy perfection of new and advanced generations of missiles and antimissile missiles.
- · "Intensified development of active civil defense to enable our people to protect themselves against the deadly hazards of atomic attack, particularly fallout; and to develop a new program to build a reserve of storable food, adequate to the needs of the population after an atomic attack.
- "Constant intelligence operations regarding Communist military preparations to prevent another Pearl Harbor.
- · "A military establishment organized in accord with a national strategy which enables the unified commands in Europe, the Pacific, and this continent to continue to respond promptly to any kind of aggres-

· "Strengthening of the military might of the freeworld nations in such ways as to encourage them to assume increasing responsibility for regional security.

· "Continuation of the 'long-pull' preparedness policies which, as inaugurated under the Eisenhower-Nixon Administration, have avoided the perilous peaks and slumps of defense spending and planning which marked earlier administrations.

"There is no price ceiling on America's security. The United States can and must provide whatever is necessary to ensure its own security and that of the free world and to provide any necessary increased expenditures to meet new situations, to guarantee the opportunity to fulfill the hopes of men of good will everywhere. To provide more would be wasteful. To provide less would be catastrophic. Our defense posture must remain steadfast, confident, and superior to all potential foes."-END





A CHEMICAL EXPEDITION



.....seeking high-temperature lubricants for advanced jets and missiles...discovering new fluids that operate up to 900°F.

Monsanto has established a base of "know-how" in a new area of synthetic fluids: the polyphenyl ethers, fluids that exceed the high-temperature performance of all other known lubricants and hydraulic fluids. These newly synthesized liquids resist radiation damage, oxidation and chemical decomposition: as liquids they cover a temperature range of 20° F. to 900° F. Polyphenyl ethers are the result of creative chemistry applied to the problem of high-temperature lubricants; they were developed under contract and in cooperation with Wright Air Development Division, U.S. Air Force.

TEMPERATURE RANGE OF

MONSANTO FLUIDS

SILICATE ESTERS

CHLORINATED

PHOSPHATE

ESTERS

POLYPHENYL ETHERS

The heat stability of Monsanto's polyphenyl ethers is the result of enlisting chemical know-how on a problem of mechanical engineering. By design, lubricants for jet engines (and liquid fuel missiles) must lubricate and cool the bearings and accessory drive gears. Existing lubricants could not meet the requirements

of advanced engine design. So the logical step was a Monsanto expedition into little-known fields of chemistry. A team of Monsanto scientists found and developed the polyphenyl ethers: to date, nineteen new compositions of matter.

In comparison with other synthetics, these lubricants are as thermally stable at 840° F., as are silicones and petroleum hydrocarbons at 740° F., and present commercial diesters at 540° F. Their useful temperature range exceeds all other fluids by 100° to 400° F.

fluids by 100° to 400° F. Their chemical stability, physical properties, and lubricity recommend them for a host of other fluid applications: "hot" hydraulic systems; base stocks for high-temperature and/or radiation-resistant greases; and heat-transfer fluids.

Until development of the polyphenyl ethers, the calculated* useful life of the best synthetic lubricant was a scant 18 minutes at 900° F. Presently used synthetic lubricants would be effective for only 6 seconds to 3 minutes at this temperature. Polyphenyl ethers, however, would have useful lives of 20-80 hours at 900° F.

*Based on the activation energy derived from isoteniscope data,

THERMAL STABILITY OF POLYPHENYL ETHERS VERSUS OTHER SYNTHETIC LUBRICANTS

Compound	Decomposition Point, °F.	Useful Life at 900° F.*
Bis (p-phenoxyphenyl) ether m-Bis (m-phenoxyphenoxy) benzene Bis-p (m-phenoxyphenoxy) phenyl ether Quaterphenyl Silicone n-Octacosane Tetra (2-ethylhexyl) silicate Pentaerythritol tetrahexanoate Bis (2-ethylhexyl) sebacate	824 862 832 826 740 662 638 585 525	25 hours 80 hours 20 hours 30 hours 18 minutes 3 minutes 14.4 seconds 7.2 seconds 7.2 seconds

*Time to decompose 10%

Heat stability is one important facet of these new molecules. The polyphenyl ethers also match the lubricity and viscosity indexes of other good lubricants and possess better hydrolytic stability. They are two to five times more stable than most other synthetic fluids under nuclear radiation.

THE PROPERTIES OF THE MOLECULES

The unsubstituted polyphenyl ethers have the general molecular structure:

$$\bigcirc -\circ (\bigcirc \circ)_n \bigcirc$$

The "n" values range from 1 to 8, each with linkages in various combinations of the ortho, meta and para positions. The various isomeric polyphenyl ethers are all good lubricants: they show heat stability within a narrow range (the 7-ring ether decomposes only 20° F. higher than the 4-ring ether; a 5-ring appears to have the optimum thermal stability).

Varying the chain length does not materially affect lubricity or heat stability—as chain length increases so does pourpoint, and, conversely, volatility decreases. A 7-ring meta ether boils at 1150° F., has a pourpoint of 70° F. Chemically "tailoring" and blending can provide optimum lubricant properties.

While the properties of these fluids may solve many needs, the chemical expedition which found them set out to answer the specific problem of advanced turbojet engine and accessory lubrication. Turbine bearings, surrounded by hot gases, must be kept clean, cool and smooth-spinning. (Please turn page.)

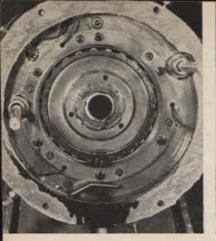




Photo Courtesy Pratt & Whitney Aircraft

Test rig parts for evaluating thermal and oxidative stability and lubrication properties of jet engine lubricants show how a polyphenyl ether (left) leaves the rig parts clean, free of deposits, and with no evidence of wear. Photo at right shows deposits and general condition of parts using one of the best synthetic lubricants prior to development of polyphenyl ethers. Both tests were run at a bearing temperature of 500° F, for 100 hours at a speed of 10,000 RPM.

Between Mach 3 and Mach 4, the skin temperature of craft in sustained flight at 40,000 feet can rise to 900° F., the temperature where steel glows red. In the lubricant reservoir, the polyphenyl ethers withstand this stress. Consequently, for speed brakes, hydraulic controls, fuel pumps and other internal moving parts, polyphenyl ethers can cope with the "heat barrier" to provide reliable performance.

Monsanto's polyphenyl ethers are a new link in the design chain leading to advanced engines and weapons systems with a minimum of "compromise" for lubricant and hydraulic fluid limitations. In present systems just "getting by" with marginal performance of earlier lubricants, the polyphenyl ethers can provide greater reliability.



SYNTHETIC FLUIDS FOR SPACE-AGE ENGINEERING

Monsanto has had 15 years' experience in the development of synthetic fluids and lubricants; currently markets over 20 fluids with applications that range from electronic coolant-dielectrics to fire-resistant hydraulic fluids for jets and radiation-resistant fluids for nuclear power plants.

If you require a fluid or lubricant for special use in an application of high stress, contact Monsanto. The material you need may be readily available or within "easy chemical reach." Write or call: Monsanto Chemical Company, Department 02-A, C Building, St. Louis 66, Missouri.

Monsanto Space-Age Projects for Government and Industry

- * High-Temperature Hydraulic Fluids
- * Coolant-Dielectrics for Electronic Equipment
- * High-Temperature Plastics
- Improved Nitrogen Oxidizers for Solid Propellants
- * Fire-Resistant Structural Plastics
- * Hydrocarbon Fuels for Jets and Missiles
- * Fire-Resistant Hydraulic Fluids for Ground-Support and Missile-Launching Equipment
- * Radiation-Resistant Heat-Transfer Fluids
- * High-Temperature Lubricants and Additives
- Radiation-Resistant Reactor Coolant-Moderators
- * Intermetallic Semiconductor Materials
- * Pure Silicon for Transistors, Rectifiers, Diodes
- * Ultra-Fine Metal Oxides
- * Materials for Vibration Damping
- Heat-Resistant Resins for Laminating and Bonding
- * Inorganic Polymers
- * High-Energy Solid Propellants



You are invited to work with Monsanto on your materials needs in the above fields.



Reserve Issue

Gentlemen: Congratulations on the special section, "New Accent on the Air Reserve Forces," in your July 1960 issue.

The excellent manner in which you have presented the complete picture of air reserve forces management will assist immeasurably in clarifying what the Air Force plans to do and the methods it proposes to employ to not only your thousands of readers who are members of the air reserve forces but the general public as well. I am sure that reservists throughout the country will read this issue with particular interest. . . .

Maj. Gen. Robert E. L. Eaton Ass't Chief of Staff for Reserve Forces Washington, D. C.

Gentlemen: . . . The excellent coverage given to our Air Force Reserve story is appreciated. This will help reservists realize the important role they play in air defense.

Lt. Gen. J. H. Atkinson Commander, ADC Ent AFB, Colo.

Our Air Defense

Gentlemen: I've just read Ed Mack Miller's article, "The Day NORAD Went to War," [August '60] and wish to convey my thanks for his efforts on behalf of air defense.

Exercise Desk Top III was but another in a continuing series of drills designed to sharpen the decision-making skills of our NORAD commanders at all levels. With new and varied problems in providing aerospace defense for North America being posed by the Kremlin and their mounting number of threatening weapon systems, it seems to me that it is in the area of decision-making that our greatest need lies. Expressions such as time compression and zero warning have little meaning in themselves, but they mark a new era of responsibility for the military commander. He may well find that upon his judgment rests the survival of his country's citizenry. . . .

Gen. Laurence S. Kuter Commander in Chief, NORAD Ent AFB, Colo. Advice for Americans

Gentlemen: I wish to congratulate Claude Witze on his editorial comments in "Airpower in the News" in the July issue. I was particularly impressed with "Advice for Bureaucrats," "We Can Be First," "Dr. Teller Speaks Up," and "How Many Russians?" There are thoughts under these titles which should in some way be communicated to every thoughtful American. I wish I knew how to do that, for I think our security and, indeed, perhaps our survival depend upon it.

At any rate, Mr. Witze must have the great personal satisfaction of knowing that he is doing his part, which few of us are, I fear, toward advising his fellow Americans of essential facts and ideas concerning the topic which concerns them most today—their security.

> Lt. Gen. Ira C. Eaker, USAF (Ret.) Washington, D. C.

Balanced Fare

Gentlemen: . . . I am disappointed in the magazine in general. I have found an occasional article of interest, but the general impression has been one of ponderous technical studies designed mainly for general staff officers. I have a degree in journalism, and I think I have some basis for considering the magazine too dull. I am sure you will disagree, and the magazine probably meets the needs of the great bulk of its readers, but I think it needs more life, more pictures, and more personalities in it. . . .

Warren C. McClain Palm Desert, Calif.

Gentlemen: I have long had the desire to write, to add my plaudits to the multitude, concerning the general excellence of our magazine. I do so now, although I must confess the motivating force in this instance is a complaint.

As membership chairman of the second largest Squadron in AFA, I am naturally in closer contact with more individual members than your entire staff might see or talk with in an entire year. While all are in general agreement as to the excellence of the maga-

zine, far too many seem to have the same complaint. Those I have talked with or corresponded with have a great and unappeased appetite for the subject matter normally under discussion in our magazine. They feel, however, that they miss something vital in each article they read due to the technical language used. Not all articles, of course, mainly those in the Space Digest section. . . .

I do not intend to imply that I speak for any other AFA members but myself and those of my Squadron who have discussed this with me. However, I am sure that you will find that the greatest percentage of our members are men like ourselves, who want desperately to understand, who devour each article, only to discover that most of what they are reading is over their heads. Here's hoping that our editors will take heed and have pity on us, and publish for the majority, rather than the few.

Ira M. Jacobs Mitchel Squadron, AFA Hempstead, N. Y.

◆ The problem cited by Readers McClain and Jacobs is one of which the editors are well aware. Our readership has a wide range of technical competence and the problem of "talking down" on one hand or "talking up" on the other is a serious one. We feel strongly that reduction to the least common denominator is not the answer, however. We try to present a balanced fare—not all meat and potatoes, not all appetizer or dessert. —The Editors

To Meet the Challenge

Gentlemen: I have always had an interest in aviation and related fields, and as I grew older my rather superficial interest deepened to include the problems presented by the dawn of the nuclear age and the ever growing menace of the Soviet sphere. I felt it was my duty as a citizen to keep abreast of events in this area, and AFA seemed to me the ideal way of accomplishing this. AFA, I feel, is doing an incomparable service to its membership and to the country. I can only

 Space surveillance systems



2. Transportable electronics systems



 Instrumentation, control, and switching systems



4. Telecommunications systems



 Integrated land, sea, and air communications systems



6. Data systems



CABLE . ALPHA DALLAS

regret that more do not listen and become aware.

AIRMAIL

I have read many of the articles published in your magazine with respect to defense problems, and I have also tried to keep aware of the contemporary literature. The picture I must say is not at all reassuring, yet in spite of all this, the extent of the public apathy is a dismal and a frightening prospect. . . .

It is too common an occurrence in our society to regard the Russian revolution as the true spirit of this progressive age-yet these people fail to realize that it is not the revolution of the Soviet, the dialectic of Marx and Lenin, but rather our system of government that gives free opportunity to all men to rule and direct themselves that is the true revolution of the Western World, and in this light the Communist doctrine is seen as the black reaction dating back in fact to the Ptolemies. We are living in an age that presents problems of a magnitude and type never before faced by man, and the price of failure is in fact not only the continuance of civilization as we know it, but also the continuance of the race. It is axiomatic then that strong measures and realistic thinking are required. . . .

One of the main areas for action in this sense is that of civil defense, for here public interest is, for all practical purposes, nonexistent. Russia today has the most active and modern civil defense organization of any nation in the world; for example, it is mandatory that every Russian youth spend several hours a week on relevant civil defense study prior to reaching age fifteen. How much time does the average American teen-ager spend on similar study? Or for that matter, how much time does any average American spend each week on similar activity? . . .

Men and women in our armed forces every day risk their lives to ensure our survival. Can we then not equal in dedication and purpose and devotion this example, perhaps best apotheosized in the men of our Strategic Air Command, who for over a decade now have borne the greater part of the responsibility for the security of the Western World? . . .

Civil defense, of course, is only one facet in the continuum of this total problem, albeit one of the more obvious ones. It is essential that provision be made to expand our missile program, to provide for airborne alerts, to provide for more sophisticated manned delivery systems. Provisions must also be made for dealing with the so-called

limited wars by an efficient nonnuclear force aided by a modernized Military Air Transport Service. From the above one must conclude that it is impossible to put a price tag on national survival, nor is it necessary to do so. Leading economists such as James Tobin and Gerhard Colm assert that the primary efforts mentioned above are well within the capabilities of our economy.

Perhaps more important than these obvious material things is something less substantial materially but of vital spiritual significance; this is a rededication to a national purpose, a reawakening within every one of us of the spirit that made our nation great and can bring it to greatness again. This, of course, presupposes that we first define exactly what our national purpose is. In detail this may vary greatly from individual to individual, but the core remains essentially constant-this purpose is best expressed I feel in the words of Thomas Wolfe, who wrote: "I think the true discovery of America is before us. I think the true fulfillment of our spirit, of our people, of our mighty and immortal land is vet to come. I think the true discovery of our own democracy is still before us. And I think that all these things are certain as the morning, as inevitable as noon. I think I speak for most men living when I say that our America is Here, is Now, and beckons on before us, and that this glorious assurance is not only our living hope, but our dream to be accomplished. . . .

A basic and complete change of attitude upon the part of the American public is absolutely essential; we must return to the pioneering spirit of our forefathers and face with confidence the challenges of the new age.

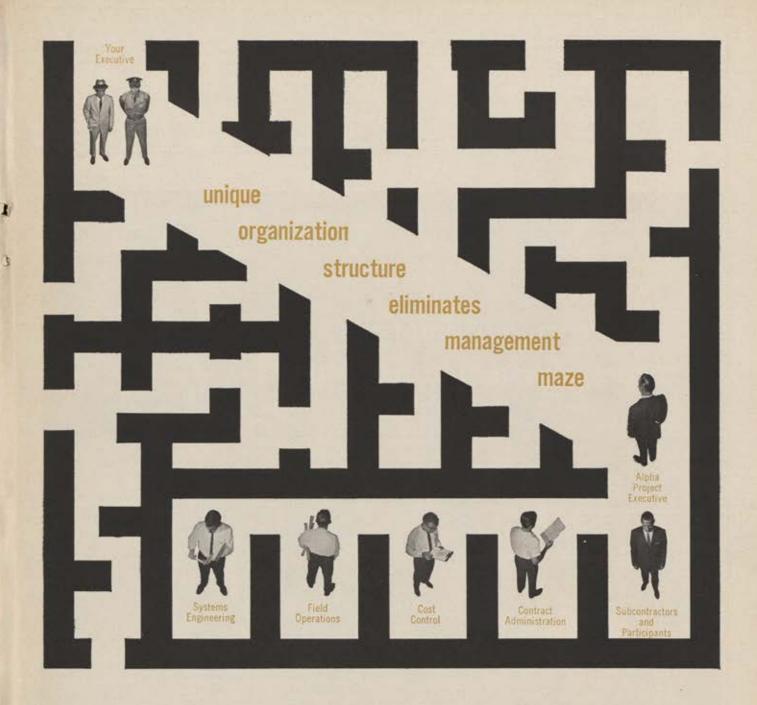
Shall we then not dedicate ourselves to our nation, our people, and our God? We must answer this, the greatest challenge of any age. We, as a people, must be worthy of our destiny, for if we fail, our memorial shall be a shattered and a ruined world.

> Robert B. Wallace Lynnfield Center, Mass.

Nuclear Tests Rebuttal

Gentlemen: I would like to comment on Maj. David H. Rust's letter [about nuclear tests] in the July issue of Air Force/Space Digest. The "certainties" Major Rust mentions only serve to indicate the ignorance of many people who should be better informed on the subject of nuclear weapon tests. First of all, the allegation that nuclear weapon test will inevitably lead to

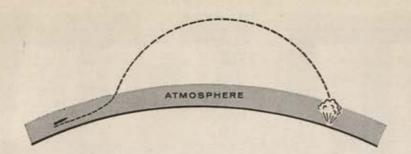
(Continued on page 15)



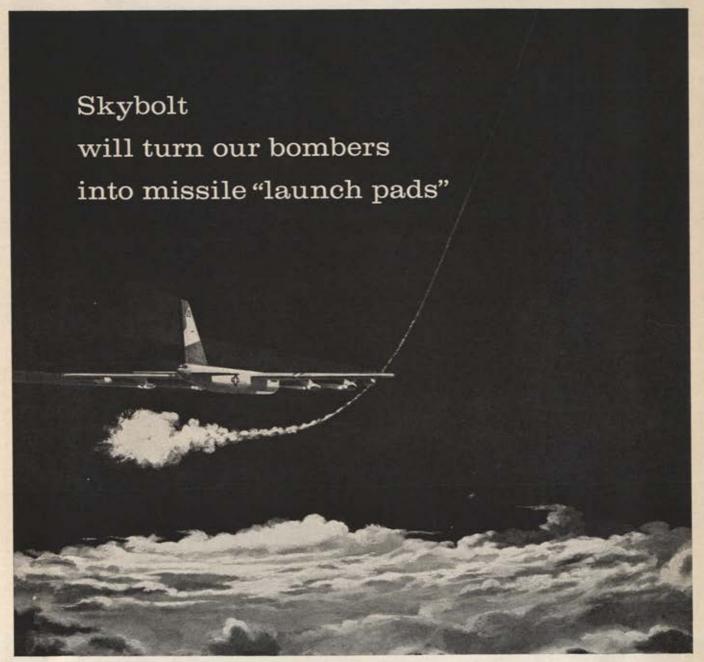
Alpha provides positive systems project execution

Alpha's Project Executive deals directly with the customer and has complete authority, responsibility, and accountability for the timely execution of the project. This unique organization structure provides complete coordination of systems management and engineering within the assigned project division. It provides your executive and Alpha management with quick, direct access to the facts on project status and performance.





When operational, Skybolt ballistic missiles could ring an enemy with sure retaliation...and make any aggressor think twice.



Nineteen years of Douglas experience with military and space-research missiles is wrapped up in the Air Force's new Skybolt GAM-87A—an air-launched hypersonic ballistic missile now under development.

This potent missile is designed to be launched from bombers more than 1000 miles from target. This mobility will make it practically invulnerable to surprise... and will give SAC time to make sure an attack has actually begun before starting nuclear retaliation.

Launching Skybolt from present-day bombers will provide a maximum deterrent at minimum cost.

Skybolt will become another in a long list of practical defense weapons from Douglas that fit our needs and budgets.

DOUGLAS

fatal pollution of the atmosphere is demonstrative proof of the effectiveness of Soviet propaganda-under-ground tests will yield invaluable data and will not result in any harmful contamination. Even surface tests of small weapons will make insignificant contributions to the radioactive debris content of the atmosphere. The second "certainty" mentioned, namely, that weapons tests consume significant quantities of "irreplaceable" fissionable material, again shows ignorance of the quantities involved. Conservative estimates of nuclear fuel reserves indicate that sufficient ore exists to supply the world's energy needs for over 4,000 years. This assumes no increase in power production technology or development of methods to produce power from nuclear fusion.

I fail to see of what value nuclear fuel reserves will be if the free world allows itself to be conquered by not developing adequate nuclear armament for defense. Every interested person should read the excellent book [Nuclear Policy for War and Peace] by Mr. Thomas E. Murray, former AEC commissioner, in which he makes abundantly clear the vital need for resuming weapons tests. . . .

It is extremely dangerous to gamble with the nation's security with a blind refusal to resume tests.

J. T. Mace West Fork, Ark.

Song Contest?

Gentlemen: . . . I would like to know whether the Air Force has a marching, flying, fighting, or whatever, song of

UNIT REUNIONS

14th Fighter Group-Sept. 24

Fairmont Hotel, Florentine Room, San Francisco, Calif. (6:30 p.m.) Contact: Ed Tindell c/o Appleton & Cax

141 Battery St. San Francisco 11, Calif.

96th Bombardment Wing (Reactivated)

Will host reunion of former unit members October 27-30 at Dyess AFB, Tex. Contact: Reunion Committee 95th Bomb Group Association

769th, 770th, 771st Sqdns., 462d Bomb Group, 20th Air Force

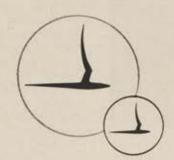
Date and site unknown at present. Contact: Jerome Boxer 59 Franklin Rd. Scarsdale, N. Y.

Dvess AFB, Tex.

its own; or, is it still staggering along with the old Army Air Corps anthem? In case the latter is answered in the affirmative, I would like to make the following well meant suggestion: How about starting a drive to get a decent piece of music adopted in place of the old terror? There is now, possibly, a really proper composition that may be knocking around on the loose. It is "The Guadalcanal March," from "Victory at Sea." All it needs is Air Force words and a change of title to become a classic among American military music. . . .

A. C. Watts Shreveport, La.

• There has never been an official USAF song. By tradition they use the Army Air Corps' "Wild Blue Yonder." It is difficult to claim one song as official overnight. For example, "The Air Force Blue," used by the recruiting office, is a good one, but not many people are familiar with it. The AF Band welcomes suggestions and attempts to create an official song, and if reader Watts has verses written to go with "The Guadalcanal March" they will be glad to look it over—The Entrops



LEAD TIME THROUGH RESEARCH

CORNELL AERONAUTICAL LABORATORY, INC.

OF CORNELL UNIVERSITY BUFFALO 21, NEW YORK



Claude Witze

Daddy Is So Rich

WASHINGTON, D. C.

There is a story current in the Capital, credited to Vice Adm. Hyman Rickover, about a young mother who took her two boys, ages eight and ten, aboard an aircraft carrier to see their father, who was captain of the ship. They were met at the foot of the gangplank by an orderly and greeted at the top of it by the executive officer. Finally they went to the captain's quarters, where they were served a delicious lunch, with nice service. When they left there was a similar ceremony in reverse with more courtesies from the executive officer and the orderly. As they walked down the

Maurice H.
Stans,
Director,
Bureau
of the
Budget.



dock one of the boys looked up with a fully reasonable question: "Mother," he said, "why is daddy so rich and we are so poor?"

Apart from the fact that it would delight fans of Art Linkletter, this yarn is not funny. It was used this spring, for example, to point up the absurdity of the financial bottleneck that has delayed work on a program of nuclear power plants for use in the Antarctic. The project is essential from the standpoint of simple economy, technological progress, and international prestige. It has been held up because the Bureau of the Budget insists it cannot be started unless the Navy can find the money. The Navy cannot do this without sacrificing some activity or system more essential to the Navy's prime mission. It appears that the program was broken loose in early August with an announcement by the Atomic Energy Commission that the Martin Company has been selected to design a reactor and testoperate the plant at McMurdo Sound. From exchanges entered in the Congressional Record it appears that this came about only as a result of some blasting efforts by the Joint

Committee on Atomic Energy, headed by Senator Clinton P. Anderson.

The background on this imbroglio provides a fascinating study, largely ignored by the press, in monkey wrenches and how the machinery can become clogged because some people find it so easy to drop their tools into well oiled gears. The case history has the merit, from our viewpoint, of being disassociated from the Air Force, weapon systems, and the entire question of national defense. At the same time it illustrates most of the weaknesses of the decision-making process as it has developed over the past decade.

The basic problem is not complicated. We are working hard on research operations in the Antarctic. There are requirements for electric power at McMurdo Sound, a station at the South Pole, and a third point in Antarctica called Byrd Station. The power requirements are growing. Without getting into technical details, even the milkman from Kenosha and the congressman from Kentucky can understand that meeting this demand with diesel generators presents a problem in logistics. There are no oil wells and refineries on the ice cap. There are only three or four months in a year when resupply operations can be carried out before 150 men are locked up in their bases for eight months of Antarctic isolation.

Here we turn to arithmetic. It is the Navy that is charged with the logistics mission-the job of moving all supplies to the Antarctic stations. Eighty percent of this transportation requirement is to provide oil for heat and power. The cost of fuel oil at McMurdo runs from \$1 to \$3 a gallon. At the South Pole and Byrd Station it is from \$7 to \$10 a gallon. At the Pole and Byrd the fuel is flown from McMurdo, where it already is expensive, and parachuted to the sites in fifty-gallon drums. Each drum costs \$7.10. There are four on each drop pallet, and each pallet costs \$139.28. Each pallet is tied to a parachute valued at \$56.25. None of this equipment can be recovered, and the taxpavers, whose interest everybody is trying to protect, are spending more than \$4,000 per plane load to scatter this stuff over the snow and ice. On top of this, it takes 6,000 gallons of aviation gasoline to deliver 3,600 gallons of diesel fuel. Then, in addition, there are the mishaps inherent in this kind of perilous operation. From the start of Operation Deep Freeze I through Deep Freeze V we have lost the lives of seventeen men, seventeen aircraft, and thirteen ground vehicles. The lost airplanes and vehicles cost \$10,481,000. It has been estimated that the end of this demand for transportation of fuel oil to the Antarctic would result in the saving of lives, equipment, and money on the order of \$80 million over the next twenty years and still allow for the funding to pay for design and installation of atomic power plants.

All of these facts, offered in testimony by competent witnesses from the Atomic Energy Commission and the Department of Defense, are on the record. They were given to the Joint Committee on Atomic Energy at hearings held (Continued on page 21)



Bell's HIgh PERformance NAvigation System - symbolized.

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It can pinpoint a long-range missile on target. Guide a satellite or space ship to any point in the universe. Regulate the predetermined course of a surface vessel or submarine to any spot on the seven seas — by any route, however circuitous.

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This is **Hipernas**, a self-compensating, pure inertial guidance system developed by Bell's Avionics Division. Designed for the U.S. Air Force, **Hipernas** is so versa-

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Hipernas — and many other systems such as the Air Force GSN-5 and the Navy's SPN-10 All-Weather Automatic Landing Systems — typify Bell's capabilities in the broad field of electronics. This diversity of activities offers an interesting personal future to qualified engineers and scientists.

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Avionics Division

BELL AEROSYSTEMS COMPANY BUFFALO 5, N. Y. NASA / Little Joe

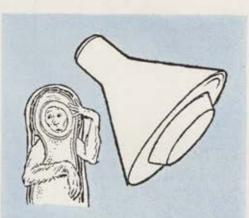
Consistently successful flight performance in Project Mercury confirms unsurpassed reliability of THIOKOL solid rocket motors.

Time after time, NASA's workhorse, Little Joe, has soared into space, checking out the workability of materials, propulsion and escape systems, and reaction of research animals to the environment of space flight.

Pollux, Recruit, Castor-solid rocket motors from THIOKOL's Elkton and Redstone Divisions-have unfailingly provided the thrust and power for Little Joe in its developmental flights.

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In NASA's Little Joe series, THIOKOL booster motors in various configurations have developed up to 250,000 lbs. thrust, today's ICBM class. Smaller THIOKOL rockets have been used to free escape capsule from booster.



Little Joe has carried this research and development capsule and research animals to varying altitudes to obtain engineering and medical data prior to launching man into orbit with subsequent safe recovery. The reliable THIOKOL solid rocket motors used in these missions are virtually offthe-shelf items and are available to other research groups.

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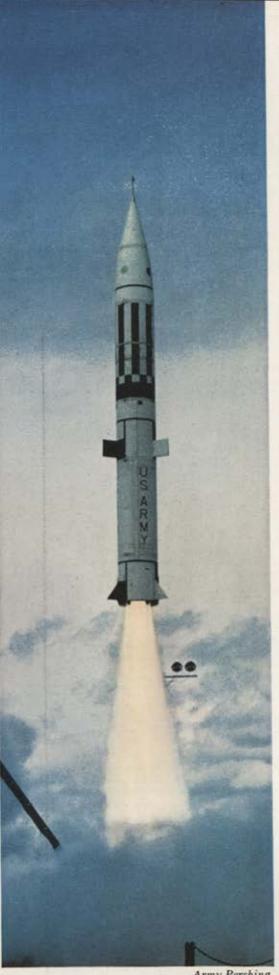
Navy & Air Force Bullpup



Air Force Mace



Army Lacrosse



Army Pershing



Air Force Titan

Five major U.S. missiles developed and built by Martin



in March and April of 1960. With them on the record, on May 17, 1960, more than a month after the hearings closed, the Bureau of the Budget disclosed it had asked the Department of Defense to review the advantages of nuclear reactors in the Antarctic.

Now the Director of the Bureau of the Budget is a man named Maurice Stans, who is a big game hunter and accountant of renown. A kindly profile of this public servant in a popular magazine recently quoted him as saying: "The psychology that the government can spend unlimited amounts of money without anyone having to pay for it is one of the least rational of our times." At this point the type, next to a big picture of Mr. Stans in his trophy room, ran out. If the Director of the Bureau of the Budget knows any person in public life or out, military or civilian, Republican or Democrat, Communist or capitalist, who is under the influence of this psychology, that person was not named. Either the reporter ran out of space at an unfortunate spot, or Mr. Stans is shooting straw men just as adeptly as he does giraffes, antelope, and other fauna of the jungle.

The request of Mr. Stans that the whole question of atomic power for Antarctic stations be reviewed was made known to the Joint Committee on Atomic Energy after (1) the committee hearings showed substantial economic advantages would result from the atomic power program, (2) \$13 million was added to the authorization bill to start work on the program, and (3) the report calling for the use of nuclear power was approved by the National Security Council. If the committee, its technical witnesses, and the NSC adheres to a psychology that nobody has to pay the bills, that is a fact known only to Mr. Stans and does not appear in the published record.

The project was broken loose in early August by Senator Anderson and his colleagues, Senator Henry M. Jackson and Representative Chet Holifield. The committee told Mr. Stans:

"It is incomprehensible to us that the Executive branch has still not formulated definite plans for the project and has not taken any positive action to start work on the plants.

"We are very much concerned with the lack of initiative and responsibility shown by the Budget Bureau in regard to this project, and with the consequences of the loss of a whole year if responsible action is not taken immediately."

The whole year will not be lost, thanks to the committee's pressure, but the Martin Company now faces the tightest timetable ever forced on a contractor undertaking development of a new reactor. The announced contract, for the McMurdo Sound power package, still remains to be negotiated. It will be for a fixed price of not more than \$3,950,678.

The Political Challenge

The affair of the Antarctic atomic power generators and the delay of nearly three months forced on the program by Budget Director Stans provides truthful and dramatic background for examination of other projects, some of them more vital to the nation's security. "Mere parsimony is not economy," wrote Edmund Burke. "Parsimony requires no providence, no sagacity, no powers of combination, no comparison, no judgment."

As Director of the Bureau of the Budget, Mr. Stans attends meetings of the National Security Council and hence knows what the Council wants, including its opinion on nuclear power units for the South Pole and weapon systems. The Navy testified that it could not start work on the nuclear power plant, because it has a ceiling on its expenditures. Mr. Stans has said in sworn Senate testimony that

his bureau does not set ceilings, and that it does not make war plans or propose war strategy. These are matters determined by the Joint Chiefs of Staff, he says, and there is no dollar limitation set. Then:

"But we do feel... that our responsibility is to see that the money that is spent on defense is spent effectively and efficiently, that there is no more overlap than is necessary, that there are no gaps in the programs, that we get 100 cents of value for every dollar spent on defense.

"That is the basic purpose of the review function of the Bureau of the Budget, to ask questions and to challenge programs on the basis of the knowledge and experience of our people over the years with respect to the defense budgets."

The final decisions, Mr. Stans says honestly, are made by the President, after his bureau has challenged programs already supported by the Joint Chiefs, the National Security Council, or a Joint Congressional Committee. At this writing the Senate is in session for its extraordinary post-Convention meeting, and the whole town is watching with interest as these challenges are brushed aside, a piece at a time, by the demands of the political campaign.

The combined efforts of Democrat John Kennedy and Republican Nelson Rockefeller now appear to have made defense a potable election issue, as outlined in the party platforms on pages 6 and 7 of this issue. There are signs that this is known at the White House, where the President, who makes the final decisions, has denied there is a freeze on expenditures for defense. "The proposition," he said, "hasn't even been put before me in those terms at all, whatsoever." Well, if it hasn't, that must be because Mr. Stans and his staff say the money is "available for future requirements" instead of "frozen."

The man who is making an issue out of this is the Democratic vice presidential nominee and majority leader of the Senate, Lyndon B. Johnson. He has, in effect, accused the White House of "unfreezing" \$476 million and keeping \$621 million on ice, while giving in to the party platforms as little as possible. The common Democratic opinion in Washington, here at mid-August, is that more money will be made available between now and Election Day, the amount to be determined by the degree of political heat put on by party orators, aided from time to time by people like Khrushchev or Castro. "The effort," said one informant on Capitol Hill, "will be to fuzz the picture as much as possible, with the Budget Bureau and the Defense Department both scraping hard from now until November."

What makes the political picture interesting at this point is the situation among the Republicans. If they hold a tight purse they are in danger of repudiating the Republican platform. If they loosen the strings they are in danger of repudiating the President and thus trip over a real tight rope—the one that restrains his "feelings of indignation" when people criticize his defense program.

In the initial move, so far as the Air Force is concerned, there are cautious words about some of the additional money provided by Congress for airborne alert capability, development of the B-70 Mach 3 bomber, and the Samos satellite program. No substantial improvement in effort is indicated.

The Needs of Our Time

Democratic candidate Kennedy's selection of Senator Stuart Symington to head a committee on reorganization of the Defense Department has spurred speculation that the Missourian is destined to boss the Pentagon if his party (Continued on following page) wins the election. Meanwhile, the Senator and his committee are to prepare a report on "how to strengthen the Defense Department and make it more efficient and more responsive to the needs of our time."

Even before the Symington study could be organized Defense Secretary Thomas S. Gates, exercising power already vested in his office, made what he has called the most important decision of his Pentagon tour. It is not the first time Mr. Gates has illustrated,

in contrast to his immediate predecessors in office, that he has privileges and that the very use of them can make the department "more responsive to the needs of our time," even if it is not *much* more.

In this particular case, the problem is the one created by the Navy's Polaris missile system, which is a weapon destined for use on strategic targets. The Air Force has been concerned about the certainty that target planning by the two services would overlap. It sug-

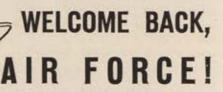
gested a single, centrally controlled strategic force, but the idea has been rejected in favor of a central planning group to assign nuclear weapons to enemy targets. Gen. Thomas S. Power, boss of the Strategic Air Command, will head the new group with a Navy officer as his deputy. The Joint Chiefs of Staff will make final command decisions.

Mr. Gates says this is not a compromise, worked out by his staff to placate an interservice clash, but it certainly has the earmarks of one, designed to keep all three branches of the armed forces in the strategic pool. It also can be viewed as an adoption of the USAF proposal with a wrinkle that will silence Navy apprehensions, real or false. It is of almost equal interest that the action was taken, about a year after the Air Force raised the question, just as the Democratic candidate and the man who may replace Mr. Gates as Defense Secretary are about to draft a program for some kind of reorganization. And there is some similarity between Mr. Gates' solution to his quandary and the known opinions of Mr. Symington. The Senator, himself once Secretary of the Air Force, has publicly called for a reorganization along functional lines, with separate forces for major missions: retaliatory, defense, limited war, and logistics. Last February he introduced a bill that seeks to retailor the military forces in keeping with a single over-all war plan. It favors more unified commands. for one thing. Mr. Symington has said the services are "in active competition in weapons systems, in the bidding for skilled personnel and in the struggle for the most desirable engineering and production facilities." He has deplored the existence of four air forces. two land combat forces, and the fact that everybody is trying to get in the space act.

Mr. Gates, as the first strong Defense Secretary of the Eisenhower Administration, probably can do something about each of these problems if he works long enough and hard enough to lick them. But the fact that he can do this, as he compromised in the case of the strategic target planning problem, does not mean further reorganization is not needed. Charles E. Wilson and Neil McElroy parried with some of these things too, and the results did not eliminate any of the grumbling.

Congress can't legislate the appointment of competent people to administrative jobs. Good organization can protect us to some extent from the incompetent ones.

(Continued on page 25)



YOU CAN REFUEL AGAIN AT SOUTHWEST AIRMOTIVE - DALLAS

For the 8th time in 9 years, we have received the Military Petro-leum Supply Agency contract to service transient military aircraft around-the-clock at Dallas' Love Field.

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The first equipment to successfully automate the processing of three-dimensional data direct from a working radar, the AN/FSA-12 (XW-1) has operated since 1958. This detector tracker has enabled General Electric to develop many improved radar techniques and equipment.

New concepts in correlation and smoothing in the track-while-scan method have been demonstrated. Delay lines applied to digital techniques and plug-in wiring boards have been improved. New ideas in data storage and digital circuitry have been applied.

This experimental model continues to be a proving ground in research and development of advanced military electronics. A completely solid state production version of the AN/FSA-12 will soon be available for many of our nation's air defense radar sites. 176-04

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GENERAL & ELECTRIC

DEFENSE ELECTRONICS DIVISION
HEAVY MILITARY ELECTRONICS DEPARTMENT * SYRACUSE, NEW YORK

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The T-39 Sabreliner is the Air Force's first twin-jet utility trainer. Now in production, it carries on the heritage of North American Aviation's renowned Sabre aircraft—the F-86 Sabre Jet and the F-100 Super Sabre.

Designed and built by North American for the Air Force, the versatile Sabreliner now is undergoing FAA certification that not only meets all military requirements but also civil specifications.

An important consideration in designing the Sabreliner was economy of operation. The result is a highly practical airplane not only when flying, but also during servicing and maintenance.

A wide range of capabilities makes the Sabreliner a highly versatile and hard-working member of today's Air Force. Carrying four students and a crew of two, it functions as a radar, navigation, or jet-proficiency trainer.

In performance, the Sabreliner rivals commercial jet airliners. Two Pratt and Whitney J-60 (JT-12) engines, with a thrust of 3000 pounds apiece, give it a cruising speed of 500 miles an hour at 40,000 feet, well above most weather. It can fly 1500 nautical miles without refueling, and can land or take off at the airport of almost any city.

With its wide range of capabilities, high performance, and low cost of operation, the T-39 Sabreliner promises to be the Air Force's compact workhorse of the jet age.

THE LOS ANGELES DIVISION OF NORTH AMERICAN AVIATION, INC.



Shelters vs. Pools

From time to time there are discouraging signs that the American people do not realize what kind of times they are living in. A particularly revolting example appeared recently in a small newspaper on the outskirts of Washington. The County Council of Montgomery County, Md., was considering some form of special tax relief for home owners who provided their own fallout shelters as part of the civil defense program.

"Just why a bomb shelter should be favored taxwise over a swimming pool that is used only in the summer; over an air-conditioning installation that lies idle all winter, or even over an extra bedroom to be held for grandma and grandpa when they get too old to keep house," is something the local editor

says he cannot understand.

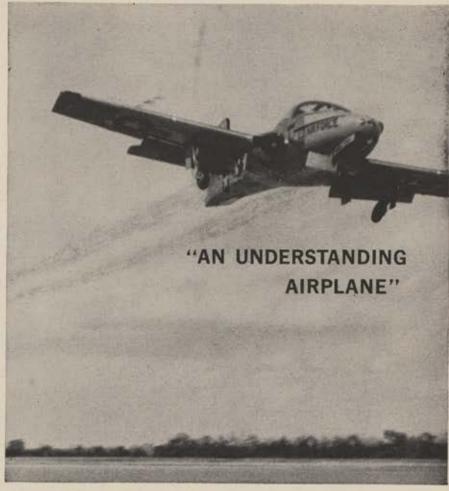
Well, the answer is that the fallout shelter is necessary to survival. There have been comments in this magazine before about the viewpoint that we can't "afford" adequate defense in the midst of a consumer economy that will put a billion dollars into private swimming pools this year. This is the first time we have seen it suggested that there may be a public interest in more private swimming pools, an interest just as vital as survival itself.

Despite such vagaries as those of the perplexed Maryland editor, there are signs that the entire civil defense question is due for a sharp examination. The most encouraging thing is that the new Chairman of the Joint Chiefs of Staff, Army Gen. Lyman L. Lemnitzer, is on record as recognizing that civil defense is part of the deterrent. The sharp truth is that it must become a military mission. The general has told the National Association of Civil Defense Directors the "fastmoving events of current history" are making clear a new interrelationship of military strength and civil defense. They are no longer separate areas. Both are "essential elements of our national military posture." And "all of us charged with national security must give searching attention to the most elemental of our security objectivespreserving the lives of our people."

As a result of General Lemnitzer's

As a result of General Lemnitzer's approach the Army is reported to be abandoning its traditional attitude that civil defense is not its responsibility. In the event of a nuclear attack it is obvious that military control will be as essential. The Army, supported by USAF logistic capability, is the only organization we have that is competent

to do the job.



STUDENT PILOT LEARNS A LESSON—THE EASY WAY

His approach low, an Air Force cadet hits the throttle. Suddenly—instantly—he's nose-up, hurtling skyward again for another try. Key to the instant power: Cessna T-37's thrust attenuators, "confidence builders" that permit thrust reduction while engines race on, restore engine thrust at a touch of the throttle. Good reason—one of many—why the Air Force has selected the T-37 as its standard intermediate jet trainer.



Although the suggestion will be met with expressions of horror in some circles, the National Guard and Reserve forces are getting prominent mention in early consideration of the civil defense reformation. There are some Army Guardsmen who still think they may fight another war in Flanders Fields, and that the citizen soldier again will shoulder his musket. More realistic observers say the Guard and Reserve forces may perform their only and most valuable service right in their own communities in the event of nuclear attack.

In addition to their military training

and capability, these forces will have suitable field equipment at their disposal. Possibly more important, in view of the public apathy typified by our Maryland editor's lack of comprehension, is that once the Guard and Reserve have the mission there will be a new drive behind the effort. Nobody, not even a congressman or an editorial writer, will tend to scorn a Guard or Reserve mission, carried out on US Army orders.

The costs will be immense but more essential than swimming pools, air conditioning, or an extra bedroom for grandma and grandpa.—End



for the needs of motion

While the prime moving forces change as man moves his vehicles from the highway to the sky and on into space, the all-important auxiliary power continues to be electricity. Jet, rocket and missile contractors who are in need of reliable units for the accurate release, transformation and control of vital electric energy can turn to Delco-Remy for certain on-time delivery, whether the quantity be measured in tens or ten thousands.



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From the highway to the stars

nnouncing the formation of AEROSPACE CORPORATION a new and vital force engaged in accelerating the advancement of space science and technology

Aerospace Corporation has been brought into being to serve the United States government by concentrating the full resources of modern science and technology on rapidly achieving those advances in space systems indispensable to the national security.

The corporation is non-profit, will share the findings of its research and laboratory experiments with all appropriate organizations involved in the government's missile-space program, and is not organized for manufacturing purposes.

The immediate responsibility of Aerospace Corporation is to aid the United States Air Force in bringing about the best possible ballistic missiles and military space systems on a continuing basis and within the shortest possible time.

In addition, it may furnish the National Aeronautics and Space Administration and other governmental agencies appropriate services whenever its participation in space exploration and related activities is desired.

THE MISSION of Aerospace Corporation, according to the Secretary of the Air Force, encompasses "the field of ballistic missile and space programs. Within this complete area, it has the responsibility for advanced systems analysis, research and experimentation, and initial systems engineering. It will also exercise such general technical supervision of ballistic systems as is appropriate. In special cases, and with the consent of the Secretary of the Air Force, Aerospace Corporation may assume broader responsibility for an Air Force military system."

The new corporation also provides support to the Air Force in its effort to achieve maximum interchange of knowledge with other military services and among universities, research foundations, and the scientific community in general.

THE FUNCTIONS of Aerospace Corporation in carrying out its responsibilities for the Air Force's missile-space programs include the performance of a wide range of scientific, technical, and administrative tasks.

The corporation will conduct extensive laboratory and field activities aimed at advancing the state-of-the-art and will augment these research and development activities by coordination with industry, universities, laboratories, and other agencies. It is intended that this combined effort will push forward the boundaries of technology on a broad front to fulfill military and other national requirements.

Aerospace Corporation will study the application of the advancing technology to military weapons, support systems, and other systems serving the national need. These studies will culminate in preliminary design and in recommendations for development programs.

Aerospace Corporation will then assist the Air Force or other appropriate government agencies in establishing space programs and in bringing the force of American industry to bear in carrying them out. Once development is initiated, Aerospace Corporation will assume responsibilities for the broad technical aspects of these new programs through their critical phases.

THE FACILITIES of Aerospace Corporation include a research and development center located near the Los Angeles International Airport and within easy reach of several attractive residential communities.

They constitute a modern administrative, scientific, and engineering headquarters which house some of the world's most advanced instrumentation and experimental apparatus.

In addition, the operations of Aerospace Corporation will be directly supported around the globe by a vast array of resources created by the government over the past six years. These will include: The Atlantic Missile Range in Florida; The Pacific Missile Range in California; The Rocket Engine Test Site at Edwards Air Force Base in California; and numerous other missile test facilities sponsored by the government in cooperation with private industry.

THE PEOPLE who make up Aerospace Corporation have been selected from industry, universities, and government. They constitute a crosssection of highly-developed engineering and scientific skills in the missile and space fields.

Extensive recruiting will continue as the new corporation assumes more and more responsibility. From the outset, the corporation is built on a foundation of proven scientific competence, imagination, and objectivity.

THE OPPORTUNITY awaiting those scientists and engineers who qualify to join Aerospace Corporation is equalled only by the magnitude of the corporation's mission — magnitude mirrored by the highly advanced nature of the programs in which Aerospace Corporation is engaged.

Typical systems projects include: advanced ballistic missiles; advanced military space boosters; recoverable boosters and satellites; space defense systems; early-warning satellites; reconnaissance satellites; communications satellites; and manned satellite systems.

Typical research programs concern: nuclear propulsion; astrodynamics; magnetohydrodynamics; inertial elements; millimeter waves; hypersonics; combustion kinetics; and materials research.

Those capable of contributing to state-of-the-art advances in these and related areas are invited to consider the advantages of becoming a part of the new Aerospace Corporation. Their resumes should be directed to: Mr. James M. Benning, P. O. Box 95081-D, Los Angeles 45, California.







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HCT-7 Test Stand, Fuel Transfer Pump

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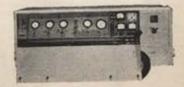


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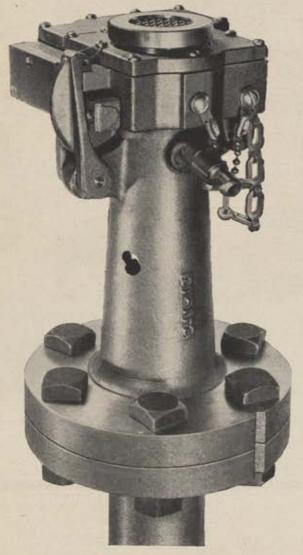


CPT-6 Cabin Leakage Tester



HSU-1A Bomarc Hydraulic, Electronic Flight Control Missile Tester

For Control of Accidentally Ignited Missiles... A Fire Detector and Water Injection Nozzle



GRINNELL

One example of Grinnell collaboration with the Armed Services in the interest of Fire Protection

Missile storage, particularly aboard naval craft, creates critical problems. So Grinnell and the Navy collaborated on the development of this Fire Detector and Water Injection Nozzle. This device is actuated by shock waves should fire start in a missile booster. Then, almost instantaneously, the nozzle delivers a stream of water to control or extinguish the burning.

Another recent development, already in operation, is the Grinnell lightactuated Primac system* for high speed extinguishment in solid propellant processing

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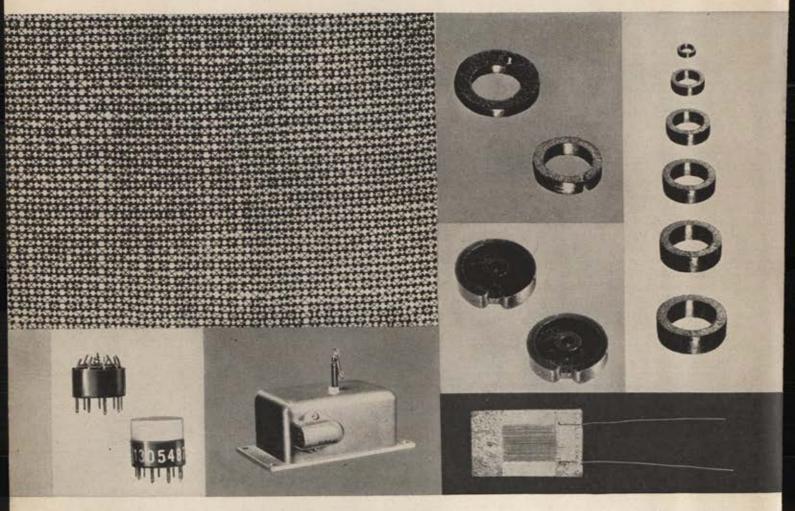
*Patent Pending



Research, Engineering, Manufacturing and Installation of Fire Protection Systems since 1870

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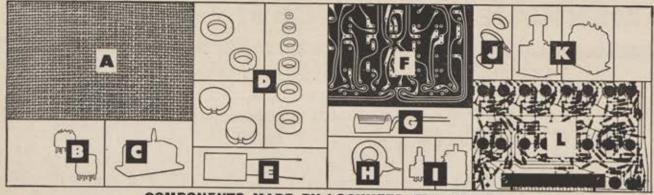


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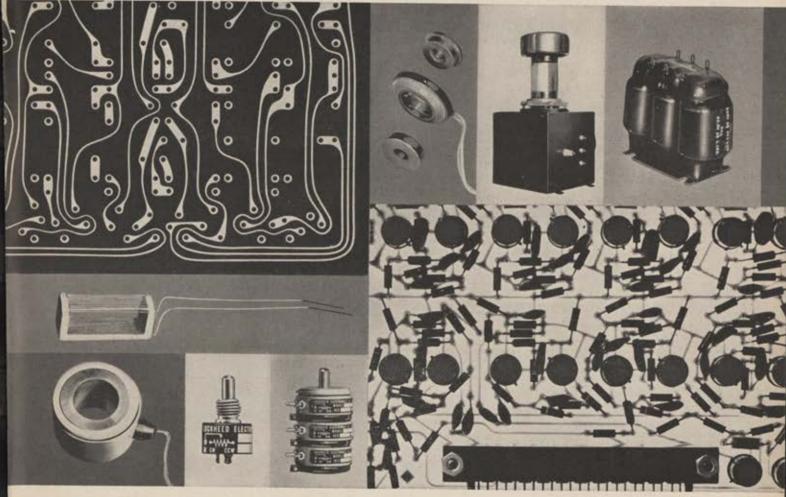
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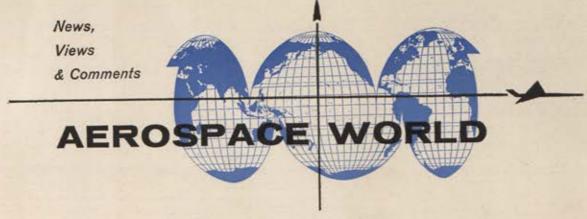


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Frederic M. Philips ASSOCIATE EDITOR

The United States piled aerospace achievement on aerospace achievement this month.

★The X-15 edge-of-space research craft set two new records. NASA test pilot Joe Walker flew the needle-nosed rocket plane to a manned-craft speed record of 2,196 miles an hour on August 4 at Edwards AFB, Calif. On August 12, crack USAF test pilot Maj. Robert M. White rode the little ship to an altitude of 136,500 feet, also a new mark for manned flight, in another test of the Edwards series.

Both eclipsed records set in 1956 in the ill-fated X-2 research plane. USAF Capt. Milburn Apt set the previous speed mark of 2,094 mph on September 27, 1956, then was killed when the X-2 went out on control. He managed to eject in an escape capsule as the plane tumbled tail over nose, but apparently lost consciousness before he could parachute to safety.

The former highest-altitude figure was 126,200 feet, attained by USAF Capt. Iven C. Kincheloe, also in the X-2, on September 7, 1956. Captain Kincheloe was later killed in a jet fighter crash.

Lessons learned from the X-2 played their part in the spectacular performances brought off in the X-15 by pilots Walker and White, who thereby became history's highest and fastest humans. The new records, it should be noted, far surpassed height and speed records set last December by USAF pilots in service jets. But it did not supplant them in the international record books. Test planes are not in competition with in-service craft in that regard. In addition, unlike the planes that took part in the December flights, the X-15 is air released from a B-52 mother plane rather than ground launched.

*Air Force Capt. Joseph W. Kittinger, Jr., continued his fantastic exploits as balloonist-parachusist. He jumped from an open balloon gondola some 103,000 feet-about twenty miles -above the New Mexican desert on August 16. The exact altitude was not immediately determined.

In the doing, Captain Kittinger broke four decords, three of which he himself established last November. The ascent bettered the 102,500-foot altitude reached by USAF Lt. Col.

David G. Simons in a closed gondola in his man High II flight in 1957. Captain Kittinger himself had set the previous mark with a flight to 96,000 feet in a closed gondola in Man High I earlier in 1957.

The three November marks that went by the boards were these: highest flight in an open gondola, 76,400 feet; free fall before opening parachute, three minutes and 66,400 feet; longest parachute jump, 76,400 feet. This time, Captain Kittinger free-fell for four and a half minutes and from 84,000 feet. Pre-Kittinger jump mark was 51,000 feet set by Swiss balloonist August Picard twenty-nine years

*Discoverer XIII, another in a highly successful, two-year-old Air Force satellite series, scored a vastly significant "first." A Thor-Agena booster placed the satellite in orbit from Vandenberg AFB, Calif., on August 10. Next day, the US retrieved a 300-pound space capsule dropped by the orbiting Discoverer. This was the first man-made object known to have been recovered from outer space. Six times previously such recovery attempts had been made after Discoverer launches, but all had failed.

The capsule, a ninety-eight-pound half-globe loaded with instruments, this time fell in the planned recovery area west of Hawaii. USAF C-119s and Navy recovery ships waited there. A helicopter from the Navy recovery vessel Haiti Victory actually effected the pickup with the aid of circling Air Force planes and a frogman.

The recovery hastened the day when men can be recovered from space. Nearer at hand, recovery of instruments, animals, and various test materials would play a big role in the nation's man-in-space program. Discoverer XIII's recovered capsule, minus instruments, was placed in the

(Continued on page 39)



Three test pilots and their record-setting X-15 edge-of-space craft. Left to right, NASA's Joe Walker, USAF's Maj. Robert M. White, and North American's Scott Crossfield. NASA pilot set new speed record for manned flight in X-15 this month. Following week, USAF's White flew it to record altitude mark.



At dash speed, the B-70 will fly a mile for every breath you take. From 13 miles up, the pilot will be able to direct his VALKYRIE across continents in an hour and a half. It represents the greatest single step forward in manned weapon systems for advancing United States air supremacy.

North American's B-70 is far more than a new USAF bomber. It will complete the awesome deterrent of a mixed force of missiles and manned systems.

Power for the VALKYRIE comes from J93 turbojets by General Electric... a name which is synonymous with both pre-eminence and dependability.

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Smithsonian Institution in Washington a few days after it returned from space.

★The very next day, August 12, NASA sent a giant communications satellite, Echo I, into orbit. The new satellite, an aluminum-coated balloon as high as a ten-story building, immediately was put in use as a passive relay station for ground-originated radio messages. Less than four hours after its early-morning launching, a prepared greeting from President Eisenhower was bounced off Echo I from a facility in Goldstone, Calif., picked up at Holmdel, N. J., and played at a news conference in Washington, D. C.

Echo I was the first of a family of satellites expected to greatly facilitate international communications, including global "live" television. Radio experimenters through its early days bounced signal after signal off it across the country. Intercontinental efforts were to follow.

Along with the Transit navigation satellites and Tiros weather satellite launched previously by the US, Echo I weighed in as a genuine contribution to the peaceful use of space in the service of mankind. The satellite, visible to observers in many parts of the United States, was expected to live for about a year. It weathered a storm of "space debris" a few days after it was launched.

★Three more Atlas launch facilities became operational and were turned over to SAC at Warren AFB, Wyo., USAF announced on August 10. They joined the free world's first operational ICBM sites at Vandenberg in the combat-ready deterrent force. As if to dramatize this important development, on August 9 an Atlas went 7,000 miles in a shot over the Atlantic Missile Range, second longest US ICBM shot. Longest went 9,000 miles earlier this year. Russia has dropped a few in the 8,000-plus range in the Pacific.

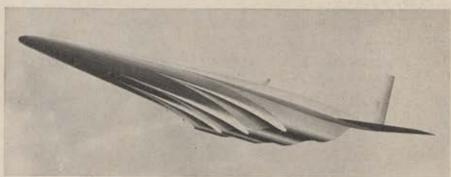
In a further major advance on the ICBM front, USAF successfully fired an operational-type Titan for the first time at the Cape on August 11. The "J" model Titan, which had failed in two previous tries, went 5,000 miles.

★The Navy fired its Polaris strategic weapon from the submarine George Washington submerged off the Florida coast twice on July 20 and once again on July 30. Another try went awry a few days later. The successful shots, each of which distanced over 1,100 miles, were the world's first known underwater-launched ballistic missile flights, although Russia

(Continued on page 41)



Left, a flying saucerlike aircraft called the Avrocar, a product of Avro Aircraft of Canada, which is under USAF, Army test. A VTOL craft, it is designed to hover near the ground on a cushion of air.



Plane of future? Aircraft designer Alexander Kartveli said in a recent talk that four generations of planes, some perhaps like this, lie ahead of us.

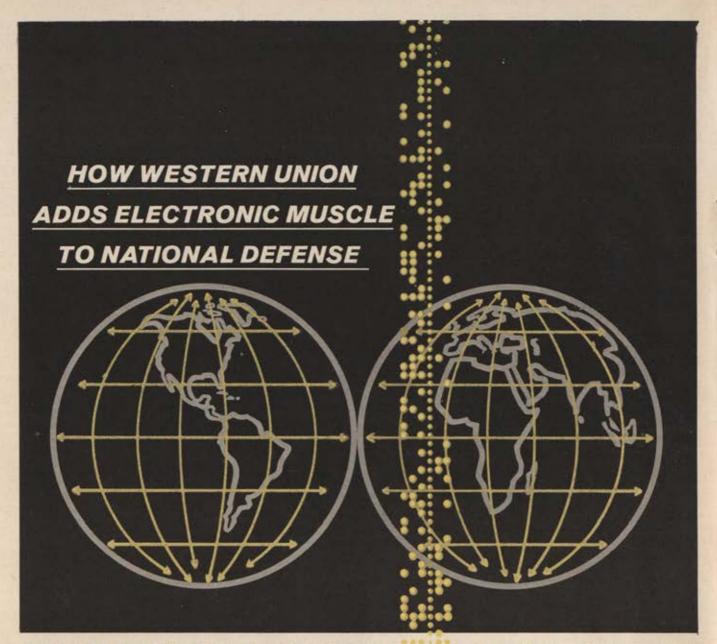


U. S. Army Signal Corps SWALLOW AN/USD-4 Combat Reconnaissance Drone Produced by Republic Aviation—Equipped with TI Surveillance Sensors

TI IN SURVEILLANCE SYSTEMS

APPARATUS DIVISION

TEXAS INSTRUMENTS



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Western Union's Plan 55 is the heart of the Air Force's Aircomnet-global Communications System. Operating out of ten major switching centers in the United States, Japan, Hawaii, England, Spain, and Germany—this 5½-million-mile automatic teleprinter system is compatible with other forms of military electronic communications. Minimum daily capacity is 130 million words, with speeds of up to 100 words per minute. Messages flash automatically and instantaneously . . . literally with the speed

of light. The entire network is engineered to give urgent messages prime priority with continuous automatic checks to insure proper operation. This is but one of many ways Western Union keeps pace electronically with the ever-growing demand of National Defense. These Air Force Centers and other similar facilities operated by the military departments will become a part of the Defense Communications System (DCS) under the control and supervision of the Defense Communications Agency.

WESTERN UNION . . . finds better ways to speed it electronically.

is known to be working in this area.

It was, in fact, a month in which America felt once more like a firstclass power that expects to stay that way. Only major event on the less favorable side of the ledger came with the failure of an attempt to launch an unmanned Project Mercury capsule of the sort that will take the nation's first Astronaut into space.

The capsule plunged into the Atlantic off the Cape and sank when its Atlas booster blew up shortly after liftoff on July 29. The seven Project Mercury Astronauts watched the shot; if one of them had been in the capsule, it was said, he might well have escaped death through the nature of capsule safeguards. Another such unmanned shot was scheduled for the near future.



Troubled Congo has been the scene of an impressive Air Force airlift operation, largest since the Berlin Airlift of 1948,

By early August, USAFE and MATS aircraft had transported approximately four million pounds of equipment and supplies and some 9,000 United Nations troops to the new African republic. The cargo included about two million pounds of food.

In addition, brought out aboard US planes were 2,300 refugees. Most of these were Belgian, but also included were nationals of most other major European nations and a sizable handful of Americans.

Two MATS C-124 aircraft evacuated 122 Americans to this country on July 19. Most members of the group were missionaries or their families. They fled so precipitately in the face of native violence that the entire 122 brought along only thirty pieces of baggage.

Taking part in Operation Safari, as USAF's Congo operation was dubbed, were USAFE C-130 Hercules transports, MATS C-124 Globemasters, and a joint US armed forces aerial task force of light aircraft and helicopters. The latter combed the Congo for isolated refugees and performed a variety of utility missions.

The lightplane and copter flyers ran into some odd experiences in isolated locations, as might have been expected. A few were fired on. At least one plane received bullet holes. In one instance, a native attacked a lightplane with a bow and arrow.

Clare Timberlake, US ambassador to the Congo, observed of Operation Safari and its airman participants:



B-47 formation with one plane missing in traditional salute to a fallen comrade passes over at funeral for Reddowned RB-47's pilot, Maj. Willard G. Palm, in August 4 rite at Arlington Cemetery.

"If these men had been selected six months ahead and trained specifically for this mission, they couldn't have done a better job."



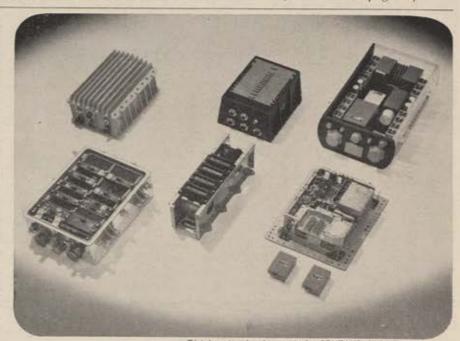
ELSEWHERE IN THE AEROSPACE WORLD:

The Air Materiel Command was assigned management responsibility for ballistic missile site activation. Air Force Secretary Dudley C. Sharp announced the action on July 20, noting that it was the result of consultations by top Air Force commanders

since mid-1959. ICBM programing to this point has been accomplished under management of ARDC's Ballistic Missile Division with participation by AMC's Ballistic Missile Center and the Strategic Air Command.

Secretary Sharp said that it was judged more efficient at this point in missile development "to separate the development and site activation responsibilities. Named head of the Ballistic Missile Center with responsibility for site activation was AMC's Mai. Gen. Thomas P. Gerrity.

(Continued on page 43)



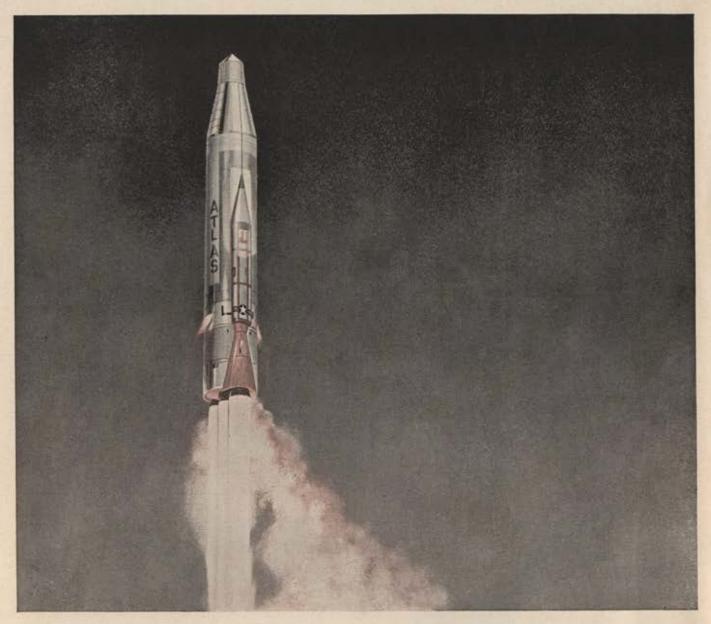
TI telemetry developments for CENTAUR, MINUTEMAN, TITAN, PERSHING, BOMARC and Project MERCURY.

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CONVAIR, a Division of General Dynamics, selected CATALYTIC to install and modify mechanical ground support equipment and to perform complete maintenance and operation services at this facility.

The numerous skills acquired during the accomplishment of projects in the petroleum, petrochemical, chemical, metallurgical and nuclear fields were successfully utilized on this major phase of the national defense program.

This ATLAS installation is another example of how CATALYTIC'S recognized technical abilities can serve YOU.

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In another important move, USAF disclosed further air defense modifications late in July. Under it, seven interceptor squadrons will be deactivated, four USAF and seven Air National Guard squadrons will be reequipped with later-model interceptors, aircraft strength in four USAF squadrons will be increased, and eleven radar, one AACS, and one SAGE site will be deactivated. The over-all switch will bring aircraft or mission changes at forty-five bases spread through twenty-three states.

The service announced on August 1, in a closely allied move, that twenty-eight Bomarc-B launchers will be installed at McGuire AFB, N. J., and twenty-eight others at Otis AFB, Mass. McGuire already has twenty-eight Bomarc-A sites. B, a longer-range version of the air defense missile, proceeded in test stage at Eglin AFB, Fla.

On July 14, as a mark of US determination in the Russian-renewed cold war, the US called off talks with Russia on the opening of air routes between the two countries. The talks were slated to begin in Washington four days later.

A USAF C-130 Hercules broke its own two-month-old heavy equipment drop record on July 20. The Lockheed plane, flying over the naval air station at El Centro, Calif., paradropped 40,500 pounds of equipment, On May 12, a C-130 broke the former RAF-held mark of 31,000 pounds dropped in one package. The planes are taking part in a continuing ARDC project.

Russia on July 26 vetoed a United Nations move to conduct an impartial investigation of the July 1 incident in which a USAF RB-47 was shot down. Russia said the plane was over her territory. The US vigorously denied this. The US demand that two survivors of the plane be returned home was ignored by the Reds, but they did return the body of the dead pilot, which was subsequently buried with honors at Arlington National Cemetery. The two survivors remained in Russian hands along with Francis G. Powers, pilot of the U-2, whose trial in Moscow was set for August 17.

The Soviets said on August 1 that Red Air Force Lt. Col. Boris Adrianov in an unspecified plane had set a new 100-kilometer closed-course speed record of 1,297.8 mph, topping the mark of 1,216.48 set by USAF Brig. Gen. Joseph H. Moore in an F-105 last December.

Twelve B-58 Hustler bombers have been delivered to SAC by Convair and assigned to Carswell AFB, Tex., it was made known August 3.

DoD and NASA announced August 4 that they had agreed to pay \$1 million for infringing on the inventions of rocket pioneer Robert H. Goddard. The money goes to the scientist's widow and the Guggenheim Foundation, which supported him through a vital period of his labors.

On August 10, Russia accused US Moscow air attache Col. Edwin M. Kirton of setting up a spy apparatus there. He was asked to leave the country. Two Russian diplomats were also declared persona non grata in Washington on espionage charges this month.

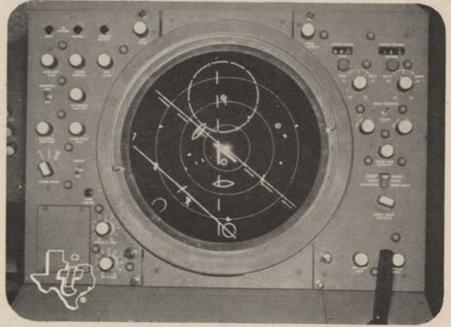
The Minuteman mobility test train program came to a close August 26 after four prolonged runs. The train runs, begun June 20 as the first step in developing Minuteman mobility doctrine, were judged so successful that they could be terminated months ahead of schedule.

Gen. Nathan F. Twining, USAF, submitted his resignation as Chairman of the Joint Chiefs of Staff early in August. Nominated to succeed him was Army Chief of Staff Gen. Lyman L. Lemnitzer. Date for General Twining's resignation to take effect was not specified, but was expected to be early this fall.

General Twining, who will be sixtythree on October 11, began military life as a member of the Oregon National Guard in 1916. He entered West Point a year later, went to flight school in 1923, saw distinguished service in the Pacific in World War II. He became USAF Chief of Staff in 1953, Chairman of ICS in 1957.

STAFF CHANGES . . . Brig. Gen. Milton B. Adams, from Deputy Assistant Chief of Staff for Guided Missiles, to Assistant Chief of Staff for Guided Missiles, Hq. USAF. . . Brig. Gen. Frederick Bell, from Deputy Director, to Director, Maintenance Engineering, Hq. AMC, Wright-Patterson AFB, Ohio. . . Brig. Gen. Charles R. Bond, Jr., from Commander, 28th Air Division, (Defense), ADC, and Commander, 28th North American Air Defense Division, NORAD, Hamilton AFB, Calif., to Commander, San Francisco Air Defense Sector, ADC, and Commander, San Francisco Air Defense Sector, NORAD, with duty station at Hamilton AFB, Calif. . . Brig. Gen. John M. Breit, from Director of Special Investigations, to Deputy Inspector General for Security, TIG, Hq. USAF, Wash-

(Continued on page 45)



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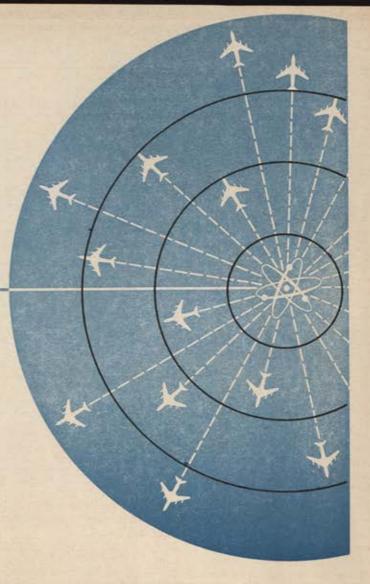
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ington, D. C., retaining original duty as additional duty. . . . Brig. Gen. Richard F. Bromiley, from DCS/Plans, Hq. MATS, Scott AFB, Ill., to Deputy Commander, WESTAF, MATS, Travis AFB,

Brig. Gen. Don Coupland, from Commander, to Deputy Commander, Ballistic Missile Center, AMC, Inglewood, Calif. . . Maj. Gen. Waymond A. Davis, from Director of Procurement and Production, to Commander, Aeronautical Systems Center, Hq. AMC, Wright-Patterson AFB, Ohio. . . . Maj. Gen. Fred M. Dean, from Commander, Air Task Force 13, Provisional, PACAF, to Director, J-3 (Operations), JCS, Washington, D. C., effective September 15. . . Maj. Gen. Thomas P. Gerrity, from Commander, Oklahoma City Air Materiel Area, AMC, Tinker AFB, Okla., to Commander, Ballistic Missile Center, AMC, Inglewood, Calif. . . . Brig. Gen. Joseph E. Gill, from Deputy Chief of Staff, Civil Engineering, Hq. ADC, Ent AFB, Colorado Springs, Colo., to Deputy Commander for Site Activations, Ballistic Missile Center, AMC, Inglewood, Calif. . . . Brig. Gen. Robert J. Goeway, from Commander, 1607th Air Transport Wing (H), MATS, Dover AFB, Del., to Deputy Commander, EASTAF, MATS, McGuire AFB, N. J. . . Brig. Gen. Robert E. Greer, from Assistant Chief of Staff for Guided Missiles, Hq. USAF, to Vice Commander for Satellite Systems, AFBMD, ARDC, Inglewood, Calif.

Maj. Gen. William T. Hudnell, from Director, Maintenance Engineering, Hq. AMC, Wright-Patterson AFB, Ohio, to Commander, San Antonio Air Materiel Area, AMC, Kelly AFB, Tex. . . . Brig. Gen. James W. Humphreys, Jr., from Commander, USAF Hospital, Wright-Patterson, AMC, Wright-Patterson AFB, Ohio, to USAF Hospital, Lackland, ATC, Lackland AFB, Tex. . . . Brig. Gen. James R. McNitt, from Commander, 6920th Security Wing, USAFSS, to Deputy Chief, Defense Communications Agency, DoD, Washington, D. C. Brig. Gen. Jack G. Merrell, from Deputy Commander, EASTAF, MATS, McGuire AFB, N. J., to DCS/Plans, Hq. MATS, Scott AFB, Ill. . . . Brig. Gen. Gilbert L. Meyers, from Commander, 4530th Combat Crew Training Wing (Tactical Fighter), TAC, Williams AFB, Ariz., to Commander, 354th Tactical Fighter Wing, TAC, Myrtle Beach AFB, S. C., effective October 1. . . . Brig. Gen. James G. Moore, from Commander, USAF Hospital, Lackland, ATC, Lackland AFB, Tex., to Command Surgeon, Hq. ADC, Ent AFB, Colorado Spring, Colo. . . . Maj. Gen. Lewis L. Mundell, from Commander, San Antonio Air Materiel Area, AMC, Kelly AFB, Tex., to Commander, Oklahoma City Air Materiel Area, AMC, Tinker AFB, Okla.

Brig. Gen. Robert G. Ruegg, from Deputy Director, J-4 (Logistics), JCS, Washington, D. C., to Director of Procurement and Production, AMC, Wright-Patterson AFB, Ohio. . . . Brig. Gen.



Air Force Secretary Dudley C. Sharp presents citation to radio-TV commentator Walter Cronkite for his services to USAF in narrating Reserve film "Two Hats" in ceremony at Aerospace Writers Association luncheon in Washington.

William K. Skaer, from Director of Staff, Inter-American Defense Board, Hq. USAF, to Commander, 4th AF Reserve Region, CONAC, Randolph AFB, Tex. . . Maj. Gen. John D. Stevenson, from Commander, WADF, ADC, and Commander, Western North American Air Defense Command Region, NORAD, Hamilton AFB, Calif., to Commander, 28th Air Division (SAGE), ADC, and Commander, 28th North American Air Defense Division, NORAD, same base. . . . Brig. Gen. Benjamin A. Strickland, Ir., from Command Surgeon, Hq. ADC, Ent AFB, Colorado Springs, Colo., to Deputy Assistant for Bio-Astronautics.

Hq. ARDC, Andrews, AFB, effective October 5. . . . Brig. Gen. Felix L. Vidal, from Deputy for Air Force Reserve Affairs, ACS, Reserve Forces, Hq. USAF, Washington, D. C., to Commander, 2d Air Force Reserve Region, CONAC, Andrews AFB, Washington, D. C. . . . Brig. Gen. Millard C. Young, from Chief, Subsidiary Activities Division, The Joint Staff, Central Control Group (Office, JCS), to Member, SAF Personnel Council, OSAF, Washington, D. C.

RETIRED. . . . Maj. Gen. Glenn O. Barcus, Brig. Gen. Laurence B. Kelley, Maj. Gen. Wiley D. Ganey, Maj. Gen. Richard J. O'Keefe,-End.



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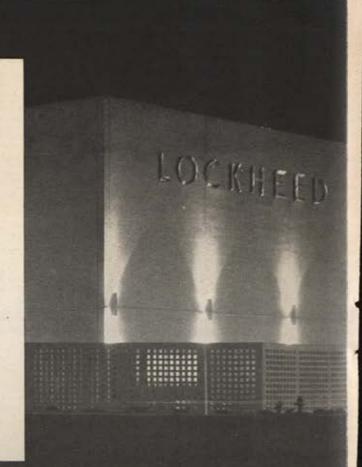
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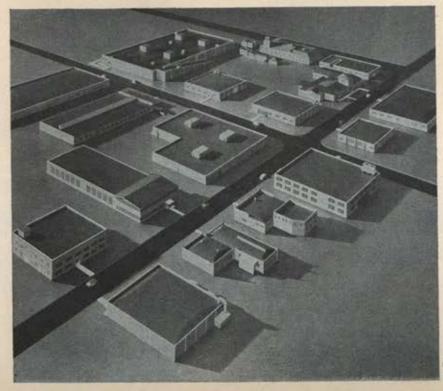


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TEN TOP PRIORITIES

Gen. Thomas D. White, USAF CHIEF OF STAFF, UNITED STATES AIR FORCE

AST September, when I addressed the Air Force Association Convention at Miami Beach, Fla., I outlined the Air Force's "Ten Most Needed"—a list of weapon and support systems representing the top-priority aerospace requirements for future national security. Today, one year later, despite many new developments and great technical advances, this listing remains valid as a concise enumeration of the Air Force's highest priority requirements. These are:

1. Intercontinental ballistic missiles.

2. Air-to-surface missiles.

3. Follow-on long-range aircraft.

4. Advanced tactical systems.

5. Ballistic missile warning systems.

6. Long-range defenses.

7. Modern communications network.

8. Advanced reconnaissance systems.

9. Modernized cargo fleet.

10. Advanced manned space systems.

In this article, I will discuss the progress we have made in these areas during the past year.

Intercontinental Ballistic Missiles

There is no question that the ICBM has the potential of becoming one of the most formidable weapons of all time. Its hypersonic speed, long-range, nuclear warhead, and demonstrated accuracy make it a lethal and extremely effective contribution to our aerospace force. At the same time, reliability, guidance, propulsion, construction, training, and the requirement for continual improvement in individual missile components will continue to be problems requiring the best of our national talent and effort.

The first of our ICBMs, the Atlas, has been operational in the Strategic Air Command for about a year. The early version of this missile, the Atlas-D, has a range of more than 6,000 miles. It has demonstrated very high accuracy using radio-inertial guidance. Later models are guided by a self-contained inertial system. In addition to requiring less ground support equipment and being more adaptable to protective measures, the all-inertial Atlas will be immune to enemy jamming. Early tests of all-inertial guidance have demonstrated far greater precision than initially forecast.

Sixty Atlas test firings have been conducted, of which thirty-nine were completely successful and eight partially successful. One of these, you may recall, was successfully fired a distance of over 9,000 miles last May.

Thirteen Atlas squadrons have been authorized. These should be in place and combat ready by the end of 1962. The first four squadrons are being constructed in a "soft" configuration—above the ground with no built-in protection against attack. The fifth, sixth, and seventh squadrons will be hardened, and each missile will be dispersed to create a separate aiming point to an enemy. Starting with the eighth Atlas squadron, the missiles will be housed individually in protective underground shelters designed to withstand high overpressures.

It is well to point out here that the degree to which our missiles are protected has a tremendous influence upon an enemy's offensive force requirements. For example, with a given degree of accuracy and warhead yield, where one weapon is needed to attain a ninety percent probability of destruction against an unprotected target, approximately thirteen weapons are needed to attain the same probability of destruction against targets hardened to withstand a pressure of 100 pounds per square inch. The various configurations in the Atlas program are the result of a combination of several factors: the urgent requirement to attain the earliest possible combat capability, the normal experience of advancing our knowledge and technology, and production and construction lead times.

The second liquid-fueled intercontinental ballistic missile to join our combat forces will be the Titan. We expect an initial operational capability with this missile next year and the authorized fourteen squadrons to be combat ready by early 1964. Early missiles will use a radio-inertial guidance system. Later models will be equipped with an all-inertial system. All Titan missiles will be deployed in a hardened, underground configuration. The Titan II will use storable-liquid propellants, is designed to be fired from within underground launchers, and will have a larger warhead

capacity than the early models.

We have had great success in Titan test launches. Twenty firings have taken place—thirteen of these have been completely successful, and two partially successful. The majority of the developmental problems appeared in the early phases of the test series. Now, there is good reason to believe that we are well on our way toward a combat-capable Titan and that we will achieve the programed force on schedule.

Another ICBM under development is the Minuteman—a solid-propellant missile which will be smaller in size, lighter in weight, less complex, and significantly less expensive than other ballistic missile systems. As a matter of fact, it is expected that the Minuteman will cost less than one-fourth as much as the larger liquid-fueled missiles. It is envisioned that large numbers of the Minuteman will be deployed in underground firing positions, widely dispersed in remote areas of low population density. In addition, plans are under way to provide mobility to a portion of the force through the use of missile launchers on roving railroad trains.

The development program on the Minuteman is proceeding at an accelerated pace. For example, eighteen tests were originally scheduled for the underground launch facility at Edwards AFB, Calif. These tests were designed to obtain data concerning underground tube pressures, temperatures, and acoustic levels generated during missile launchings. The results of the first eight tests were so satisfactory that the remaining ten firings were eliminated.

The initial operational date of the Minuteman is now planned for 1962. If this date is met, the Minuteman missile will have been brought from program approval to an effective weapon system in just four years. This will represent a truly remarkable achievement. After Minuteman, what? Generally, we would hope for an even smaller, less complex, and less costly missile, possessing comparable or improved range, accuracy, reliability, and load-carrying characteristics. Several follow-on systems are presently under study by the Air Force.

Air-to-Surface Missiles

As potential enemy offensive and defensive capabilities increase, the firepower, speed, and penetrability of our own weapons become of even greater importance. Ideally, we must be able to withstand surprise attack while at the same time maintaining the capability for quick and flexible reaction. One answer to this problem is the air-to-surface missile carried by far-ranging aircraft. The movement of such aircraft cannot be predicted by an enemy and their great speed gives them the flexibility to cover a wide area and still react on target in a matter of minutes. Furthermore, they can operate without approaching too close to unfriendly borders. Such an aircraft/missile combination would enable us to conduct constant airborne patrols capable of immediate response to aggression anywhere at any time. Moreover it would, in effect, provide us with a recallable missile capability.

During this past year, we have made substantial progress in air-to-surface missiles. Our first weapon of this type is the Hound Dog, which is powered by a jet engine. It has a range up to 600 miles which it can cover at supersonic speeds. The Hound Dog has been tested successfully and is now operational in the Strategic Air Command.

The follow-on weapon to the Hound Dog is the Sky Bolt—an air-launched ballistic missile which is designed to travel at hypersonic speeds and as far as 1,000 miles. Its guidance will be provided by a combined astro-inertial system. The first aircraft programed to carry the Sky Bolt is the B-52. However, we are not overlooking the possibilities of using other current aircraft or the tremendous potential which would be inherent in a force of B-70s or nuclear-powered aircraft armed with weapons of this type.

Ballistic missile test vehicles have already been fired successfully from bombers in tests of both subsonic and supersonic launches. These tests, in addition to proving the feasibility of air-launching ballistic missiles, demonstrated that such missiles possess adequate stability and that the necessary flight control techniques exist. The Sky Bolt is scheduled to be operational by 1964.

Follow-On Long-Range Aircraft

I am certain it would be redundant from the standpoint of the readers of this magazine to reiterate all of the reasons for my firm conviction that manned vehicles will continue to be necessary. Basically, however, it narrows down to one key point: Our aerospace forces must be properly balanced and unmanned vehicles, by their very nature, cannot meet effectively every combat and support requirement. As we progress in the state of the art for each type of vehicle and its related systems, we can expect our total force to change in relative quantities of missiles, manned aircraft, and spacecraft.

The logical follow-on to the B-52 is the B-70—a Mach 3 aircraft designed to cruise at altitudes of more than 70,000 feet, with an unrefueled range capability at supersonic speeds on the order of 7,000 miles. With such performance, the B-70 could be launched from bases in the United States and reach almost any point in the world within three hours. A combat inventory of a few hundred such aircraft would provide a good part of the flexibility we will need in the long-range striking force of the future.

In addition to its combat potential, the successful development of a B-70 type aircraft will result in another major advance in the science of aeronautics. Its designed speed characteristics, for example, will require initial penetration of the so-called "thermal thicket"—the ever-rising heat condition associated with increasing speeds within the atmosphere. The solution to the airframe fabrication, propulsion, and control problems involved is as important as the conquest of the "sonic barrier." In fact, the B-70 is an essential step toward higher speeds and performance by large manned vehicles—perhaps multipurpose aircraft capable of performing other combat roles, and certainly the large high-speed global transports needed in the future.

The Air Force, under the present program, has been authorized to build two partial prototype B-70s—that is, the airframes and engines. Work on the first of these aircraft is well under way and we should have it in the air sometime in 1962. In addition, we are carrying on some developmental work on the subsystems needed to make the B-70 a combat-effective weapon system.

An associated national project in the area of long-range flight is the work we are doing on airborne nuclear propulsion. Successful development of such a propulsion system would provide aerospace craft with the long sought objective of essentially unlimited endurance. Although progress in the development of airborne nuclear propulsion has been slow, certain important advances have been accomplished. For example, shielding weights have been reduced to a reasonable level for an airborne vehicle. A prototype engine—actually, a laboratory rig—also has been operated successfully and we know the thrust needed for a large aircraft can be achieved.

Advanced Tactical Systems

A long-time Air Force objective has been a tactical all-weather capability to react quickly and selectively on a global basis. Our newest tactical fighter, the F-105D, represents a long stride toward this goal. With its capabilities for precise navigation, quick reaction, long range, and improved weapon delivery, the (Continued on following page)

F-105 can be used in a wide scope of military operations. Its capacity for close air support of ground troops, in particular, is far superior to anything the Air Force has been able to provide in the past.

The F-105 possesses an improved loitering capability and can deliver its weapons against ground targets at supersonic as well as low subsonic speeds. It is equipped with the highly accurate short-range air-to-surface missile—the GAM-83 Bullpup—which can be armed with either nuclear or nonnuclear warheads. It also can deliver free-falling bombs, including a new family of extremely versatile nonnuclear weapons designed to ensure far more effective sup-

port of surface forces.

Future tactical fighters also must possess an "acrossthe-board" reconnaissance/strike capability. With such a weapon system, we will be better able to accomplish the Army's requirements for reconnaissance and close air support, as well as other phases of the tactical mission. We need aircraft which can find and attack targets of inexact and unknown locations, including the mobile systems which an enemy can be expected to develop. In addition, these aircraft should be capable of random dispersal to off-base sites where they can be launched and recovered. This means that future tactical fighters should be able to operate from very short, relatively unprepared surfaces with a minimum of ground environment support. Studies show that we can develop this type of equipment. We have taken the first step in this direction by establishing a specific operational requirement (SOR) for a short takeoff and landing (STOL) tactical fighter/reconnaissance aircraft. This aircraft will give us the increased flexibility to fulfill the complete tactical mission spectrum from supersonic cruise at long range, either high or low altitude, to slow speed maneuverability in the close support role. Advanced aerodynamic engineering will make this performance possible in the one weapon system, rather than in several as has been the case in the past. The next step is a suitable vertical takeoff and landing (VTOL) aircraft. Propulsion principals and hardware leading to this critical requirement are presently in the development stage.

Tactical missile systems also have been significantly improved during the past year. Introduction of the Mace-A as a replacement for the Matador has increased our all-weather missile strike capability. Further improvement in accuracy and reliability will be provided by the Mace-B. Ballistic missiles are under study as a solution to our specific operational requirement for tactical missiles having greater mobility, survivability, and performance than those now available.

Ballistic Missile Warning Systems

Warning is the key to effective military response. Each additional minute of warning in effect saves X number of bombs and missiles to be added to our striking forces, and gives us additional time to alert our defenses.

The first of three programed Ballistic Missile Early-Warning System (BMEWS) sites is completed and undergoing final tests in Greenland. This site alone will be capable of detecting missiles aimed at a large portion of the United States. Next year, a second site located in Alaska will become operational. The third site will be in England. The completed network will provide extended coverage and should give us an average of fifteen minutes' warning of an approaching ballistic missile.

Also under development is a Missile Defense Alarm System (Midas). This will be a satellite system employing infrared sensors. A series of Midas satellites orbiting the earth will be capable of detecting hostile missiles just after launch, while in the boost phase. Together, the Midas and BMEWS will provide more reliable warning of missile attack and will be able to cope with a wider variety of conditions and tactics.

Two attempts to launch prototype Midas satellites have been made. The first failed because of a malfunction in the booster staging. In May of this year, the second Midas was successfully placed in orbit. A large amount of significant telemetered information was obtained on the first five orbits of this flight, prior to the satellite becoming unstable. This data, when correlated with the information obtained earlier from other tests, indicates conclusively that Midas will do its job.

Long-Range Defenses

The objective of the Air Force in its air defense planning is to establish a defense in depth ranging as far out in front of us as possible. Ideally, we would like to destroy enemy forces over his territory. Such defenses must be divided into two categories—defense against air-breathing vehicles and defense against ballistic missiles.

The current program—which includes the Air Force's manned interceptors and Bomarc missiles, in addition to the Army's Nike weapons—provides for a defense in depth against the present threat of aircraft, air-breathing surface-to-surface missiles, and

short-range air-launched missiles.

In recent months the Bomarc has established an excellent record of successful flights under various conditions. Of the last nineteen Bomarc-A missiles launched in the current series since May of this year, fifteen have been completely successful. In the Bomarc-B program, the last four missiles have been launched successfully and met their test objectives. Included in these tests have been multiple launches, kills against the supersonic Regulus II, firings out to distances of 270 miles and to within less than fifty miles, intercepts at altitudes of more than 40,000 feet, and simulated kills of a realistic bomber target, a radiocontrolled B-47. In its recent tests the Bomarc has clearly demonstrated its technical soundness and its flexibility-in other words we know beyond any doubt that it can perform the task for which it was designed.

In combating the air-breathing threat, a new problem will be the advent of hostile long-range air-tosurface missiles launched by bombers out of range of

(Continued on page 57)



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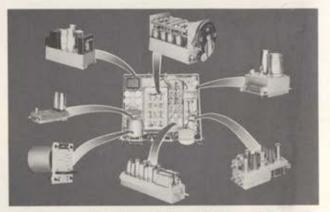




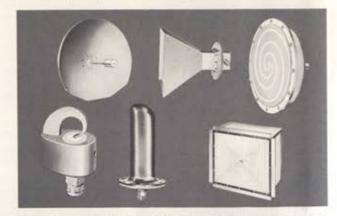
New levels of speed and efficiency are being reached in equipment modernization, retrofit and technical support programs with Hallicrafters' radical new 'Blue Streak" project. Specially-trained Maintenance and Technical Support Teams, close-knit and flexible, can be tactically deployed to accomplish maintenance, installation and testing of electronics weapons systems anywhere in the world



Hallicrafters participation in the Atlas missile project helped to develop capability for many areas of the complex missile field, including code translator data systems; ground support equipment; ECM testing and antenna systems. Current explorations involve latest Infra Red techniques.



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Military Electronics Division, 4401 W. 5th Ave., Chicago 24, III.

company

present air defense weapons. Although such a threat does not now exist, potential hostile powers will probably have a Hound Dog type missile in a year or so. It also is logical that they should undertake development of a weapon like our Sky Bolt. Longer range fighterinterceptor aircraft and air-to-air missiles are required to counter such a threat-to attack enemy bomber aircraft before they can launch their nuclear missiles or decoys. We have under development a fire-control system and guided air rockets for adaptation to a suitable long-range fighter interceptor-should the threat develop.

Defense against ballistic missiles poses a most critical problem. The optimum ballistic missile defense would have the capacity to destroy enemy missiles in the launch or boost phase of their trajectory. The next best alternative would be to destroy the missiles during mid-course flight. Least desirable-truly a last ditch defense-is to attempt to destroy missiles as

they reenter the atmosphere over the target.

In line with this reasoning, the Air Force has supported a vigorous research and development program for a system which would attack hostile missiles at their most vulnerable time of flight-as soon as possible after launch, before burnout, and prior to the time the relatively small warhead has separated from its huge booster. An active missile defense of this type appears to us to provide the greatest hope of an effective counter to the ICBM threat. Moreover, such a system would be effective against offensive missile refinements, such as decoys or multiple nuclear warheads. We are working closely with DoD's Advanced Research Projects Agency (ARPA) on several approaches to the development of such a defensive weapon.

Modern Communications Network

During the past year significant strides have been made toward our goal of instantaneous, reliable, and secure communications. In my discussion on this subject a year ago, I specifically mentioned the need to extend our tropospheric scatter systems and to increase the channel capacity of our equipment. In this respect, almost 200,000 channel miles of tropospheric scatter communications were added to Air Force networks during fiscal year 1960, and close to a million additional channel miles are programed for installation in the next twelve to twenty-four months.

The past year also marked the completion of the Air Force's automatic message relay system-the only completely automatic, high-speed, teletype communications system of its kind in the world. But even this network with its tremendous capacity-ultramodern by today's standards-represents only the threshold of the efficiencies which will be required in future com-

munications systems.

The vast potential of space operations is being exploited rapidly to meet fast expanding communication requirements. Research over the past year has indicated the possibility of establishing passive communication satellites, such as further versions of Echo I.

If future tests yield favorable results, limited operational systems of this nature could be available in 1963-65. In addition, an active communications satellite is in the development stage. Active systems for long-range communications, including the control of mobile forces, can be expected in the 1965-70 time period.

There is one other extremely significant advance in the communications field which I should mention here. The Defense Communications Agency (DCA) has been established within the Department of Defense to provide unified management of long-range strategic

communications.

Advanced Reconnaissance Systems

Information concerning the military activities of potential enemies is a basic requirement for sound defense planning. One source of such information is reconnaissance which, in this era of high-speed, lethal, and long-range weapons, has assumed greater importance than ever before. Yet, it is in this field that we face some of our most difficult problems. We need a capacity for determining an enemy's long-range strike capabilities, for tactical reconnaissance of surface battle zones, and the ability to conduct damage assessment. We are making every effort to improve our position in each of these areas. One project in an advanced stage of development is the Samos satellite system. This would be most valuable in reducing the danger of a surprise attack against us.

Modernized Cargo Fleet

Although today's MATS fleet is generally adequate to support approved critical wartime requirementsin a quantitative sense-it does not possess a sufficient number of modern aircraft. For example, there is an urgent national requirement for a strategic airlift capability which can more adequately support a quickreacting, mobile Army force. Our C-124s, which comprise the backbone of the airlift fleet, are eight to ten years old. The C-133s are the only modern transport aircraft in this force, and these aircraft represent a relatively small portion of our total MATS fleet.

To meet the strategic airlift needs of all the services and the specialized requirement for rapid deployment of Army troops and equipment, we must possess a modernized MATS with cargo aircraft capable of:

Moving large and heavy military equipment.

· Flying far enough to minimize dependence on en-route bases.

· A minimum turn-around time with a minimum of ground equipment.

· Operating from existing airfields without requiring lengthening of runways.

Carrying troops.

Airdropping troops and equipment.

Real progress has been made toward these goals during the past year. Specifically, \$50 million were allocated in the fiscal year 1961 budget for the de-

(Continued on following page)

velopment of a high-speed, turbine-powered cargo aircraft. This aircraft is being designed to carry outsize cargo, troops, and large payloads. Its speed and range performance will provide a fast-reacting intertheater capability. In addition, \$200 million were authorized for limited procurement of aircraft already under development or in production. This interim modernization program will provide a number of C-130Es—range-extended models of the C-130B—and cargo versions of existing jet aircraft.

Advanced Manned Space Systems

Several Air Force programs are directed primarily toward piloted operations in the far reaches of aerospace. These are the X-15, the Dyna-Soar, and the Air Force's extensive space medicine program. In addition, the Air Force is involved in other basic and applied research projects which have far-reaching implications upon manned space activities. One example is the Air Force's Discoverer program. The recovery of an intact capsule released by an orbiting Discoverer satellite on August 11, 1960—a most significant first in international space achievements—is an excellent indication of progress the Air Force has made in such research.

The X-15 program, which is being conducted in conjunction with the National Aeronautics and Space Administration (NASA) and the Navy, is primarily a research effort to explore the problems of manned flight at extremely high speeds and altitudes. Although the X-15 rocket-powered aircraft is not an orbital vehicle, the vast amount of useful data which is being obtained from this program qualify it as an important step toward manned space operations. The X-15 is a single-place, air-launched, rocket-propelled, research aircraft designed to operate at high aerodynamic heat rates and temperatures and to provide a suitable environment for the pilot and integral aircraft equipment under these conditions. During recent X-15 flights, pilots have attained speeds of almost 2,200 miles per hour and altitudes of more than 135,000 feet -faster and higher than man has ever maneuvered before.

Ground testing of the larger rocket engine, the XLR-99, which will take the X-15 to even higher altitudes and speeds, has been successfully completed. The significance of this should not be overlooked. It means that today the United States has, ready for flight, a controllable rocket engine which will provide a variable thrust up to 50,000 pounds. We hope to have an X-15 equipped with this remarkable engine in the air before the end of the year.

The next step—and the first development program pointed directly toward a manned space system—is another Air Force project in conjunction with NASA—the Dyna-Soar. Eventually, the Dyna-Soar will have global range—with the ability to operate at orbital speeds and altitudes. The Dyna-Soar, in effect, is the first vehicle which will combine the advantages of manned aircraft and missiles into a single system. This vehicle will utilize the boost-glide principle, obtaining

its initial high speeds and altitudes from a booster such as the Titan. Then, operating on aerodynamic principles, it will maneuver and make a normal landing with full control at a preselected site on the earth. It is interesting to note that although the Dyna-Soar will attain peak speeds of over 15,000 miles per hour during flight, its proposed landing speed is to be less than that of some of our present-day combat aircraft.

The Dyna-Soar program is being planned in three steps. The first will employ full scale, unmanned gliders to be boosted by Titan missiles into suborbital flight. Later, heavier manned gliders will be used. In the second step, both manned and unmanned gliders will be propelled to global range or orbital flight with larger boosters. Finally, studies will be made of potential applications resulting from the Dyna-Soar development program. These actions, in turn, will lead to the more sophisticated manned aerospace systems we need for the future. Included in these will undoubtedly be self-powered vehicles with unprecedented performance, which the pilot can control in all phases of flight.

0 0 0

Generally speaking, I feel that the over-all advances made during this past year represent considerable progress. Technological successes, however, are not the whole story. In our concentration on hardware we cannot overlook the one common denominator of success in any field—people. Individual intelligence, initiative, courage, and judgment have not been outdated by push buttons and fantastic technical performance. It may seem obvious, but it is often forgotten, that the "mixed forces" of manned and unmanned systems we hear about so often refer to both hardware and people.

It has been repeated time and again—and not only in the Air Force—that to meet the threat we need a "force in being," because in case of war there will not be time to produce additional or improved hardware. Neither, I might point out, would there be time to develop the trained personnel and the leadership we need to use our weapons most effectively. In simple terms: We must keep our personnel as ready, alert, and capable as we expect our weapons to be. The need to maintain the edge of training and leadership honed to its keenest over an indefinite period, is perhaps the greatest challenge which the United States Air Force has ever faced. Meeting this challenge will require moral courage comparable to the tradition of wartime courage the Air Force already has established

As the dawn breaks on additional new developments and possibilities, there also will be a continuing need to review our military concepts—to assure the most effective and efficient employment of this nation's total military resources. This, in fact, we have already begun to do—but I foresee the time when changes may well be much more drastic than they appear now. In the face of all this, the Air Force's goal must remain the same—to produce and maintain for this country the world's foremost aerospace power—an absolute necessity for national survival.—End

U.S. AIR FORCE SELECTS NEW GILFILLAN "TALKING RADAR"

New brain-and-voice final approach radar increases jet landing safety -currently under operational evaluation at USAF bases world-wide

> AUTO VOICE GCA-GILFILLAN'S NEW "TALKING RADAR"-SIMULTANEOUSLY...

COMPUTES moment-by-moment 3-dimensional position of approaching aircraft with infallible electronic accuracy

PREDICTS guidance requirements including course correction at beginning of any deviation from safe approach limits

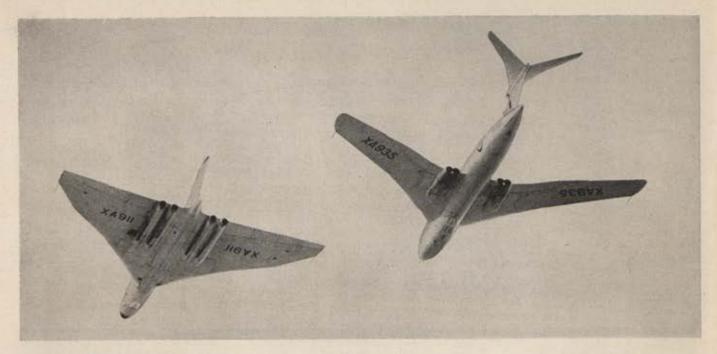
SELECTS required data from 32-track standardized R/T voice drum TRANSMITS confirming or correcting voice guidance to pilot instantly

The radar operator monitors the approach, undistracted - ready

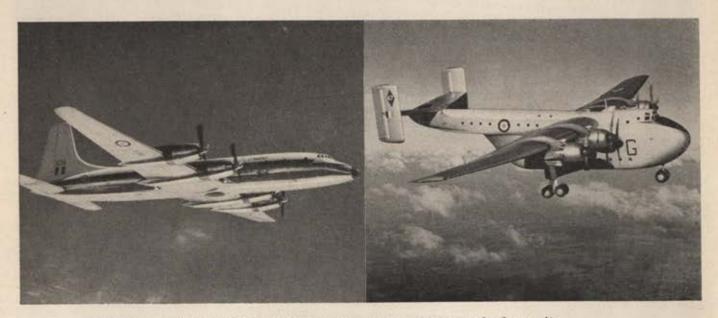
to communicate directly to the pilot should an emergency occur.







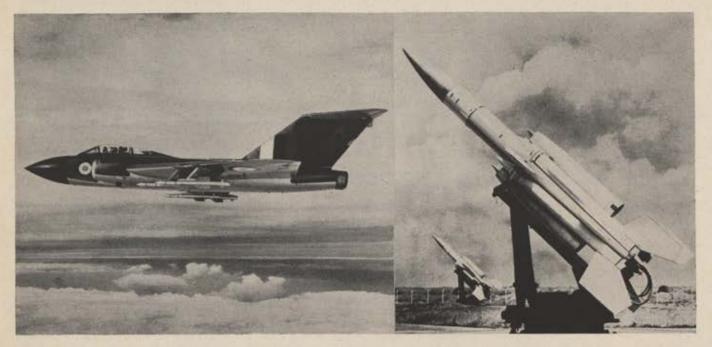
RAF V-bombers fly 10 miles a minute, 10 miles up, for 10 hours...



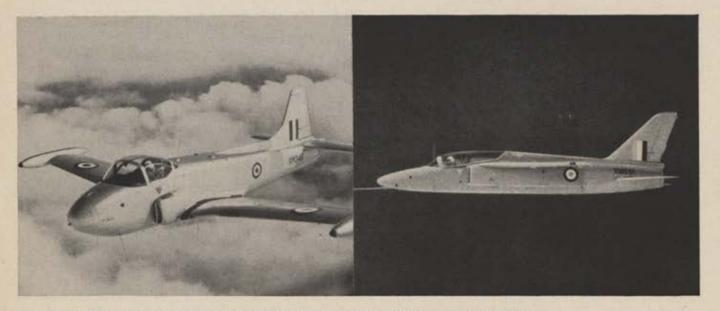
RAF Transport Command provides 5,000-mile range-20-ton payload capacity ...

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Bristol Siddeley Engines Limited, one of the largest manufacturers of aero-engines in the world, supply flight power for a large proportion of the aircraft and missiles of the Royal Air Force. The most potent part of the RAF's strategic V-bomber fleet, the bulk of its round-the-clock defense, the majority of its transport aircraft and all its new primary and advanced jet trainers are powered by Bristol Siddeley.



RAF round-the-clock defense intercepts aircraft hundreds of miles out, far up into the stratosphere ...



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Advances in hardware and combat techniques have added significantly to the capabilities of the free world's prime deterrent force, the . . .

STRATEGIC AIR COMMAND

Gen. Thomas S. Power, USAF

COMMANDER IN CHIEF, SAC



General 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.

CONTRARY to widespread public opinion, the primary mission of the Strategic Air Command is not one of "massive retaliation." SAC's primary job is its peacetime mission of deterrence—to help maintain an honorable peace by discouraging aggression.

The dictionary defines "deterrence" as the principle of "restraining from action through fear of consequences." Hence, the basic objective of our national policy of deterrence is to keep any potential aggressor convinced that an attack on this country or on any of its allies would result in unacceptable consequences to him. This policy has been successful to the extent that it has prevented an all-out nuclear war to this date.

The future success of our policy of deterrence in averting both general and limited war hinges on a variety of political, economic, technological, military, and related factors. In combination, these factors must impress on the Communist world that this nation is capable, prepared, and determined to protect its interests and security by applying its military strength whenever, wherever, and however necessary.

It is obvious, therefore, that military strength by itself has little if any deterrent value. To serve its purposes in preventing war of any kind as well as in helping contain the spread of global Communist domination, military strength must meet a number of conditions.

First, the threat which it poses to an aggressor must be used with skill and sophistication by our statesmen in countering diplomatic blackmail. Second, it must be backed by the full support and cooperation of the American people. Next, our armed forces must possess—and be known to possess—the resources, flexibility, and reaction capability to permit their selective and effective employment regardless of the locale, scope, and nature of military action required. Finally, military strength must be maintained at an "adequate"

level without imposing an "undue burden" on the nation's economy.

The determination of what is "adequate" on the one hand and "undue burden" on the other is subject to a great deal of speculation and indeed subjective interpretation. There can be little doubt that the great majority of the American people will support the quantity and quality of military resources which the Congress and Chief Executive agree are necessary to back up our policy of deterrence. But there can be no conclusive answer as to "adequate" quantity and quality as long as we cannot predict what degree of damage a potential aggressor would consider unacceptable or be unwilling to risk.

Under these circumstances, the only safe and, in the long run, most economical approach in establishing our future military requirements is to base them on the worst possible contingency, namely, a massive surprise attack against the United States. If we are fully prepared to cope with and thereby avert such a contingency, we should be even better prepared to deal with and avert lesser threats.

This does not mean that we should resort to the sledge-hammer approach in resolving local crises and limited conflicts. We will always need a variety of special tools for handling special situations as they may arise. But from the standpoint of deterrence, our real and evident capability to achieve a decisive military victory in a nuclear war must serve not only to prevent general war but also to discourage limited conflicts and, should they occur, help win them or prevent them from expanding into general war.

At present and for the foreseeable future, the major share of the nation's military deterrent is contributed by the Strategic Air Command. As of today, SAC has the unquestionable capability to counter any act of aggression with decisive results. Its alert forcerepresenting one-third of its combat-ready strike forces—stands ready day and night to go to war within fifteen minutes and, upon orders from the President, carry out its mission, regardless of whether it calls for a limited objective or total destruction of an aggressor's war-making capacity.

But as we address ourselves to the future, SAC faces two major problems which stem from the steady advances in the Soviet's offensive and defensive capabilities. For one, the growing missile potential of the Soviets poses a formidable threat to the survival of SAC's strike forces in case of a surprise attack. And, second, improvements in the Soviet's aerial defenses tend to make it increasingly difficult for SAC's manned bombers to penetrate to their assigned targets.

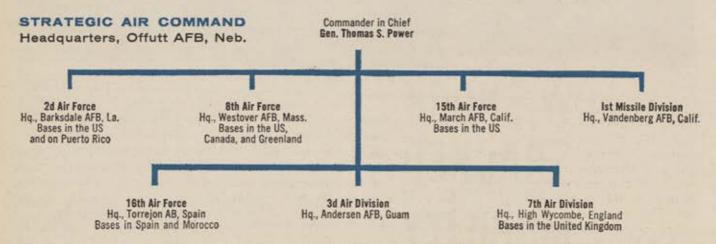
SAC is endeavoring to meet these problems, without impairing its day-to-day combat readiness, by concentrating its efforts on three areas—modernization of the strike forces, development of new tactics and techniques, and measures to ensure the survival of an adequate percentage of its strike capability under the most unfavorable conditions. The gratifying progress made in all three of these areas is reflected in the following review of the command's activities and accomplishments during the past twelve months.

SAC's centrally controlled global organization now comprises some seventy bases which are spread throughout the free world. Command personnel strength is at the 270,000 mark, making SAC the largest single component within the US military establishment.

Most of SAC's fighting strength today and for the immediate future lies in its force of manned bombers, about 2,000 long-range jet aircraft which presently are entrusted with the delivery of over ninety percent of the free world's firepower, as measured in TNT equivalents. Backing up the bomber force is a fleet of tanker aircraft—KC-97s and the newer all-jet KC-135s—which give the bombers the range needed to strike targets anywhere in the world and reach their recovery bases.

Backbone of the combat forces still is the B-47 medium bomber which, however, will be phased out gradually during the next few years and replaced both with missiles and the B-58, our first supersonic jet bomber. SAC's first operational B-58 unit was activated at Carswell AFB, Tex., in March 1960. Crews of this unit, the 43d Bomb Wing, are now familiarizing themselves with this Mach 2 bomber. Current plans call for three B-58 wings.

The B-52 inventory included some 550 aircraft at (Continued on page 67)





The B-52G, new version of SAC's major current bomber, can carry Hound Dog air-to-surface missiles as well as usual bomb load. The first of the new, turbofan-powered B-52Hs is scheduled for completion sometime early in 1961.



LOW-SHOCK TRACKED MOBILITY FOR SENSITIVE ELECTRONIC EQUIPMENT

The tactical advantages of full off-road tracked mobility in military support vehicles have been well proved in many years of field operation. But the idea of transporting intricate radar and communications equipment and fully-assembled missiles over rugged terrain raises the question, "What about vibration and shock input to sensitive components?"

The answer – favorable. Carrying a simulated missile and sensitive oscillograph recording equipment, an FMC tracked vehicle ran a 2,000-mile shock test over our proving ground—on 60° slopes, over rough cross country terrain, and on high speed roads. Data returns showed that the vehicle's torsion suspension system effectively cradled the missile, with a low shock input factor.

For full details on these tests and other questions of adapting tracked mobility for your purposes, contact FMC, America's leading producer of military-standardized tracked vehicles.

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> > Putting Ideas to Work



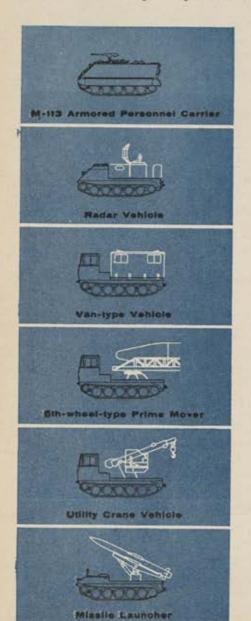
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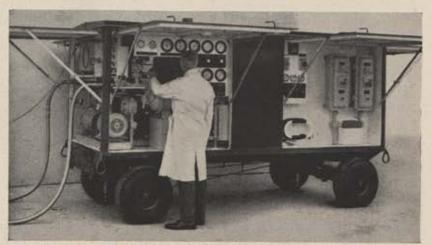
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fmc

Illustrated below are the M-113 and five vehicle adaptations of this basic tracked vehicle. All of the vehicles use the same military standard equipment, including engines, power train, and suspension components; thus reducing the military logistic burden and R&D costs in weapons systems.



FMC's New Liquid Propellant Metering System Achieves Accuracy to $\pm 0.1\%$



Mobile metering and control unit for fueling liquid propellant missiles.

The crucial reliability of multistage missiles is influenced by the accurate measurement and delivery of liquid propellant to the missile tanks. For example...a small error in fuel weight could adversely affect the in-flight performance of the missile, causing possible failure of the entire mission.

Food Machinery and Chemical Corporation's Ordnance Division has recently developed a mobile liquid propellant metering and handling system which promises to solve many missile fueling problems. The advantages offered by this unique new system are many.

Accurately measures and records the amount of fuel delivered to the missile tanks. Original specifications called for a metering accuracy of ±0.2%. Extensive tests, recorded by precision test equipment, show that the system is capable of metering and delivering missile propellants with far superior accuracy—to ±0.1%.

Automatically compensates for factors influencing fueling accuracy.

The fuel is continuously sampled and the flow corrected for variations in temperature and density. In addition, the fuel which vaporizes in the missile tanks is returned to the system, condensed, measured, and an equivalent amount added by the metering unit.

Adaptable to many different missile fuels. The system is designed to handle such storable liquid propellants as hydrazine, nitrogen tetroxide, Dimazine® (UDMH) and nitric acid.

Economical to manufacture and safe to operate. To reduce development, manufacturing and operating costs, the system makes maximum use of standard, interchangeable, and commercially available components. The simple and safe design eliminates human errors and danger to operating personnel.

Mobile and compact. All metering, pumping and control equipment is mounted on a single, portable trailer. The complete unit may be easily transported, rapidly positioned, and provides a single station for the monitoring of fueling operations.

The successful development of this mobile metering and handling system by the engineering staff of FMC's Ordnance Division is another achievement made possible by utilizing the unique combination of chemical and mechanical engineering talent available at Food Machinery and Chemical Corporation.



the end of fiscal year 1960. SAC has started to receive the B-52G, latest modification of this eight-jet heavy bomber, and development is well under way on the B-52H which will have still greater range and thrust. Both the G and H models will be capable of carrying various types of air-to-ground missiles, as will be discussed below. The first B-52H is scheduled for completion in early 1961.

To ensure the continual modernization of its manned bomber force and thereby prevent a dangerous gap in its combat capability, SAC has strongly urged a virile and expeditious development program for the B-70, a highly advanced aircraft with greatly increased speed, range, and altitude performance. The B-70 will have to take the place of the B-52 when that aircraft nears the end of its useful service life and, like the obsolescent B-47 now, must be replaced by more advanced weapon systems. Congress has appropriated the funds required to provide a limited number of B-70s by the mid-1960s.

In addition to modernization, the past year has seen considerable progress in SAC's program for enhancing the survivability of its strike forces in the face of a surprise attack. The bomber and tanker alert forces are now spread out over more than fifty bases in this country, as compared to some forty bases a year ago. A dispersal program for the manned force, being implemented as rapidly as possible, is designed to place no more than one B-47 wing of forty-five aircraft or one B-52 strategic wing of fifteen aircraft on any one base. The primary objective of dispersal, as applied to both manned and unmanned weapon systems, is to increase the target system of a potential aggressor and thus to lower his confidence that he can hit and destroy all our strike forces simultaneously.

Toward this end, SAC also is conducting tests involving the use of bases of other USAF commands as well as civilian airports for the periodic deployment of some B-47 units. Under this plan, which was announced in June, B-47 units would be deployed from their home stations to a number of suitable Air Force bases and nonmilitary airfields for short periods of time. The main purpose of this tactic is to make it more difficult for an enemy to predict the exact locations of SAC's medium bomber force at any particular instant.

Another advantage of dispersal lies in the fact that it adds runways and thereby compresses the time required for launching the alert force. SAC's reaction capability will be enhanced still further by a new "minimum interval" takeoff procedure which was tested successfully at several SAC bases during the spring of 1960. The tests, called Project Open Road, demonstrated that all alert aircraft at a base could be launched at a rate some four times greater than previously thought possible. This procedure is now being implemented throughout the command, ensuring takeoff of the entire alert force in a matter of minutes after warning of an attack has been received at SAC Headquarters.

But as the Soviet missile threat continues to grow and, with it, the danger to SAC's strike forces, it becomes increasingly urgent to supplement the ground



Atlas ICBM stands on alert beside gantry at Vandenberg AFB, Calif., free world's first operational ICBM base. Twenty SAC ICBM bases were programed by end of FY 1960.

alert by placing at least part of the heavy force on an airborne alert. Further tests of this tactic and indoctrination of crews were conducted during the past twelve months. The tests have clearly shown that SAC can initiate a sustained airborne alert to the full extent permitted by available resources. The major problem is stockpiling of the necessary spare parts, some of which have very long lead times.

At present, funds have been allocated to provide the capability for placing one-eighth of SAC's heavy bomber force on airborne alert. It is hoped that this figure can be doubled in order to ensure an effective deterrent in the critical period ahead. I am speaking of the period when the Soviets may have enough ballistic missiles to risk a surprise attack while this country still lacks adequate facilities to give SAC's groundalert force the required minimum of fifteen minutes warning of such an attack.

The Ballistic Missile Early Warning System (BMEWS), which is now under construction, is expected eventually to provide sufficient, reliable warning to permit the airborne alert force to revert to ground alert. Until then, however, a sizable force of B-52s on airborne alert would represent our most (Continued on following page)



Radio operators work at control board of SAC's new singlesideband radio system known as "Short Order," System can put Hq. SAC in immediate contact with aircraft anywhere,



Minuteman mobility test train begins its initial run at Hill AFB, Utah, on June 20. Test trains, scheduled to run through the fall, develop missile mobility doctrine.

effective deterrent in convincing the Soviets that they cannot attack this country with impunity, regardless of how well they may plan and execute a surprise missile attack.

The airborne concept is also utilized for assuring continuity of control in the event that SAC's underground control center of Offutt AFB, Neb., and all alternate SAC headquarters should be destroyed simultaneously. Procedures for maintaining an airborne command post under emergency conditions were initiated in July. Three KC-135 aircraft have been equipped with the communications gear necessary to control the global strike forces. One of these aircraft will always be ready to take off within fifteen minutes, with a full crew of controllers and technicians. Each standby crew is headed by a general officer from SAC Headquarters who would assume command of the force if such should become necessary.

SAC's continued efforts toward improving the penetration capability of its manned weapon systems led to a program of low-level training missions for B-47 and B-52 crews. Announced in November 1959, the program is designed to check out crews on radar bombing approaches from altitudes as low as 1,000 feet. As a result of this program, SAC crews will be able to operate at the most advantageous altitudes, from very high to very low, and can resort to low-level tactics to assist them in slipping under the enemy's warning and intercept radars.

But SAC's striking power no longer rests solely in its bombers. On September 9, 1959, the first Atlas ICBM was launched by a SAC crew, marking the birth of the command's operational missile capability. Since this historic event, ICBMs have joined the manned alert force, and, although their number still is small, they are destined to assume an ever greater share of the deterrent load.

Locations for twelve new ICBM bases were announced during the past year, including Atlas sites at Altus AFB, Okla.; Dyess AFB, Tex.; Fairchild AFB,

Wash.; Forbes AFB, Kan.; Lincoln AFB, Neb.; Plattsburgh AFB, N. Y.; and Walker AFB, N. M. Titan sites were announced for Beale AFB, Calif.; Davis-Monthan AFB, Ariz.; McConnell AFB, Kan.; and Little Rock AFB, Ark. Malmstrom AFB, Mont., was the first site announced for the Minuteman.

These site selections brought the total of SAC's announced ICBM bases to twenty by the end of fiscal year 1960. Construction is well under way at some of these bases, and Vandenberg AFB, Calif., already has a combat-ready Atlas unit, the 576th Strategic Missile Squadron. Training of crews to man SAC's growing complex of missile bases continues at a steady rate under the direction of SAC's 1st Missile Division at Vandenberg.

The plan is to disperse ICBM sites as extensively as presently available funds will allow. Hardening through use of underground concrete silos and aboveground concrete "coffin launchers" will serve further to enhance the survivability of the missile sites. Hardening and dispersal are particularly important for the missile force since missiles cannot be recalled and, therefore, would have to ride out any initial attack to preclude their being launched upon spurious warning.

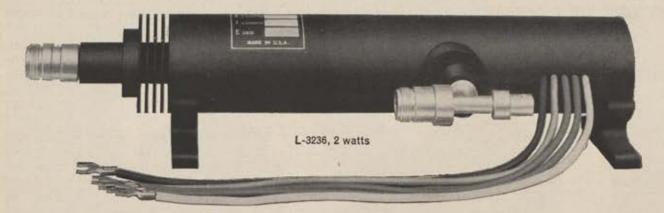
In addition to hardening and dispersal of ICBM sites, SAC is now resorting to another protective tactic—mobility—tests of which began in June 1960. Mobility is a most attractive defense tactic against missile attacks because the probability of destroying a mobile target with a long-range missile is very small. The advantages of mobility are fully exploited in SAC's airborne alert system and also underlie the basic concept of the Navy's Polaris weapon system, which uses a nuclear-powered submarine as a missile platform. US-based mobile ICBMs and the airborne alert forces will have the added advantage of being beyond the range of Soviet reconnaissance and countermeasures.

The mobility concept is especially suitable for the Minuteman, a greatly simplified solid-fuel ICBM which will require minimum maintenance and will have very high-reaction capability. Present plans call for placing a portion of the Minuteman force on trains moving over random patterns throughout the nation, in addition to the use of widely dispersed and well hardened fixed sites.

A special SAC task force was established at Hill AFB, Utah, to conduct a series of deployments with a Minuteman Mobility Test Train. The first deployment ended June 27 after seven days of random travel over existing civilian rail facilities in the Ogden area. The test series will continue through the fall of 1960 with other rail movements in the Far West and Midwest.

The rail tests, which do not involve actual missile hardware, are designed to analyze problems associated with mobility, control, and communications. A train control center at Hill AFB monitors the movement of the test train between available rail sidings, using SAC's single-sideband radio system. All movements of the train are coordinated with the Association of American Railroads and the railroad companies whose facilities are being used in the deployments. The

(Continued on page 71)



TWINS



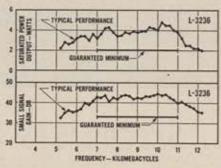
These Litton TWT twins are PPM focussed X-band traveling wave tubes. They are not prototypes. They are metal and ceramic tubes in field application now.

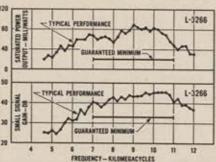
Designed to cover X-band with minimum saturated CW power of 20 milliwatts (L-3266) and 2 watts (L-3236), they may be operated in cascade to amplify signals as small as —50 dbm to the 2 watt level. Their performance, far exceeding the conservative specifications, is evident in the accompanying graphs.

Small size (less than 12" in length), light weight (under 4 pounds each), and extreme environmental capability (temperature compensated —54°C to 86°C) make these tubes the ideal choice for military applica-

tions. A typical airborne equipment, designed and manufactured by Granger Associates of Palo Alto, California, incorporates the L-3266 and L-3236 and occupies only 0.75 cubic feet, including all necessary power supplies, modulating circuitry, cooling, etc. This equipment is now in field operation.

If your work involves ECM repeaters, radar target enhancement, frequency diversity radar or any application requiring broadband microwave amplifiers, appraise these new tubes. In production quantities their price is the lowest in the field. Ask for catalog sheets on the L-3266 and L-3236. Address: Litton Industries Electron Tube Division, 960 Industrial Road, San Carlos, California.





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Air Force Ballistic Missile Division, Air Materiel Command, the US Army Transportation Corps, and the various industrial concerns associated with the Minuteman development are providing assistance for the tests.

Another significant area for the utilization of missiles lies in their marriage with the manned bomber, which will add greatly to the latter's utility and flexibility. The first step in this direction is the airborne GAM-77 Hound Dog, a supersonic and accurately guided airto-ground missile with a nuclear warhead. The B-52G bomber can carry two of these missiles—one under each wing—in addition to its regular nuclear payload. The Hound Dog, whose first production model was accepted by SAC in December 1958, will make it possible to attack the enemy's defenses from hundreds of miles away and thereby help the bomber to penetrate to its target. In addition, it will permit a variety of new tactics, such as attacks on several targets in different areas on the same mission.

A different type of penetration aid is represented by the Quail missile, which is a decoy system designed to confuse the enemy's radars by reflecting the same radar image as the B-52. It can be launched in quantity from target-bound bombers and thus assist in the penetration of enemy defenses. The first multiple Quail launch was conducted successfully over the Eglin AFB, Fla., test range in June 1960.

The next step will be the use of manned aircraft as airborne and virtually invulnerable platforms for air-launching ballistic missiles. One of the most promising is the GAM-87 Sky Bolt, which will be SAC's first ALBM. This weapon system will lend itself to use on SAC's present B-52 fleet as well as on the supersonic and nuclear-powered aircraft which are expected to enter the Strategic Air Command's inventory in the years ahead.

In my considered opinion, there will be a requirement for manned weapon systems for the foreseeable future, although in decreasing numbers. It is not likely that there will ever be a complete substitute for man's reasoning power, for it is that capacity which will always be needed over enemy territory in order to deal with unpredictable problems. In fact, it is not beyond the realm of imagination that, someday, a technological breakthrough may lead to development of effective defenses against ballistic missiles. If this should come to pass, and we must not rule out the possibility, there may be increased need again for our manned weapon systems—an added reason why manned systems should always reflect the latest advances in technology.

The point is that we cannot afford to place our entire or main reliance on any one particular type of weapon system, whether manned of unmanned, because the consequences could be disastrous if future advances in technology should impair or nullify its utility. For this reason, the Strategic Air Command must plan for a well balanced aerospace force of both manned and unmanned weapon systems, designed and timed to operate in the demanding environments of the future.

However, modernization of the weapons inventory would be of little value unless accompanied by commensurate advances in support facilities and equipment. This applies, in particular, to SAC's global communications network upon which hinges effective command and control of the worldwide strike forces. SAC now has the most modern and extensive network of telephone, teletype, and radio systems in the world, and several new systems were added during the past year, with still more advanced techniques under development.

In March 1960, a new single-sideband radio system, known as "Short Order," was put into operation. This system provides instant voice communications between the SAC Command Post in the Underground Control Center at Offutt and combat aircraft in flight over any part of the globe. Messages can be relayed in all directions from the powerful 45,000-watt transmitters located near Offutt and at the headquarters of each of SAC's three numbered air forces-Westover AFB, Mass., Barksdale AFB, La., and March AFB, Calif. "Short Order" would be the medium through which SAC bombers, launched under "Positive Control" in the event of tactical warning of an attack, would receive the "go-code" signal authorizing them to proceed to their designated targets once the President should direct a counterattack.

Thus, the past year has witnessed continued and significant improvements all along the line which have added greatly to SAC's fighting capability and, hence, its deterrent strength. But these improvements were possible only because of steps taken in the past. Future improvements will depend on the steps which are taken today, and it is, therefore, none too early to prepare ourselves for the unprecedented demands of the dawning space age. For there can be no doubt that, eventually, we will have to extend our defenses ever deeper into space.

It would be futile to speculate about the problems and promises that the battle for space supremacy may entail. But we must accept the fact that the conquest of space is far more than a scientific challenge. Indeed, supremacy in space may well be a matter of survival for the free nations of the world.

To achieve and maintain such supremacy for the sake of a lasting and honorable peace will demand an all-out cooperative effort which will have to draw upon all the economic, technological, and military assets at our command. In the event of need, SAC can be expected to contribute its share to this effort by putting into space strategic weapon systems designed to provide as convincing a deterrent to aggression as we have had in the past. To attain this goal, we may think in terms of strategic satellites or, even, perhaps, of manned spacecraft which would orbit the earth in a continuous space alert.

The day when such weapons become a reality may still be far in the future. But regardless of the dramatic challenges that lie ahead, it is safe to predict that, the American people can always count on SAC and its men to do their part—on the ground, in the air, and in space.—End



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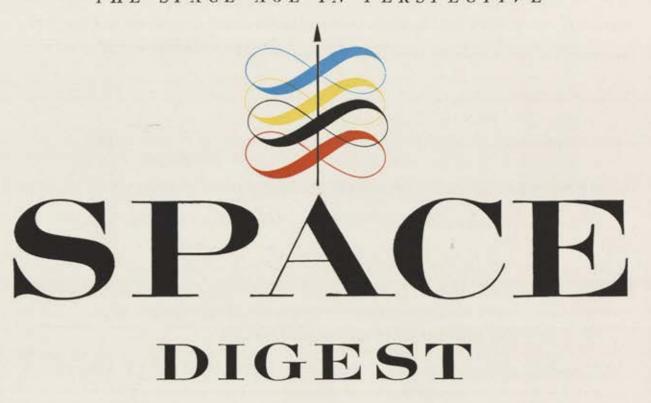




COUNTERMEASURES

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VOLUME 3, NUMBER 9 • SEPTEMBER 1960

Some Challenges That Will Face the Country's
First Space-Age President
William Leavitt
The Vast Transition from Air to Aerospace Force
A Special Report
USAF Organization for Space
A Space Digest Chart 80
All in a Week's Space Work
Discoverer XIII, X-15, Echo I102

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Whoever wins in November will need the courage and creativity to recognize the tremendous impact of technology on a changing world. Suggested here are some areas of challenge to the man who in January will become the country's first truly . . .





SPACE-AGE PRESIDENT

WILLIAM LEAVITT Associate Editor

HE fourth day of next month will mark the third anniversary of Sputnik I. We can be sure that the Soviets will salute the day with a barrage of propaganda extolling the splendor of their technology and its significance as the harbinger of the faceless future they would impose on the world.

We will be lucky if that is all they do. The anniversary, falling a few weeks before our presidential election, presents a marvelous opportunity for the Russians to jolt us anew with a spectacular feat, perhaps the launch of a manned vehicle into orbit, or the announcement, with sufficient detail to unnerve us, of a militarily significant space weapon system. One such possibility might be an antisatellite technique to counteract our Midas early-warning and Samos reconnaissance satellite programs.

No news is traditionally good news, and except for their ominous Pacific rocket tests and the partial failure of their Sputnik IV which was supposed to have carried a dummy in a life-support system, the Soviets seem to have been lately more occupied with mundane matters. It is possible that our first space-age election campaign will proceed with no more formidable Russian head-line-grabbing interruption than the trials of U-2 pilot Francis G. Powers and the captured crew members of the ill-fated RB-47.

As noted, this is our first space-age election. If you watched both political conventions on television, you may have caught the films shown in Los Angeles and Chicago to illustrate the Democratic and Republican platforms. A totally innocent viewer might have gotten the impression that he was seeing footage of two entirely different countries. Among other denunciations, the Democrats pictured our space and missile posture as essen-

tially inadequate. Their opponents presented a proud pageant of US space and missile achievements, all the results of decisions by a wise and prudent Administration.

The superpartisan quality of the films disqualify them as living history. But the important fact is the formal recognition by both parties of the reality of the new era and its trappings and of the need for close and serious attention to technological questions by the next Administration, whoever wins the election.

A year ago, in reviewing on these pages the national space effort, it was remarked that since Sputnik we had gone through "emotionally and politically a significant transition from bland acclimatization, through a nagging-headache sort of cold war, to a new realization of the broadness and potential fatality of the conflict in which our country is engaged with a tenacious opponent." Added as a qualification was the suggestion that *some* of us had gone through this transition. Today, it is fair to say that *more* of us have.

And if the candidates, as they examine the technological posture of the country during the campaign, talk of the programs and approaches they can honestly say they would implement if elected, even more citizens will benefit from new understanding of the seriousness of the struggle for the future. Recrimination will serve little purpose.

For the Republicans to claim that achievements already logged are purely the result of their wisdom is for them to forget that Democratic members of Congress have led fruitful investigations of shortcomings and rivalries that were undeniably slowing our technological progress. For the Democrats to blame all deficiencies on Republican budgetry is for them to forget penny-pinching in their own ranks, not only before Korea but after Sput-

nik. The point is that today, what the American people (and the rest of the free world) are essentially interested in is not what Mr. Kennedy or Mr. Nixon said yesterday but what they would do as President after next January.

What is our technological posture, in achievements and organization, on the eve of election?

In terms of vehicles launched and in orbit, we have, except for the weight factor and their successful moon-impact and moon-circumnavigation, kept respectable pace with the Russians, and have certainly chalked up notable scientific accomplishments. These have included the discovery of the Van Allen radiation belts, the photoscanning of the earth's cloud cover, the long-distance communication relay from solar orbit by Pioneer V, the Discoverer recovery, Echo satellite, and X-15 flights, among other feats. But the exceptions noted above are sizable and significant, and it is idle for high officials to infer, as they so often have since the end of the initial uproar after Sputnik, that all the rough spots have been smoothed over and that we now have an entirely orderly and purposeful space and defense program. Space and defense must be lumped together in discussion because they will merge at an increasing pace into a military totality in the decade to come. Without omniscience, the Russians certainly believe this, and we had better too.

Peter Drucker, writing in Harper's Magazine recently, remarked that the key to the success of a President is his ability to sort out what is relevant to his times. The technological revolution is the most relevant fact of our times, and space as its most startling aspect will be a peace or war theater of national and international operations. Historically, it may well be more important for the next President to decide, say, how much the country ought to spend and how it ought to spend for a worldwide communication satellite program, than it will be for him to work out the tangled farm question—not that the latter is unimportant.

The outgoing Administration leaves a record and a program far from complete. This incompleteness extends from achievement to organization, but the very fact of its incompleteness represents a great challenge to the courage and creativity of the incoming President and Administration.

Creativity indeed is the key to the future. The next President will have to decide on specific goals geared to the nation's safety that can be reached through technological advance. Once the goals are established, he must lead the people to a willingness to spend the funds to finance the goals. That in process, he must blueprint the or-

ganizational structure that will give some assurance of the realization of the goals.

As of today, none of the above have gotten beyond slight beginning, and the leadership has largely come from worried legislators and influential commentators. This is the major reason why no really broad course for a technologically transformed America and the world has been set.

Suggested below are but a few of the space-age questions the next President will have to face and resolve:

 The continued pluralism of our national space effort. For example, the National Aeronautics and Space Administration, through no fault of its own, has developed into an agency required to provide scientific data, working programs, and sets



The face of the future. Only a firm determination on the part of the next President can assure this youngster that if he has the talent he will be assured of the education he'll need to fulfill his potential.

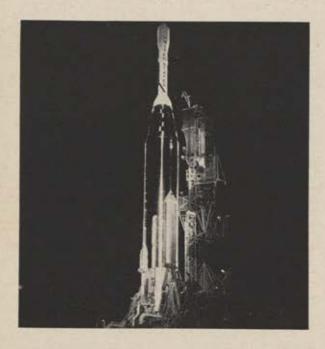
of long-range goals—all at the same time. In ordinary times, this might be perfectly fine. But in extraordinary times, in which NASA's product, space technology, is irrevocably tied up with national survival, it is neither fair to the country nor to NASA and its people to make this tripartite demand on a civilian agency that should be dedicated to the production of technological capability alone.

The creation of NASA in its present form was at least partially the result of the Administration's obsession with presenting a "peaceful" front for its space organization. Somehow, in our American way, we were convinced that this outer garment would be more appealing to the rest of the world. The fact is that foreigners, friendly or hostile, attach only the label "American" to our achieve-

ments. They have little interest in our governmental management techniques.

The reverse of this problematical coin is the continued unwillingness fully to recognize the military significance of space technology. This has resulted in not only the loss, over the past few years, of outstanding officers who have given up the military ghost for posts elsewhere, but also in the continued duplication of effort and conflict among the three services, with final adjudication of differences by the Department of Defense often only after too much money and effort have been wasted.

Somehow the unity of a growing NASA and the anxiety among the military services for operational space technological assignments must be



melded into a national space and defense program. Only the President can decide its broad purposes, and its role as an instrument of national purpose.

• The problem of mobilizing our educational system for national survival. The next President will have to take an active and strong interest in raising the national standard of excellence in both scientific subjects and the humanities. He will need courage to push a program geared to the encouragement of the gifted as a truly national resource and a factor in our strength. This does not necessarily mean the forced-draft training of every bright student as a future space pilot, mathematician or physicist. But it does mean the provision of educational foundations for those who do want such opportunities.

· The problem of dramatically using our technological capability in the world arena. It is a bitter irony of the cold war that, thanks to their temerity and their willingness to say all things to all men, the Communists have succeeded greatly in portraying themselves as the fighters for peace and us as rapacious colonialists. Yet, as emphasized previously on these pages, the advances in space technology, and technology generally, give us a new dimension, not only physical, but diplomatic, in which to operate. Surprise attack, so often belittled as a possibility, remains the nightmare of the world. A bold program, using space tools, offered to the world by the next President could certainly do much to redramatize our country as truly peace loving.

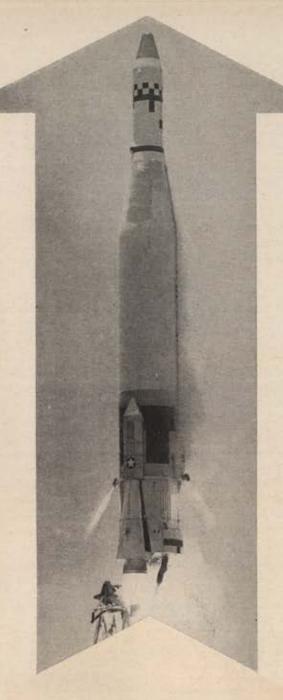
Other practical ideas—in line with the increasing trend (especially in Western Europe under the leadership of President de Gaulle and Chancellor Adenauer) toward regionalism—which the next President could spearhead might include a "Marshall Plan for Space," in which we would work closely with the West Europeans and the British to help them attain a space capability of their own. This could serve several purposes, the most important the bolstering of a new and stronger united Western Europe as a self-respecting and stakeholding partner in the grand alliance. This sense of equality could appreciably lessen neutralist trends in areas that now openly wonder whether we will really risk our lives to defend theirs. There

"Made-in-America" label is what interests foreigners. Pioneer V carried "United States" credit line into space, but present space organization still lacks unity of goals, purpose, and over-all authority.

are, of course, small movements among the European powers toward joint space research, but without the stimulus described above, it will be hard for such movements to get off the ground in an all-out manner.

The above are but three of the several areas of technology that could be examined by the next President. There will, of course, be many more problems.

As we look back on the past eight years, it is paradoxical to note that a time which really set out to be a second "return to normalcy," marked instead the opening of a drastically new era. Technology, initially the symbol, will soon become the fact of the new era. The next President will have to understand that fact and turn it to this country's advantage if he is to succeed.—END



New technology and a new breed of "blue suiters" are taking the Air Force into the space environment, a complex journey in a cold-war world. Under way now is the vast transition from . . .

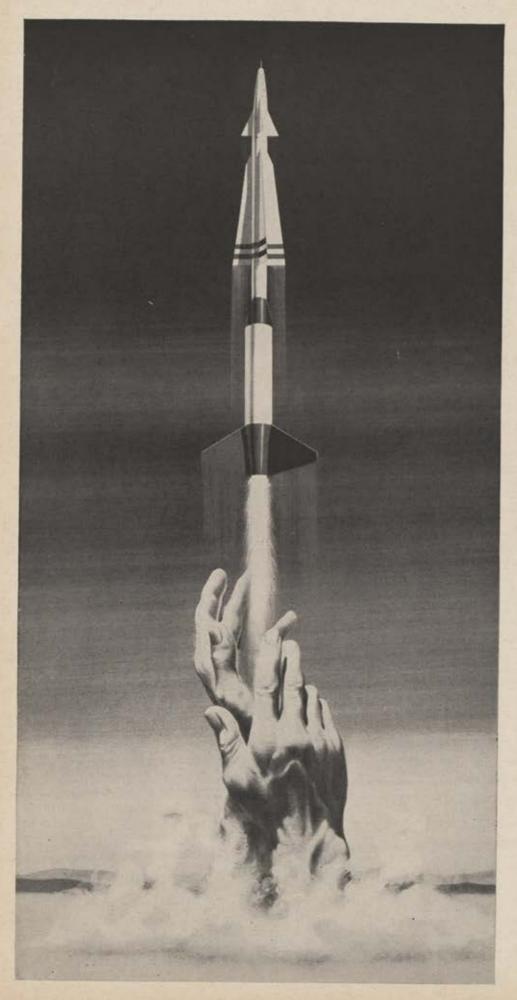
AIR TO AEROSPACE FORCE

LTHOUGH a more specific national policy with regard to the military role in space awaits firmer decisions by the coming new Administration, the logical extension of Air Force operations beyond the aerodynamically navigable atmosphere is an article of faith of today's Air Force leadership.

For a variety of internal and external political reasons, the inevitability of the transition by the Air Force from air to aerospace force has not yet been totally accepted on all governmental policy levels. This hesitancy stems from a number of different points of view.

One such point of view has been that space technology, as an outgrowth of scientific advance, must be treated primarily as a "civilian science" program, and that otherwise military conflict on earth will extend itself beyond the atmosphere. Another, and less altruistic argument has been: Why should the Air Force, of the three military

Symbolic of the transition from air to aerospace, and the mix of conventional and new technological capabilities, are SAC's B-52 manned nuclear-armed aircraft, left, and the Midas II test early-warning satellite, launched May 24, 1960.



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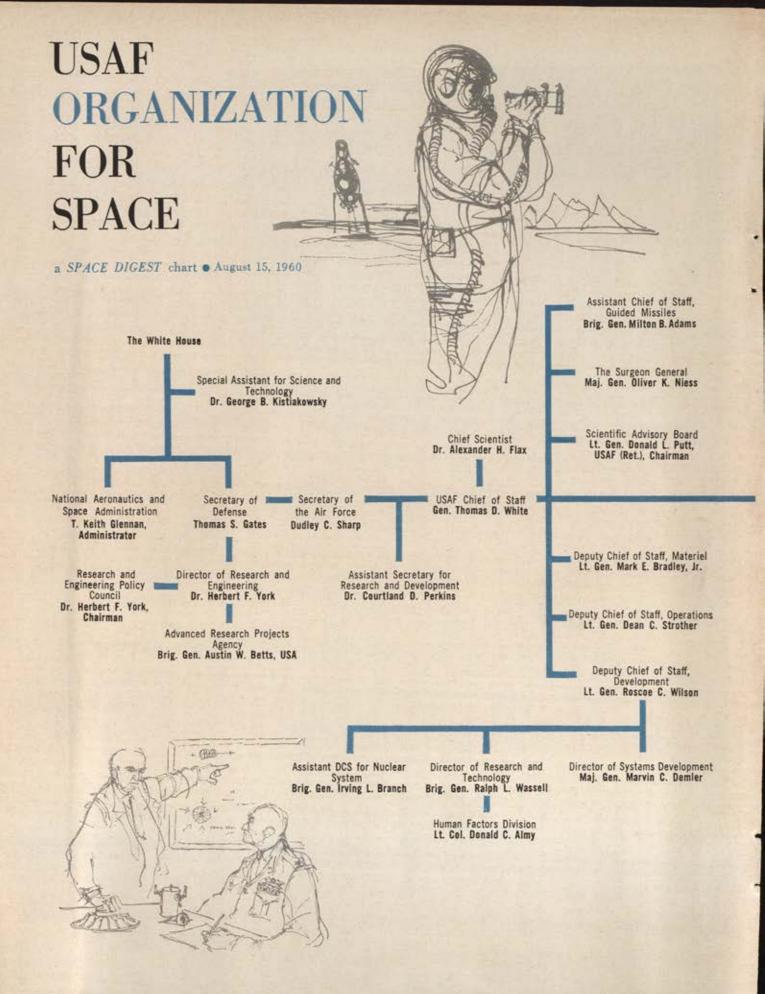
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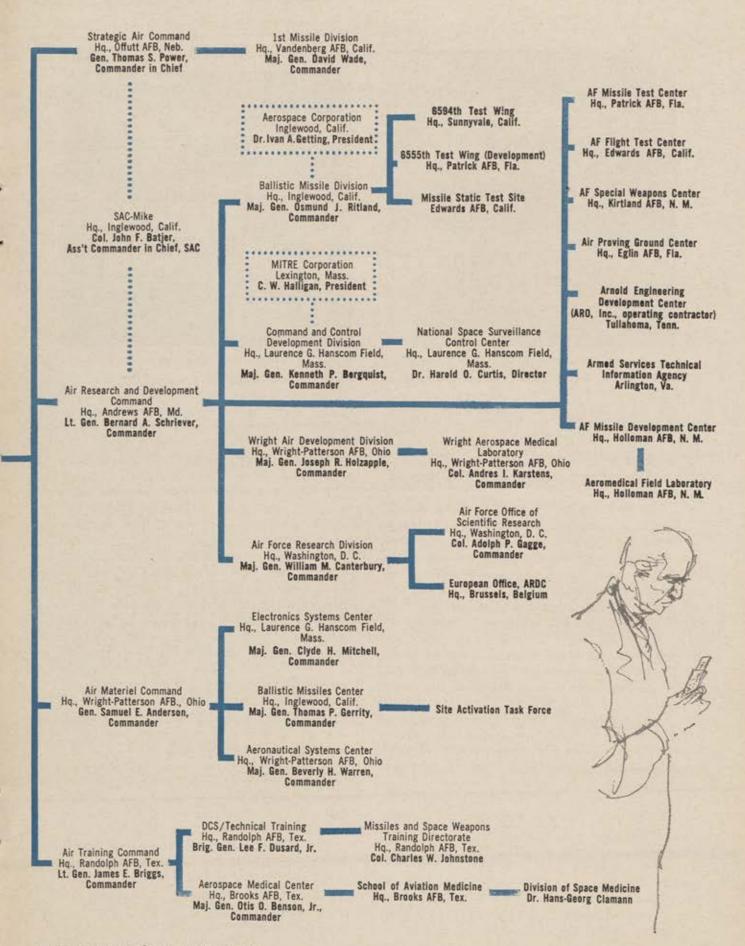
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USAF Capt. Leroy Cooper, Jr., right, participates in weightless flight aboard USAF C-131 over Holloman AFB, N.M. Air Force aerospace medical know-how contributes to NASA program.



Future Air Force missilemen at Sheppard Technical Training Center, Sheppard AFB, Tex., study Atlas operations as they undergo Air Training Command instruction in launch operator analysis.

services, be dominant in space operation, when there are viable reasons for interest by the other services?

The first argument is general and the second specific. Yet they are both significant and it is a continuing chore for the high Air Force officers who must testify before congressional committees or justify programs at Department of Defense level to discuss such questions.

The "civilian science" argument is a retreat from reality. First, our experience with the Soviets indicates that they will not hesitate to use space as a military arena if it seems advantageous; hence it is essential for us to keep pace with their capability, even though we have no real idea as to their intentions. This has been the rationale that both we and the Russians have followed in connection with nuclear military power. In a different world, the Russians might have accepted post-World War II American proposals for international control of nuclear energy, but, because of their aim of world domination, they chose instead to develop their own capability. In turn, we strengthened our own capability, and out of this situation emerged the uneasy, but so far effective, mutually deterrent posture. In a real world, unpleasant as it often is to all of us, space technology potential must be exploited for defensive military strength.

The other aspect of the argument for "civilian science" is semantic. Many people believe sincerely

that there is a deep cleavage in interests and motivations between civilians and military. This may have been true in ancient and medieval times, when the military was an entirely separate and vested interest unto itself much of the time. But it is simply not true today. The military man and the civilian are all part of the same vast complex. Much of the "blue-suit capability" of the Air Force derives from civilians. And, by the same token, much of the impetus for scientific advance has come from military requirements. Yet many critics persist in the belief that donning a uniform changes a man so radically that he cannot be really completely trusted. The fact of the matter is that military men and civilian scientists have the mutuality of professional status and outlook-and that today their two disciplines are increasingly combined in the new breed of soldier-scientist, or conversely, scientist-in-defense.

The other criticism—referred to above—is the questioning of the Air Force's claim of primacy in the space mission. This is, of course, an intra-DoD question. The other services feel that, in view of the lack of complete knowledge as to military use of space in the future, they too should have a free hand in planning spaceborne missions. The answer to this problem does not lie in denying Air Force primacy. Instead it depends on a redoubling of effort to unify the services so that all military space needs can be served. Whether the presently

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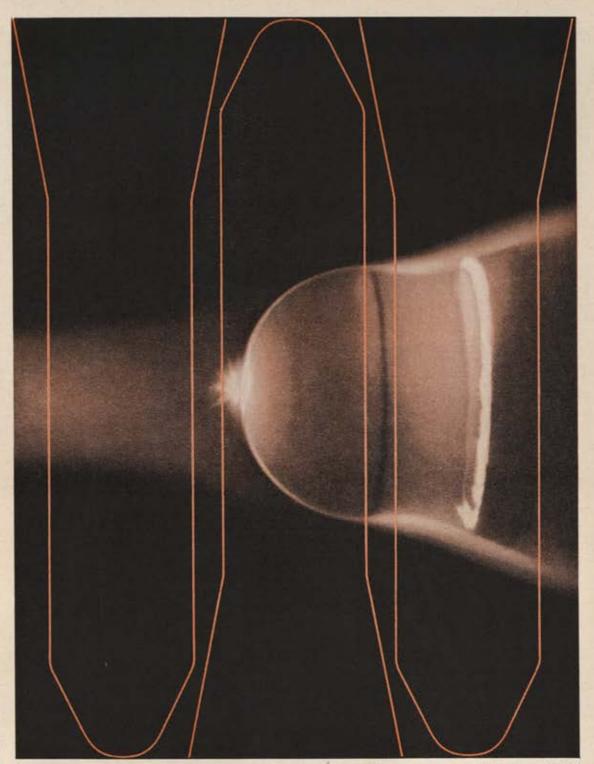
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Blasting new materials to make missile nose cones. The first ICBM nose cone ever to be recovered after flight was protected by a new, high-temperature material. Its name: Avcoite. Its construction: specially reinforced ceramic. Avcoite was the first of a family of new heat-shielding materials. They were developed for reentering nose cones and satellites by Avco's Research and Advanced Development Division. Newest addition to this materials family is Avcoat, a plastic heat-shield here ablating smoothly in a hydrogen-oxygen jet simulating satellite re-entry temperatures.



constituted Air Force or a single service handles the mission—the mission will remain.

Aircrews racing through the Pacific night to pinpoint at sea a Discoverer capsule ejected from orbit . . . advanced planners in the Pentagon charting space systems of a decade hence . . . men on USAF launch pads in California and Florida tuning in on missiles as they roar over their watery ranges . . . a flight surgeon whose exclusive charges are the seven military test pilots, one of whom will be the first American Mercury Astronaut into orbit . . . a parade of specialists describing technological tomorrows to congressional questioners . . . a captain in southwestern Texas working to perfect a closed-circuit breathing system for spaceships . . . a lady dietitian in Ohio studying ways to feed future spacecrews . . . a major in California who has piloted the X-15 aerospace ship to an incredible altitude of 136,500 feet . . . "slipstickers" at an electronics facility at Lexington, Mass., not far from where American farmers fought Brit-

ish Redcoats on the village green in 1775....

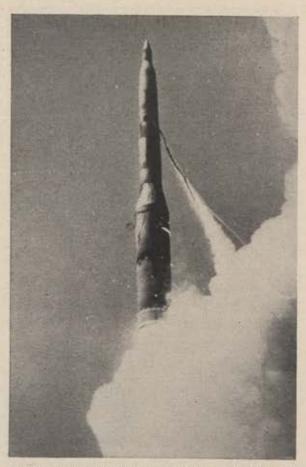
At scores of facilities across the country, the new breed of "blue suiters" are leading the US Air Force in its inevitable transition into the new regime of space as the natural extension of what USAF Chief of Staff, Gen. Thomas D. White, has called the indivisible continuum of aerospace.

The movement into the future is clearly under way, yet because of the exigencies of a cold war which could turn hot at any moment, it is being carried out with an eye to ever-present problems of first, deterrence, and second—should deterrence fail—a "win-the-war" capability.

Thus the Strategic Air Command, which for more than a decade has guarded an uneasy peace, is adding to its formidable manned air attack capability the new power of unmanned, nuclear-armed intercontinental ballistic missiles—the first generation of space weapons.

To the developing mixed force of manned aircraft and manned missiles of SAC will soon be added the advantages of orbiting space vehicles designed to provide early warning of ballistic missile attack and to provide needed observational and reconnaissance data on areas from which attacks against the free world might be launched.

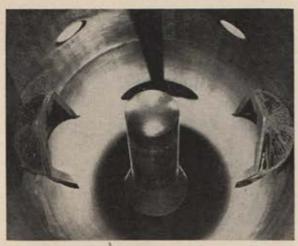
These new dimensions of capability, being rushed by Air Force planners, backed by the aerospace industry team, are exemplified by such projects as Midas and Samos, the first of which has already entered the test launch stage. When both of these systems are in operation, they will enhance the giant electronic fence, BMEWS (Ballistic Missile



Solid-fueled spaceborne deterrent, Air Force's Minuteman ICBM, has already been successfully tested in tethered launches from underground silo site at Edwards AFB, Calif., will soon join USAF.



USAF Capt. Duane E. Graveline spent a week in a bathtub recently at Air Force School of Aviation Medicine to check effects of life in relative weightless state, as part of manned spaceflight research.



Air Force aid in development of Polaris submarine-launched missile is illustrated by this Mach 8 test of a proposed reentry configuration at Arnold Engineering Development Center in Tennessee.



Borne on a white plume of rocket exhaust, this Air Force Bomarc-B interceptor missile takes off from the Air Force's Air Proving Ground Center at Eglin AFB, Fla., during recent missile tests there.

Early-Warning System) now being pushed to completion in England, Greenland, and Alaska.

Symbolic of the space age, the entire Air Research and Development Command has as a specific mission the maintenance of US aerospace technological superiority. Toward that aim, in a few short years, it has laid the groundwork for a missile capability which has transformed the nature of war so radically that World War II, in which today's Air Force was truly born, seems almost as remote in technique as its 1914-1918 predecessor. In the space age, push-button war has become a frightening possibility. Yet conversely, push-button peace—through worldwide spaceborne warning and reconnaissance systems—has already become a realistic hope.

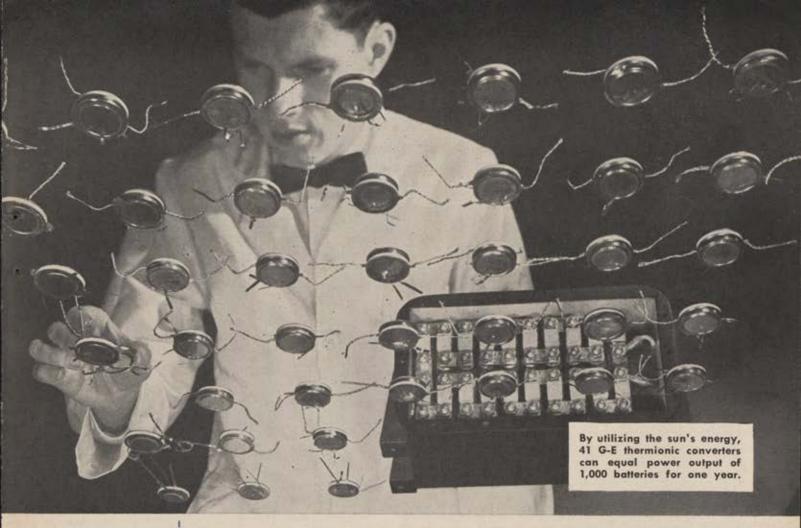
Complementing the operational job of SAC and the development job of ARDC is the training complex in Air Training Command, which today is in the serious business of training Air Force personnel in the intricate arts of missilry as well as the traditional business of flying aircraft.

And engaged in the vast effort of procurement and logistical support of space weapon systems ranging from the ballistic missile to the Dyna-Soar project that will someday lead to an orbital bomber capability is the Air Materiel Command, which only recently had added to its chores the expediting of completion of ballistic missile bases now under construction.

The Air Force's transition from air to aerospace arm has brought into being whole new approaches to the technological problems attending such a vast change. In almost every area of activity, the effects are visible, not only from the organizational but also from the functional point of view.

As the chart on pages 80 and 81 indicates, new and specialized organizations have sprung up throughout the Air Force, to meet these new challenges. And old organizations are constantly being assigned new responsibilities to meet the demands of new technology.

Added to the total complex are such space-age industrial phenomena as the nonprofit "brain factories" which have been set up in recent years for the specific purpose of providing ideas, technical backup, and systems engineering to the Air Force in specialized areas. The two newest such groups are the Aerospace Corporation in Inglewood, Calif., which serves the Ballistic Missile Division, and the MITRE Corporation in Lexington, Mass., which provides technical capability to the Air Research and Development Command's new Command and Control Development Division, in the Division's





...center for missile and space technology research and development at General Electric

Progress in power for space

Manned space flights, as well as other U.S. space projects, will require new, light-weight, long-life sources of electrical energy. Conventional batteries, now being used in missiles and satellites, are far too heavy for most future space applications.

For example, during a year's operation, one thousand 15 amp/hr batteries, similar to the one shown above, would be required to equal the 41 watts which the thermionic converters in the photo can generate from the heat of the sun. These batteries would weigh 15,000 lbs—a complete thermionic system, including the converters developed in General Electric's Research Laboratory plus a collector and orientation equipment, only about 20 lbs.

To provide such new, light-weight systems, engineers at General Electric's Missile and Space Vehicle Department are investigating a wide variety of promising space power sources, utilizing the specialized capabilities of other Company research operations. For instance, under U.S. Air Force contract, G.E. is conducting extensive research in thermionics, and is developing an experimental thermionic system consisting of a solar collector, converters, and storage

and control components. Intensive work in photovoltaics includes the development of an advanced unit to provide more than 500 watts of continuous power for the Advent communications satellite.

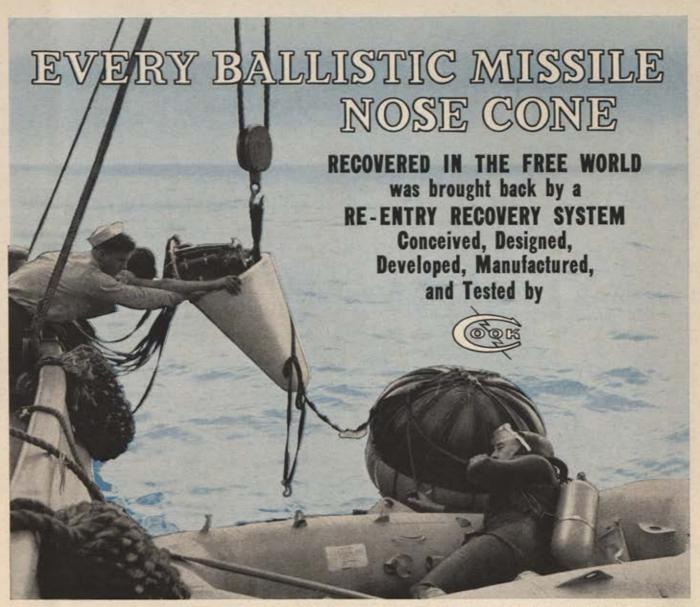
For the U.S. Army Signal Research and Development Laboratory, a regenerative fuel cell is under development, as are magnetohydrodynamic electrical converters for the Air Force Office of Scientific Research, WADD and BMD. In addition, MSVD is investigating nuclear thermionics and nuclear turbines.

To learn more about these MSVD space power developments, write to Section 160-76, General Electric Co., Missile and Space Vehicle Department, Philadelphia 1, Penna.

GENERAL & ELECTRIC

MISSILE AND SPACE VEHICLE DEPARTMENT

A Department of the Defense Electronics Division



SUCCESSFUL RECOVERY OF THE JUPITER C, JUPITER, ATLAS, AND MISSILE NOSE CONES WAS ACCOMPLISHED THOR-ABLE BALLISTIC BY COOK ELECTRIC COMPANY RE-ENTRY RECOVERY PACKAGES.

CURRENT PROJECTS INCLUDE THE MINUTEMAN AND TITAN DATA CASSETTES AND RECOVERY OF THE SATURN BOOSTER.

Scientists and engineers with experience in the following fields are invited to explore the wide range of openings now available:

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Big ear on Air Force Discoverers is this huge sixty-five-foot-wide parabolic antenna which receives signals from the vehicles during the launch phase and later as they proceed in their orbits.

search for integrated man-machine systems for instantaneous and correct human command action based on electronically gathered and processed information.

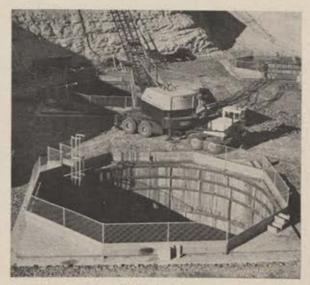
The chart that accompanies this article is an attempt to portray graphically, and with an indication of line and staff relationships, the principal Air Force agencies involved in the transition highlighted above.

The chart starts at the White House.

All military authority derives from the President as Commander in Chief. He in turn leans for scientific advice on his Special Assistant for Science Technology, Dr. George B. Kistiakowsky, a professor and distinguished scientist on leave from Harvard University.

Below the President, in coequal status representing the civilian and military aspects of space technological developments, are the National Aeronautics and Space Administration Administrator, T. Keith Glennan, and the Secretary of Defense, Thomas S. Gates.

At present, for practical purposes, no official body is operating as liaison on space matters between NASA and DoD. The reason is that the Civilian-Military Liaison Committee set up for this purpose in the Space Act of 1958 is expected to be abolished by amendment, and no agreement has been reached between the House and Senate space committees as to a substitute body (although a coordinating board cochaired by the Associate Administrator of NASA and the Deputy Secretary



Big hole for big missile is this excavation at Larson AFB, Wash., one of the operational sites chosen for the Air Force's Titan ICBM squadrons, symbolic of the transition from air to aerospace.

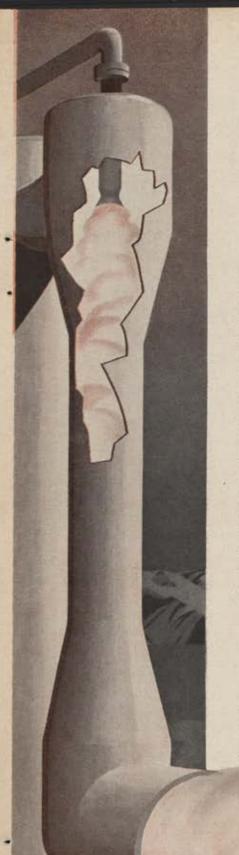
of Defense has been suggested on the House side).

Also missing from the chart is the National Aeronautics and Space Gouncil, created by the Space Act to advise the President on space matters. The Council is also slated for abolition in amendments to the Space Act now under congressional study.

The next layer leading from President to Air Force includes an office now second in authority (as far as technological spending and planning questions are concerned) to the Secretary of Defense—that of Director of Research and Engineering. Dr. Herbert F. York, a physicist long involved in military developments, holds this post and wields great power in his dual role as staff adviser to the Secretary of Defense and as arbiter and general supervisor of all technological research by the military departments. One of the hats he wears is that of Chairman of DoD's Research and Engineering Policy Council in which position he hears the research and development ideas of the staffs of the three services.

The final segment in the DoD layer is the Advanced Research Projects Agency, headed by Maj. Gen. Austin W. Betts, USA. ARPA, which for a time after Sputnik and before the transformation of the National Advisory Committee for Aeronautics into its much larger successor, NASA, reigned nearly supreme as directing and funding agency for military space projects, now has been essentially absorbed by Dr. York's office. It is still significant as sponsor of studies in advanced fuels,





CUSTOMER

Air Force Flight Test Center

PROJECT

Altitude Simulation System

APPLICATION

Testing Low Chamber Pressure Rockets

DESIGNER/BUILDER

Marquardt's Facilities Engineering Division

The Air Force Flight Test Center's Rocket Propulsion Directorate at Edwards AFB needed a new kind of static test facility. It had to be one that would simulate the altitude environment of a rocket engine through its full operational cycle—ignition, steady state operation at altitude, and final cut-off. Marquardt's Facilities Engineering Division is doing the job.

When completed in 1961, this will be the first Air Force facility of its kind. Control rocket systems will be tested at altitudes in excess of 100,000 feet.

To meet these objectives a new design approach has been developed — one that combines a multiple stage ejector system with a high performance exhaust gas diffuser and a Marquardt pioneered steam generator.

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Marquardt's Facilities Engineering is prepared and staffed to design and construct the most complex Space Age facilities. It can provide you withFeasibility and Planning Studies to determine the most suitable approach to new facility requirements.

Design Criteria to describe in detail the design approach to a new facility.

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Detailed information about the Division's experience, facilities and services may be obtained by writing for Marquardt's new Facilities Engineering capability brochure. Address your inquiries to: Tom Hudson, The Marquardt Corporation, 16555 Saticoy Street, Van Nuys, California.

Engineers and Scientists experienced in these or related fields will find it rewarding to discuss their career futures with Marquardt. Founded in 1944, Marquardt now has a staff of 5,000—two out of three are professional people. The company's growth is a parallel to the atmosphere of challenge and rewarding accomplishment that has existed since the firm's beginning.

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Spage-age night view of test site at the Air Force's Flight Test Center, Edwards AFB, Calif., showing facilities where Thor and Atlas underwent vital static test processes in ballistic missile program.



Under Air Force's "concurrency" concept, people to operate systems are trained as weapons are perfected. Here, an airman learns about rocket control at an Air Training Command school in Illinois.

antimissile defense, and spaceborne communications studies.

The top posts in the Air Force, as indicated in the chart, are those of the civilian Secretary, Dudley C. Sharp, and the Chief of Staff, Gen. Thomas D. White. They are provided scientific counsel by the Assistant Secretary for Research and Development, Dr. Courtland D. Perkins; the Chief Scientist, Dr. Alexander H. Flax; and the Scientific Advisory Board, chaired by Lt. Gen. Donald L. Putt, USAF (Ret.).

On the Air Staff level, advising the Chief of Staff, suggesting policy, and outlining requirements, are the staff specialists, whose people perform planning in the specialized areas.

These include: the Assistant Chief of Staff, Guided Missiles, Brig. Gen. Milton B. Adams; the Surgeon General, Maj. Gen. Oliver K. Niess, among whose duties is the keeping track of the various elements of the Air Force's in-house aerospace medical research; the Deputy Chief of Staff, Materiel, Lt. Gen. Mark E. Bradley, Jr.; the Deputy Chief of Staff, Operations, Lt. Gen. Dean C. Strother; the Assistant Deputy Chief of Staff, Nuclear System, Brig. Gen. Irving L. Branch; and the Deputy Chief of Staff, Development, Lt. Gen. Roscoe C. Wilson.

Aides involved in planning space-age projects under the aegis of the DCS/Development are: Director of Research and Technology, Brig. Gen. Ralph L. Wassell; Human Factors Division chief, Lt. Col. Donald C. Almy; and Director of Systems Development, Maj. Gen. Marvin C. Demler.

Four working commands of the Air Force are especially involved with space technology as an added dimension of operational capability.

The Strategic Air Command, headquartered at Offutt AFB, Neb., commanded by Gen. Thomas S. Power, is the using command for existing space weapons—intercontinental and intermediate-range ballistic missiles—and is looking ahead to eventual manned aerospace capabilities that will emerge from such projects as the X-15 and Dyna-Soar. The 1st Missile Division, headquartered at Vandenberg AFB, Calif., commanded by Maj. Gen. David Wade, currently is the repository of existing ballistic weapon capability. Construction of additional bases from which retaliatory ballistic weapons would be launched is under way.

The developmental program for space weapons is the job of the Air Research and Development Command, headquartered at Andrews AFB, and commanded by Lt. Gen. Bernard A. Schriever.

Under ARDC are the famed Ballistic Missile Division, at Inglewood, Calif., commanded by Maj. Gen. Osmund J. Ritland, which has directed the Air Force ballistic missile development program; the Wright Air Development Division, at Wright-Patterson AFB, Ohio, commanded by Maj. Gen. Joseph R. Holzapple, and its complex laboratories, including the Aerospace Medical Laboratory, with probably the largest technical capability





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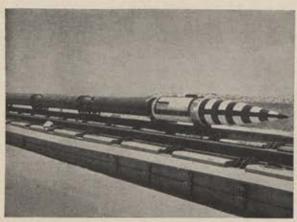
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This multiple-stage monorail sled at Holloman AFB, N.M., has been used in joint USAF-Army tests of missile warhead fuzing systems. The sled has attained record-breaking speed of Mach 3.5.

In the interest of aerospace medical science, Courtney A. Metzger climbs into capsule at Wright-Patterson AFB, Ohio, to spend week living off his own liquid body wastes and regenerated air.

in the country in studies of human stress and endurance; the Air Force Research Division, commanded by Maj. Gen. William H. Canterbury, which operates a multimillion-dollar program of contracted basic scientific research in universities and foundations in this country and overseas; and the new Command and Control Development Division, at Laurence G. Hanscom Field, Mass., commanded by Maj. Gen. Kenneth P. Bergquist.

Just as the Ballistic Missile Division has been a sign of the technological times, so is "C²D²." Its job is the study of systems which will effectively combine the incredible speed of the new computer devices with the unique—and necessary—factor of human control. Among the facilities of C²D² is the National Space Surveillance Control Center, where men and computers work together to keep a constant inventory of all space vehicles orbited.

There is an interesting parallel between the older BMD complex and C²D², in that both of these space-age Air Force operations rely to a great extent on specially created nonprofit corporations which specialize in the areas of interest of the respective division; in the case of BMD, the Aerospace Corporation and in the case of C²D², the MITRE Corporation.

Also listed on the chart are several of ARDC's research and test centers; the Air Force Missile Test Center, Patrick AFB, Fla., principal missile research and development launch site; the Air Force



Flight Test Center, Edwards AFB, Calif., where the X-15 project is headquartered; the Air Force Special Weapons Center, Kirtland AFB, N. M., research and development center for nuclear weaponry; the Air Proving Ground Center, Eglin AFB, Fla., another missile and weaponry test area; Arnold Engineering Development Center, Tullahoma, Tenn., a contractor-operated research center on aero and astrodynamics; the Armed Services Technical Information Agency, Arlington, Va.; and the Air Force Missile Development Center at Holloman AFB, N. M., also the site of the Aeromedical Field Laboratory, where in the very early fifties investigators were firing animal-carrying rockets to obtain information on human factors.

Logistical support for aerospace development and operational capability is the assignment of the Air Materiel Command, headquartered at Wright-Patterson AFB, and commanded by Gen. Samuel E. Anderson. An extremely important shop of AMC involved in this effort is the Ballistic Missiles Center, at Inglewood, Calif., commanded by Maj. Gen. Thomas P. Gerrity. BMC is a principal link between AMC, ARDC, and SAC and recently was assigned management responsibility for site activation of missile bases construction, installation, checkout, and turnover to SAC on schedule.

Working closely with both BMD and BMC is the special operation called SAC-Mike, also at Inglewood, and commanded by Col. John F.



TOMORROW...

Advanced aerospace defense systems from Raytheon

The skills evolved in developing existing air defense programs are now being applied by Raytheon to the solution of the free world's aerospace defense problems.

Research and study programs have produced a broad range of advanced defense systems concepts. As with HAWK, Raytheon is applying its proved systems capability to these programs.



MISSILE SYSTEMS DIVISION



This giant propulsion wind tunnel at Air Force's Arnold Engineering Development Center, Tullahoma, Tenn., is designed for tests of vehicles at speeds ranging from Mach 1.5 to around Mach 5.

Batjer, Assistant Commander in Chief of SAC. SAC-Mike's responsibility is to serve as primary link between ARDC developmental capability and SAC's operational requirements.

Paralleling the ARDC developmental divisions are AMC's specialized centers, notably the Electronic Systems Center, Laurence G. Hanscom Field, Mass., commanded by Maj. Gen. Clyde H. Mitchell, and the Aeronautical Systems Center, at Wright-Patterson AFB, Ohio, commanded by Maj. Gen. Beverly H. Warren. ESC is opposite number to C²D², while ASC is opposite number to WADD.

Air Force-wide training for the new skills that will be required for aerospace weaponry is the job of the Air Training Command, headquartered at Randolph AFB, Tex., and commanded by Lt. Gen. James E. Briggs. Training, carried on at several Air Force bases across the country, is under direction of General Briggs's Deputy Chief of Staff for Technical Training, Brig. Gen. Lee F. Dusard, Jr. and ATC's Missiles and Space Weapons Training Directorate, also at Randolph, headed by Col. Charles W. Johnstone.

Also under ATC is the Aerospace Medical Center, headquartered at Brooks AFB, and commanded by Maj. Gen. Otis O. Benson, Jr. A principal component of the center is the School of Aviation Medicine. SAM's dual mission is the training of flight surgeons for the Air Force and research in aerospace medicine, including basic research on medical problems of manned space-



Plasmatron is used at Air Force's Special Weapons Center, Kirtland AFB, N.M., to create temperatures of up to 25,000 degrees Fahrenheit for test of materials in reentry vehicle simulations.

flight, which is focused in the Division of Space Medicine, established at SAM in 1949.

The nearly sixty elements listed on the chart are a mere highlighting of an effort that would take many more pages to illustrate totally.

In this third year of the space age, almost every national space activity necessarily involves the Air Force. As of September 1959, the official responsibility for launch of and development of military space boosters was assigned by DoD to the Air Force, settling earlier confusions of authority among the services. And for all practical purposes, the launch capability for the civil space program, directed by NASA, rests with the Air Force, which has launched most of the successful US space vehicles to date.

Equally important is the Air Force's sizable capability in the field of aerospace medicine which translated into practical terms is the indispensable key to successful manned spaceflight. This capability ranges from in-house research on crew cabins in advanced flight systems to the recycling of human waste as part of life support systems in spaceflight. Even before the official inauguration of the NASA Project Mercury program to orbit an American Astronaut, the Air Force was close to establishing its own program to accomplish the same mission. And from the start of Project Mercury, Air Force aerospace medical skills and people have been fed into the NASA program.

-WILLIAM LEAVITT



Over 25,000 informative cloud-cover pictures have been received from TIROS I since it was launched on April 1. In two months the satellite had completed 1000 orbits and travelled 27,500,000 statute miles. This means not only that TIROS itself has performed as planned, but that the complex problems of command and control, as well as signal reception and processing, have been successfully surmounted. Like the satellite, the special ground station equipments were designed and built by RCA Astro-Electronics Division under the auspices of NASA and technical direction of the U.S. Army Signal Corps.

Major components at each of the four ground stations include:

- Five TV receivers and four beacon receivers used in diversity reception to minimize signal fading
- A programmer which pre-programs different combinations of operating modes, and a 200 watt command transmitter
- A TV monitor to display the picture signal for the automatic recording camera. The camera is equipped to make either positive or negative films
- An indexer and sun angle computer which generate an index number and sun angle indication for each picture, used for geographical orientation
- An attitude recorder which picks up the earth-horizon signal for spin axis position computation

- Two standard 4-channel tape recorders to back up the monitor
- Two paper recorders to monitor forty telemetered satellite parameters
- An antenna programmer which directs the antenna to follow the orbit of the satellite when it is in range of the ground stations

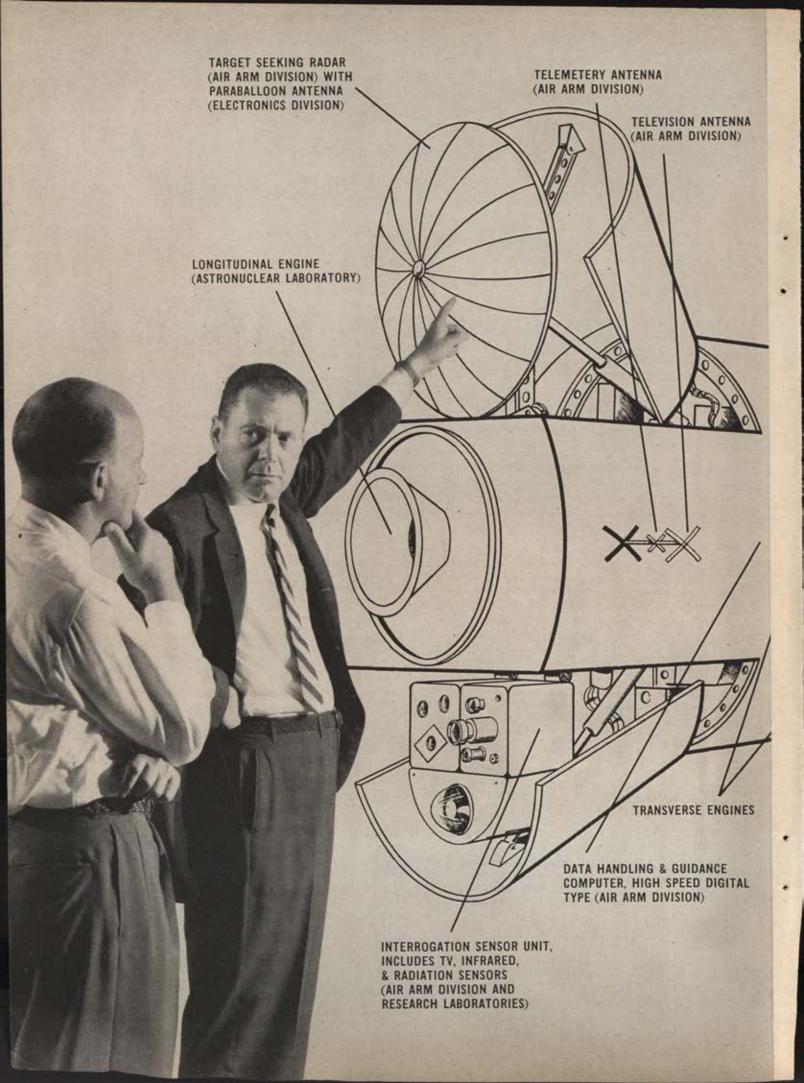
All program functions are timed by a master clock which is synched to standard time signals from WWV. In addition to normal picture direct transmission and record functions, the programmer can also command spin-up. After two months the spin rate had decreased to 9.4 rpm's due to the effect of the earth's magnetic field. On command from the ground, two solid propellent spin-up rockets on the satellite were fired, increasing the spin to 12.8 rpm's.

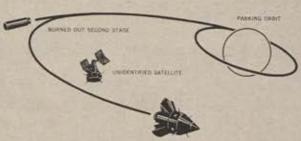
AED's own ground station was used to process photos from the magnetic tapes for the first one hundred orbits.

The integrated design and development of these TIROS ground stations is an indication of AED's capability in total satellite systems. This capability will become increasingly critical as more and more complex satellites and space probes are launched to advance man's understanding and control of his universe. To discover how you can draw on this broad R & D experience, contact the Marketing Manager, RCA Astro-Electronics Division, Princeton, N. J.



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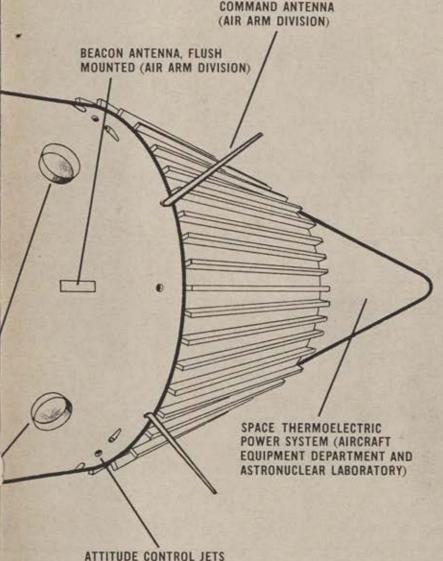


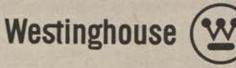
RENDEZVOUS SATELLITE

This sophisticated payload is a concept encompassing Westinghouse capabilities for the space rendezvous mission. It incorporates the company's broad experience for radar target seeking, propulsion, stabilization and control, telemetry, thermoelectric power generation, high speed data handling, and TV and infrared sensors. Many of these systems are ready today. Others are advancing rapidly in development.

Such a satellite could be launched for immediate intercept, or placed into a parking orbit, always ready to intercept, interrogate or inspect in detail another object orbiting in space.

This payload, one of the many space mission requirements, demonstrates a capacity approached by few companies today. Westinghouse provides the full range of experience, facilities and engineering skill needed to produce pay-loads vital to the nation's space program. You can be sure . . . if it's Westinghouse.







Aerial recovery crews of Air Force Ballistic Missile Division's 6593d Test Squadron attend preflight briefing for instructions on the Discoverer recovery plan.



Waiting, seconds before Discoverer XIII launch, BMD's Test Controller, Col. "Moose" Mathison, tunes in on the blockhouse from Test Center at Sunnyvale, Calif.

ALL IN A WEEK'S SPACE WORK

Discoverer recovery . . .

A spurt for the X-15

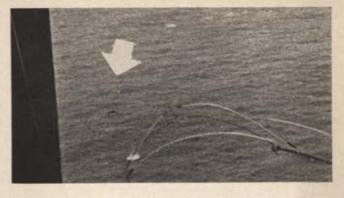
. . . And an Echo in orbit



As their C-119 circles over the Pacific Ocean area where the capsule was recovered, Air Force crew members take some welcome time out for relaxation.



Making a low pass over the capsule, which has now been sighted in the sea, aircrew awaits the signal to drop smoke marker to make impact area more easily visible.



The marker has been dropped as the C-119 makes a low pass over the capsule impact area, and the capsule can be seen as the little speck under the white arrow.

HE US Air Force, both on its own and backing up the National Aeronautics and Space Administration, took three giant steps into space in a single week in mid-August which saw the vitally significant first successful recovery of an object from orbital flight, the smashing of the world's manned flight altitude re-

cord, and the as yet most dramatic demonstration of the feasibility of worldwide communication via space.

On August 11, the Air Force spotted and directed pickup from the sea near Hawaii of the eightyfive-pound instrument capsule from Discoverer XIII, "Lucky Thirteen" of a series of Air Force Ballistic Missile Division-launched space vehicles which started more than a year ago. Safe reentry and recovery was the most hopeful signpost yet toward the feasibility of recovering a manned capsule as contemplated in the Mercury Astronaut program. It was a feat that had not yet been achieved by the Soviet astronautical program.

The two other elements of the Air

Bendix cermets (ceramic-metallic materials) beat the inferno-like heat of rocket launching and re-entry. Sub-scale and full-scale motor tests, using the latest types of aluminized propellants, consistently show zero erosion in the throat areas.

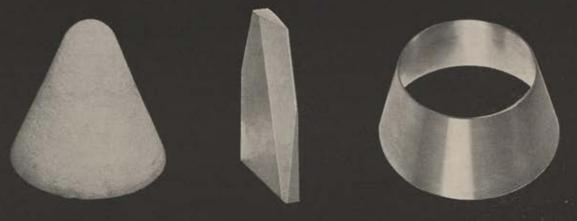
The new cermets result from our experience with Cerametalix[®], now a widely preferred friction brake material for high-performance aircraft. Even more advanced refractory techniques are used in our cermet production. These include: flame spraying, plasma arc spraying, hydrostatic pressing, vacuum sintering, layer compounding and transpiration cooling.

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ROCKET NOZZLE THROATS





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for NASA's Jet Propulsion
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many space-oriented programs
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They emphasize Ford's rapidly growing role in meeting the needs of science and defense in the Space Age.

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Into the wild black yonder, in mid-August, roared Air Force Maj. Robert M. White, who took the X-15 up to 136,500 feet in four minutes.

Force August astronautical tripleplay: On August 12, only a day after the significant "bringing back of the capsule alive," Air Force X-15 pilot, Maj. Robert M. White, took his experimental airplanerocketship to an altitude of 136,500 feet, reaching a maximum speed of 1,700 mph. Major White's flight followed by only eight days the speed record of 2,196 mph set on August 4 by NASA test pilot, Joe Walker. On the very same day, the Air Force launched into a 1,000mile-plus orbit from Cape Canaveral, Fla., NASA's giant Echo I communications test satellite, a 100foot aluminized balloon which shortly after attainment of orbit was broadcasting President Eisenhower's voice across the world.-END



Demonstrating the feasibility of communications via bouncing signals off orbiting vehicles is NASA's Air Force-launched Echo I satellite.

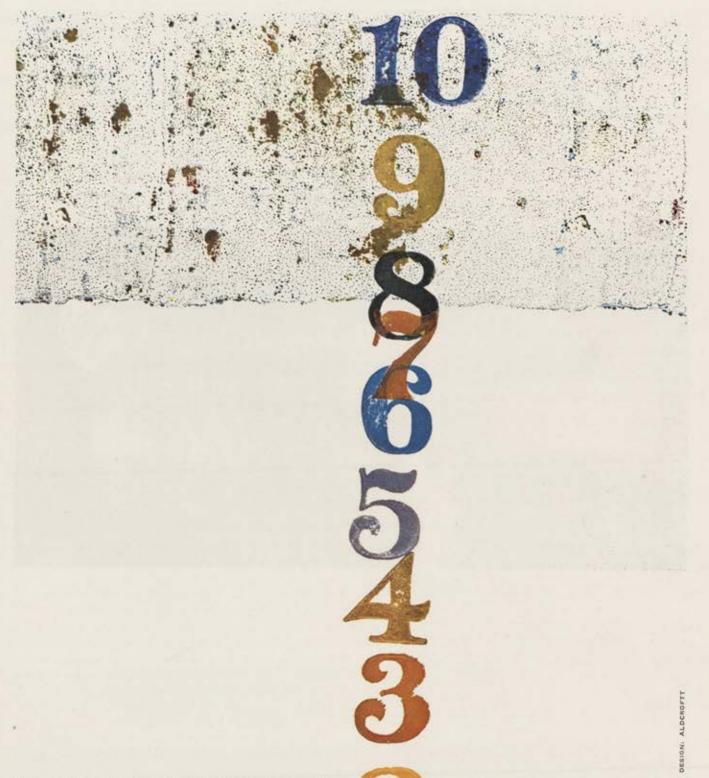
Programme of the ball to be provided the property of the ball to cope the Military C. effectively. It mit and extend his control control becteronce, writine to the Commander are deterrence, writine to the tated by electronic system play the data required for the involve, to an unusual dega factors, operational factors and systems are to function. Further, be considered independently of and machines.

The MITRE Corporation is a not, 1958 under the sponsorship of the Max nology. It provides technical support to the Command and Control Development Divity posed of the engineers and scientists who a SACE—the world's largest real-time control design, develop and evaluate large-scale, computed and control systems. Its technical competence a will provide the Military Commander with compatible meet the standards of technical realism.

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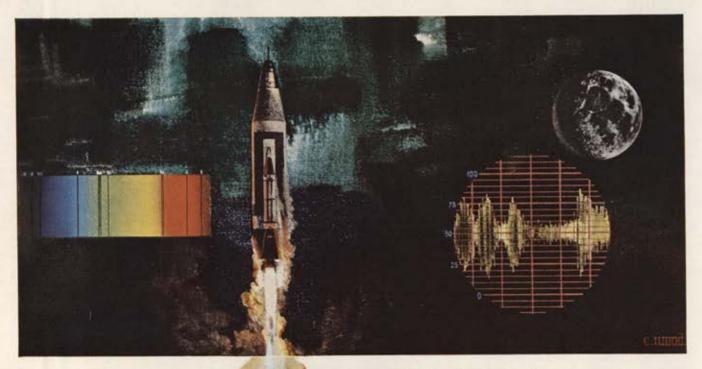




COMMUNICATIONS

Sine Qua Mon

OF A MODERN WEAPONS SYSTEM



*

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



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



General Everest, TAC Commander since August 1959, was formerly Commander in Chief, USAFE, from 1957 to 1959, and DCS/Operations at Hq. USAF, from 1954 to 1957. General Everest saw extensive service in the Pacific during World War II. He commanded the FEAF Fifth Air Force in Korca. He has also been Director of the Joint Staff, Hq. USAF.

Versatility, mobility, and firepower as epitomized

in the Composite Air Strike Force

characterize USAF's rugged . . .

TACTICAL AIR COMMAND

Gen. Frank F. Everest, USAF

COMMANDER, TAC

URING the past year tactical air forces worldwide have proved their worth many times over as a flexible and responsive element of military power. Those forces assigned to theater commanders in Europe and the Far East have upheld their primary responsibility as an integral part of our general-war deterrence. Other air units, held in central reserve in the United States under the Tactical Air Command, have repeatedly demonstrated their competence to augment theater forces in a matter of hours or, if needed, to deploy rapidly to meet a small-war threat almost anywhere in the world.

Moreover, in their overseas locations tactical air forces have afforded apparent and undeniable proof of our intentions to defend our allies and the rest of the free world as readily as we would our own homeland. Together with other Air Force elements and elements of the other services, they represent this nation's military contribution to treaty alliances and to our all-important policy of mutual security.

The fundamental task of the Tactical Air Command is to prepare tactical units for eventual employment overseas. In essence this command is a producer of combat-ready airpower, whose customers are the unified and specified commanders. It is our responsibility to constantly stay abreast of customer needs and tailor the product accordingly. In short, we must ensure that tactical air forces overseas are furnished with the proper weapons, that the officers and men are properly trained to use them, and that they are located and supported in such a way that they can perform their mission.

Because of their quick reaction, mobility, and wide range of firepower, tactical air forces are particularly suited for small-war contingencies. In fact, since 1950 one of our most important missions has been countering local aggression. As a result TAC has devoted a good deal of its time and resources toward developing and refining the Composite Air Strike Force (CASF) concept, the organizational vehicle for our small-war function.

The CASF concept is founded on the tenet that the best way to counter Communist aggression is to deploy rapidly to any threatened area small but highly effective air units. Upon arrival, these forces must be immediately prepared and ready to engage in any type of war.

To react quickly, the CASF must be reinforced and supplied by airlift and by drawing on strategically prepositioned stocks of fuel, arms, and equipment. While sealift can be used for follow-on logistic requirements, airlift is essential for speed in the initial deployment in order to halt the aggression.

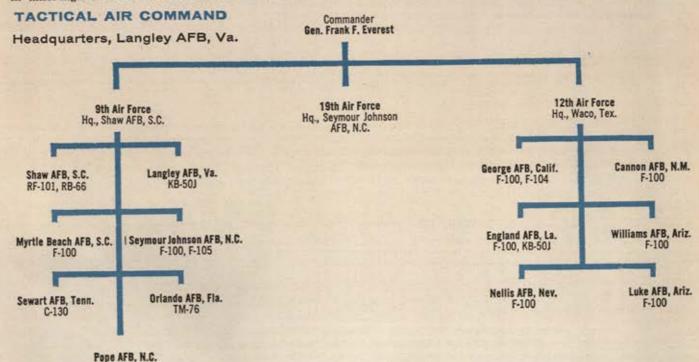
We maintain our CASF on alert so that its leading elements can depart the US within six hours of decision time. Consequently, a sizable force may be dispatched to almost any part of the globe within a period of twenty-four to seventy-two hours, depending on the distances involved, available routes, etc.

CASF procedures were severely tested during the past twelve months. Tactical fighters, reconnaissance planes, tankers, and troop carrier transports were dispatched repeatedly on missions to exercise their operational readiness as well as to "show the flag" to the nations of the free world. These highly mobile, self-sustaining strike forces paid visits to Europe, the Middle East, the Far East, the Caribbean, and South America in graphic demonstrations of tactical air-power's contribution to peace and diplomacy.

Operation Spearhead, one of TAC's most critical tests, began after a surprise alert was ordered by



Close-in view of a TAC aerial refueling operation. RF-101F tactical reconnaissance plane receives fuel from KB-50 in miles-high midair rendezvous. Aerial refueling is major factor in global quick-response capability of TAC CASF.



Headquarters USAF in November 1959. Within hours after leaving Myrtle Beach AFB, S. C., a Composite Air Strike Force, refueling at night and in bad weather over the Atlantic, touched down in France. In less than twenty-four hours, complete units were in place and ready for combat missions. Enough priority cargo was moved, with MATS assistance, to allow the force to operate for thirty days without support.

C-123

In another deployment, dubbed Exercise Quick Span, a force of fifty TAC fighter, reconnaissance, troop carrier, and tanker aircraft departed the United States for a Middle East good-will tour. Performing before huge crowds and many notables, including the Shah

of Iran, they made thousands of friends for the United States in such faraway places as Teheran, Iran; Karachi, Pakistan; and Ankara, Turkey.

The people of Southeast Asia Treaty nations also saw US tactical airpower in operation when the men and aircraft of Exercise Mobile Yoke engaged in training in the Far East and a good-will visit to Bangkok, Thailand. This exercise, which was designed to test our capability to reinforce Pacific Air Forces, was considered highly successful both operationally and as a demonstration of our readiness and capability to support SEATO nations if called on to do so.

Exercise Banyan Tree II was another example of

outstanding cooperation between the Tactical Air Command and the Continental Army Command. For the second year, TAC C-130s airlifted Army paratroopers nonstop from Ft. Bragg, N. C., to their drop zone in the Republic of Panama. Fighter cover was provided by F-100s operating from a Florida base and refueling from TAC aerial tankers. Colombian and Peruvian jets also participated under the control of Composite Air Strike Force headquarters.

In other friendship flights, Tactical Air Command saluted our neighbors to the south with a good-will visit of fighters, aerial tankers, and transports to Mexico City in 1959, and early this year another flight of F-100s flew to Buenos Aires to help commemorate

the 150th anniversary of Argentina.

In January 1960, ski-equipped C-130 Hercules aircraft, which had just returned from air resupply missions on the Greenland icecap, flew to Alaska to rescue a group of scientists based on Ice Island Charlie. Other ski-mounted C-130s journeyed to the South Pole to assist in Operation Deep Freeze. In two weeks in the Antarctic, the aircraft airlifted 400 tons to the Pole, the first time that a four-engine aircraft had landed there.

In addition to CASF deployments, certain tactical squadrons are rotated every four months to Aviano, Italy, and Adana, Turkey, in support of NATO com-

Tactical Air Command personnel wait at Chaumont Air Base in France for plane to take them home to States after Exercise Spearhead, testing command's tactical mobility.

mitments. To simulate the most realistic conditions during deployment, these squadrons are launched and refueled over the Atlantic so as to reach the foreign base nonstop in minimum time. Support personnel follow in TAC C-130 Hercules troop carrier aircraft or MATS transport aircraft.

In November of last year, a squadron of F-104 Starfighters for the first time flew nonstop to Moron, Spain, to replace an F-100 rotational unit there. The F-104s, armed with Sidewinder air-to-air missiles, are a part of a joint Spanish-USAF air defense effort for protection of military installations in that area.

Detachments of our aerial refueling wing are also on station overseas at all times. Prepared to refuel either the aircraft of TAC strike forces or jet fighters in the aerial delivery system, they represent the key

to the added range of the jet fighter.

The KB-50s of the TAC tanker fleet are the oldest first-line tactical aircraft in the USAF inventory. With two J47 jet engines added to the four reciprocating power plants, they can carry tremendous quantities of fuel at altitudes above most oceanic weather. Tankers also serve as navigation stations, providing their fighters advanced weather information, compass headings, and times and distances. Just as mobile as

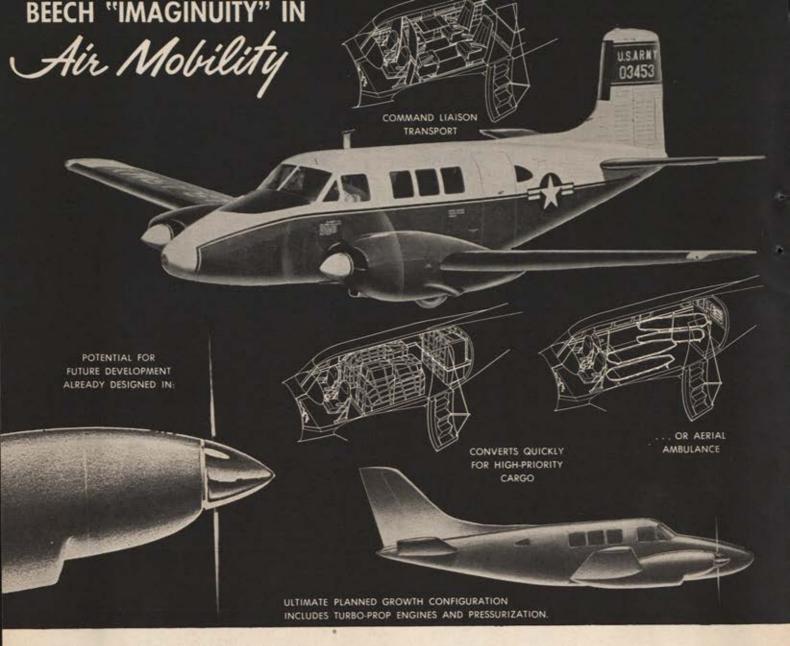
(Continued on page 113)



Pakistan airmen and civilians take a look at F-100 Supersabre jet fighter on display in their country as part of Tactical Air Command deployment exercise in Far East.



Left, a scene at Don Muang Airfield in Thailand during recent Operation Mobile Yoke by CASF. RF-100, RF-101, C-130 transport in background. In foreground, local Thais work away.



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Already serving the U. S. Army, the versatile new Beechcraft L-23F is the latest in a long line of highperformance training and utility aircraft which Beech Aircraft Corporation has designed, developed and produced for the military services since 1932.

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BEECH AIRCRAFT CORPORATION . WICHITA 1, KANSAS.



Antarctic, 1960. Ability of ski-equipped C-130 Hercules to land and take off at sites deep in the frozen continent has opened many regions of Antarctic to US exploration.

the aircraft they service, tankers carry with them the logistics to operate from advance bases.

These are only a few of the operations carried out by TAC in the past year. Countless firepower demonstrations, ground-support missions for the US Army, and airdrops of paratroopers are a part of the daily routine that keeps TAC forces operationally ready.

One of the most unique TAC units is the 4440th Aircraft Delivery Group. Charged with the responsibility for moving aircraft to and from overseas bases, this skeletonized group has no assigned ferry pilots or crews. Instead, pilots and aircrews are requisitioned from units in TAC or other major commands possessing the type aircraft to be delivered. As a product of this operation, the Tactical Air Command receives efficient, low-priced delivery service and its aircrews become intimately familiar with worldwide deployment routes. Whenever possible, aircraft are delivered nonstop, utilizing aerial refueling. Ocean crossings run into the thousands, as reconditioned fighters and reconnaissance aircraft are brought home for modification or overhaul and returned to their parent units overseas.

An interesting byproduct of the delivery system has been the support it has given to President Eisenhower's People-to-People program. Beginning with a herd of twenty purebred calves airlifted to an orphanage in Seoul, Korea, the program has taken advantage of C-130 transports returning from the US to haul a variety of good-will gifts. Included were a shipment of hogs, shipments of blankets and clothing for the people of disaster-ridden Nagoya, Japan, and books for the children of Far Eastern countries.

Last year one TAC unit, the world-famous USAF Thunderbirds, won the Mackay Trophy for a 25,000-mile tour of the Far East. The team crossed the expanses of the Pacific and demonstrated their precision flying before crowds of hundreds of thousands.

Another TAC activity, the Air Ground Operations School, conducted classes for the flying personnel of the SEATO nations. Attending the lectures, which



Brig. Gen. Joseph H. Moore, Commander of TAC fighter wing, holding trophy he received in connection with new closed-course speed record of 1,216.48 mph he set in F-105.

were actually given in the Pacific area, were pilots from the Philippines, China, Japan, Korea, Thailand, Indonesia, Burma, Laos, Vietnam, Cambodia, Australia, and New Zealand.

With the current rapid rate of scientific advances, in which weapons approach obsolescence by the time they become operational, we must constantly replace our equipment—a process we call modernization.

The near-term answer to TAC's fighter modernization problem is the F-105 Thunderchief. Manufactured by Republic Aviation, it is a highly versatile, all-weather, Mach 2 fighter-bomber which will replace some of our aging F-100s. In the past year, the partially all-weather F-105B completed its Category II functional suitability

testing with flying colors and is presently well into the operational or combat phase of the testing program. The F-105D radar-equipped, completely all-weather version has recently entered the joint Air Force-industry-conducted functional test phase, which should be finished sometime next year.

Also last year, three squadrons of the 4th Tactical Fighter Wing at Seymour Johnson AFB, N. C., the first wing to receive the F-105, were assigned their full complement of the new aircraft. The fourth squadron, the 335th Tactical Fighter Squadron, has been temporarily detached from its parent wing and is conducting the F-105 testing at Eglin AFB, Fla.,

in conjunction with ARDC.

Looking beyond the F-105 into the 1965-1970 time period, the tactical fighter of the future must incorporate into one system the flexibility to accomplish the manifold tactical air tasks in the face of the rapidly increasing efficiency of enemy air defense systems. It must be capable of flying at supersonic speeds at both low and high altitudes and delivering nuclear or nonnuclear weapons with extreme accuracies in any type of weather. It must have sufficient ferry range to deploy nonstop without in-flight refueling from the US to Europe or with not more than one refueling to the Far East. In view of the vulnerability of permanent airfields in a general-war situation and their scarcity in the remote areas of the world where small wars might occur, this aircraft must be able to operate from secondary airstrips 3,000 feet in length, with a semi-improved surface such as PSP or compacted sod.

In our preliminary studies of the problem of finding one aircraft which would meet these demanding criteria, it was evident that the solution might rest with the partially tested concept of variable wing geometry. Consequently, in January of this year TAC submitted to Headquarters USAF a requirement for an all-purpose tactical air vehicle which has since been identified as STOL, an abbreviation for one of its most significant operational characteristics—the capa-

bility for short takeoffs or landings.

Since that time a firm development plan for STOL has been prepared by Wright Air Development Division and approved by AF Headquarters. It is anticipated that design competition will begin soon.

When STOL becomes a reality, TAC will be able to reinforce either theater with an aircraft that will have the best chance of operating effectively in the extreme conditions of a general war. Also the equipping of a significant portion of theater Air Forces with this aircraft will provide those commands with a weapon system having a potential for surviving and fighting in a general nuclear war from the outset.

Relying on its low-level, supersonic dash, we would hope that STOL could run the gauntlet of a sophisticated air defense and still deliver its weapon on target. Also, its short-field capability would give it a much greater selection of airfields for recovery and subsequent strikes. In my opinion, such a weapon system would be a most valuable adjunct to the ballistic missile in the event of a general war.

In addition to this general-war role, the STOL is particularly well adapted as a local-war weapon system. As a result of its nonrefueled ferry range, it will not be dependent on tanker support and not be hampered by bad weather in crossing either ocean. Through reduced reaction time, a STOL-equipped CASF could arrive in a threatened area in time to quell a disturbance before it generated into a first-class shooting war.

Moreover, the STOL aircraft could deploy more readily to those areas with limited runway facilities such as in Africa and Southeast Asia. This type of flexibility could be of utmost importance to a CASF

operation.

Another of our major considerations in tactical air planning is the proper balance between missiles and manned aircraft. While the aircraft is better suited for small wars and in certain phases of a general war, the ballistic missile is, in my opinion, a better weapon for preplanned fixed targets in the initial phase of a general war. Because of its relative invulnerability, on the ground through mobility or hardening, and once launched, through its speed and altitude, the ballistic missile stands much better odds of surviving an enemy's first blow and accomplishing its objective.

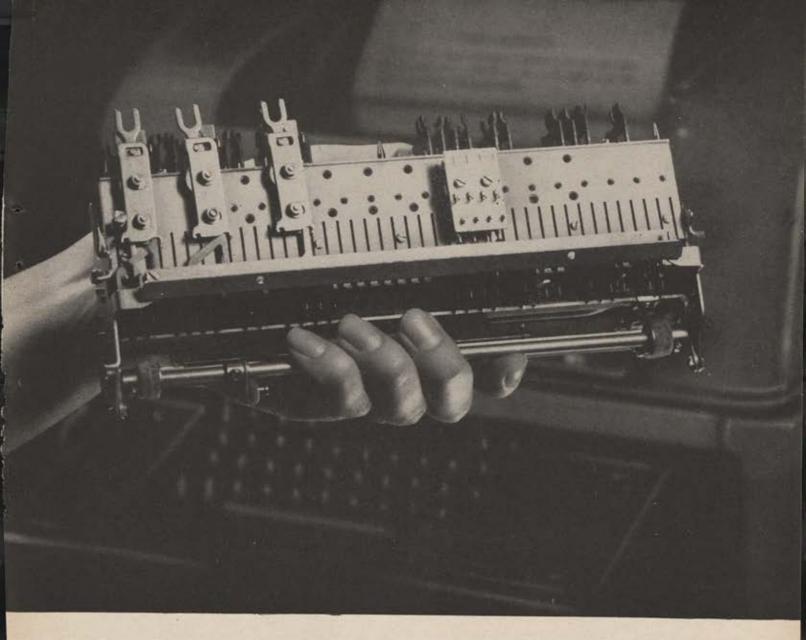
As time passes, the missile will play an increasingly important role in overseas theaters. This doesn't mean that there will be a decline in the importance of the mission accomplished by manned aircraft in these areas, but it does point out the primary employment of the manned aircraft in missions that cannot be accomplished by missiles. We see, therefore, a readjustment in the next few years between manned aircraft and missiles, but not the elimination of manned aircraft in

overseas areas.

Our present-day operational tactical missiles are the air-breathing, subsonic TM-61 Matador and the TM-76 Mace. The shorter-range Matador, which is dependent on ground stations for its guidance, is gradually being replaced with the Mace. We have established in TAC a comprehensive program to train individuals and units in the operation and maintenance of the Mace and the Matador. This training, which is conducted at Orlando AFB, Fla., and at Cape Camaveral, has been extremely valuable in preparing missile squadrons for overseas deployment.

These past few months TAC has had under intensive review follow-on missiles. As a result of these studies and solicitation of views of various technical agencies within the Air Force, proposed characteristics have been submitted for the development of a missile to meet the overseas general-war needs. We are encouraged by the state-of-the-art development that will permit the attainment of a relatively lightweight missile which has a high degree of mobility and potential of surviving almost any type of attack in any overseas

This then is a brief review of the major activities, accomplishments, and developments in TAC in the past year—with a few observations on our future requirements.—END



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Teletype Corporation manufactures this equipment for the Bell System and others who require the finest in data communications equipment.

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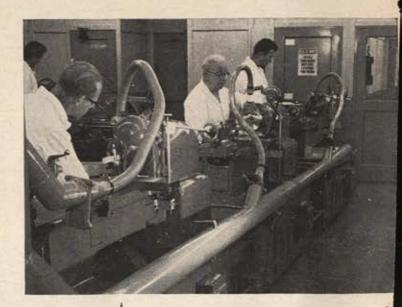
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General O'Donnell has been Commander in Chief of PACAF since August of 1959. He served as DCS/Personnel at Hq. USAF from 1953 to 1959. At the start of the Korean War in 1950, he set up FEAF Bomber Command in Japan. General O'Donnell served with heavy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

An uneasy peace lies over the Far East, where

a powerful, tension-tuned Air Force

command stands at the ready . . .

PACIFIC AIR FORCES

Gen. Emmett O'Donnell, Jr.

COMMANDER IN CHIEF, PACAF

N UNEASY peace lives over the Far East. Communists threaten Korea; terrorists' bombs and gunfire explode in Vietnam; Quemoy is the target of Red artillery; Taiwan is menaced by formidable jet airpower; Laos is subjected to terrorist subversion; and Communist-inspired mobs riot in Japan in defiance of their elected government.

Such has been the run of events in the troubled Pacific theater of the cold war. It is in this gigantic area that the future of human history may be decided—and it is the mission of the Pacific Air Forces to help ensure that Communist aggressors do not do the deciding.

In military terms, PACAF exists to perform the following primary functions:

 Provide tangible evidence to our allies, and other countries which may be threatened, of the determination of the United States to fulfill its mutual security treaty obligations.

 Contribute to the effective defense of the threatened areas in the event of hostilities. The ability to do so also constitutes part of US deterrent strength.

In accomplishing these functions, of course, PACAF simultaneously contributes to the direct defense of the United States and is in a position to play an important role in any enlarged conflict should that unfortunate circumstance develop.

For more than a decade now, Communist gunfire has dealt death and destruction to the people of Eastern Asia. Within the past eleven years or more, mainland China, North Korea, North Vietnam, and Tibet have been bloodily joined to the Communist empire. And the conflict still continues.

Today the ancient weapons of fear and force are being used against Japan, against India, and against all of the Asian rim-lands lying between them. Today, areas of uneasy truce await only the word from Moscow or Peiping to flare up anew in Korea, on the China Coast, in Vietnam and Laos, or in any other place that appears to suit their menacing purpose. Border incidents, diplomatic insult, and invective, lying propaganda, student subversion—all these and many other weapons continue to sustain the Communist war for world conquest.

PACAF is a member of the vast and complex US defense team operating worldwide on the political, economic, and military fronts to meet the Red threat. With approximately thirty-five squadrons, PACAF operates from twenty major bases in half a dozen countries.

The importance of these bases can be measured by the Communist effort to make them ineffective. On just one recent effort involving student rioting in Japan, the Communists are reported to have spent nearly \$1.5 million for salaries, food, and medical care for their hired "rioters."

PACAF, as it stands militarily ready, also performs other prime functions:

• The US is bound by treaties of mutual defense to protect and help strengthen the new free nations of Asia. To this end PACAF is helping to build national air forces in eight Asian countries. The measure of success to date is that there are now more combatready aircraft squadrons among our allies than PACAF itself possesses. There will eventually be many more.

 President Eisenhower has declared, "The most worthwhile purpose there is in the world today is to help build the road to peace.... Today we have this problem... of creating understanding between peoples."

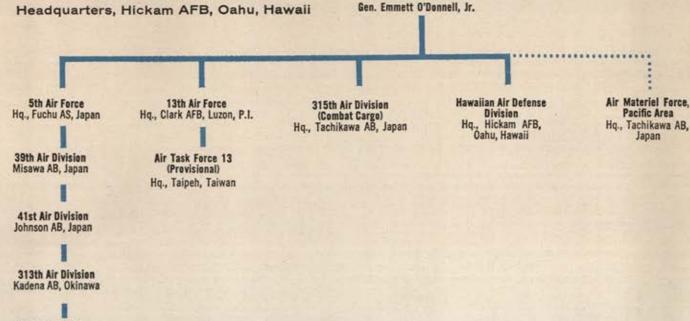
PACAF has some 75,000 American citizens overseas. All of them are taught their responsibilities as individuals representing the United States abroad. They



Philippine Air Force members participating in SEATO "Flying Brothers 1960" exercise pause before their aircraft at Clark AFB near Manila. Annual exercise points up PACAF mission to help build allied airpower in Western Pacific.

PACIFIC AIR FORCES

Commander in Chief



314th Air Division Osan AB, Korea

are actively devoted to building mutual understanding and respect.

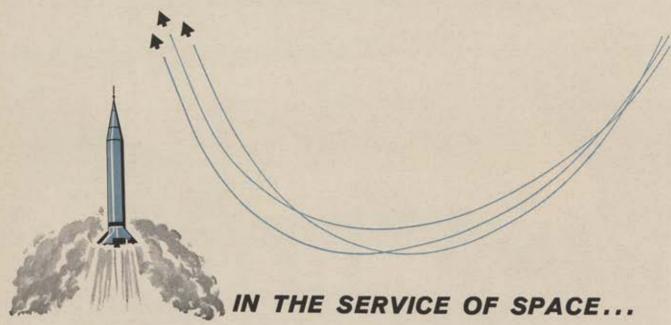
What is the composition of the Pacific Air Forces? First of all, they are part of the powerful military team of the US in the Pacific. Army, Navy, and Marine forces are the other members of this team. PACAF serves as the air component of the unified Pacific Command.

Including 25,000 indigenous personnel, the people of PACAF total more than 100,000. They operate hundreds of combat jet aircraft from bases in six different countries.

The PACAF area of responsibility covers forty percent of the earth. But modern communications and frequent staff visits keep headquarters-Hickam AFB, Hawaii-in continuing touch with the bases in Japan, Korea, Okinawa, Taiwan, and the Philippines.

To perform its broad mission of helping to defend the United States and its allies in Eastern Asia, PACAF

(Continued on page 121)



... The Budd Company "teams up" men, minds and machines in a continuous creative effort—backed by the most modern and comprehensive research and testing facilities. The closely integrated work of its divisions and subsidiaries results in ideas, products and processes of great value in the design and production of a wide range of aircraft, missiles and rockets.



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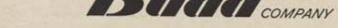
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AERONCA designs, tools, produces and tests advanced brazed honeycomb structures

In the production of exotic high-temperature air weapon components, there is no substitute for actual experience. That is why Aeronca... with production records on several thousand brazed stainless steel honeycomb sandwich assemblies . . . is one of the recognized leaders in this highly specialized field.

And to meet the growing requirement for complex high-temperature structures, Aeronca has evolved a fully integrated facility for designing, tooling, producing and testing all types of brazed honeycomb sandwiches. This special facility includes more than 65,000 square feet of plant area and the most advanced production and inspection equipment available today. Brazed structures up to 14' x 24' can be produced in volume at present.

Whatever your requirements, Aeronca's experience and capabilities can assure you of uniform quality, on-schedule deliveries and the lowest over-all cost consistent with reliability and performance specifications. Our customers will verify that Aeronca produces results ... not claims!



This complex speed brake for a new air weapon system illustrates Aeronca's advanced capabilities. Photo at top shows one of these units emerging from furnace after brazing cycle (indicated temp.: 2000°F.).

We have openings for creative R&D Engineers with Missile/Space experience. Write to Mr. O. E. Chandler, Mgr. Professional Employment RONCA

> manufacturing corporation 1720 GERMANTOWN ROAD . MIDDLETOWN, OHIO

is equipped with a carefully balanced mix of weapons, aircraft, and missiles tailored to the requirements of the current situation.

As the situation changes, so does the mix. PACAF's vehicles and weapons today are not the same as those of only a year ago. The command is able to use whatever weapons are required, from nuclear or high-explosive bombs through rockets and cannon. This wide range of destructive power gives flexibility to the application of defensive or offensive forces.

The price of defending freedom is not cheap. PACAF, from the financial angle, is larger than all but seven of America's largest business firms. Its capital assets are more than \$5 billion. Its annual operating costs are

approximately half a billion dollars.

The value of PACAF's personnel assets cannot be measured in dollars and cents. In terms of dedication to their important tasks and of devotion to their duty in defending freedom, PACAF's personnel resources, like those of the global Air Force, are priceless.

Now let's look at what PACAF's people and weapons have accomplished during the past year of not-so-

peaceful coexistence.

The major achievement of the period, in a broad sense, lies in the fact that, while Communist efforts toward expansion have been continuous, there has been no instance of successful expansion at any point where US forces, and those of her allies, stood ready to fight. More specifically, PACAF's 1959-60 record shows:

 An aircraft accident decrease and significant improvement in the emphasis placed on centralized main-

tenance and flying safety education.

• Electronic flight planning, an operational development of major potential importance, was successfully tested in June 1960 at Itazuke AB, Japan, where the 8th Tactical Fighter Wing has been working to develop a system for electronic computing of flight plans. The values of computer-created flight plans are many. The time- and money-saving features, and the safety factors, of this new system are obvious and important. But the most important improvement is quicker reaction to changes in combat profiles.

 "Flying Brothers," the second annual US-Asian Fighter Weapons Conference, saw airmen and soldiers of ten nations gather at Clark AB in the Philippines in

late April and early May.

The conference was hosted jointly by the Philippine Air Force and by the US Thirteenth Air Force. Observers were present from Laos, Australia, South Vietnam, Indonesia, and the United Kingdom, while flying teams as well as observers were present from the Republic of China, Thailand, the US Pacific Fleet, the Republic of Korea, the Republic of the Philippines, and the US Air Force.

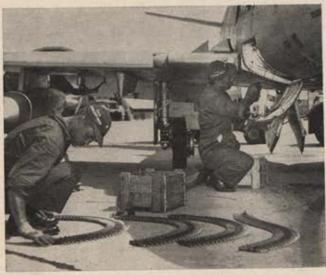
Activities of the conference included three days of seminars, followed by two days of demonstrations and practice in the operating of an Air Operations Center and an Air Support Operations Center in scheduling and directing tactical air support missions. In addition, the flying teams engaged in air-to-air and air-to-ground gunnery rocketry and bombing exercises.



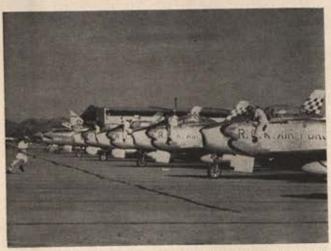
Thai tots appear somewhat bewildered viewing Composite Air Strike Force planes at Don Muang Air Base, Thailand, at an open house during CASF tactical mobility exercise.



This local youngster received an assist from an Air Force sergeant in viewing the intricacies of KB-50 tanker nose wheel during Don Muang open house for visiting aircraft.



Chinese Nationalist Air Force armament technicians in final preparation of their F-86 Sabrejets to take part in gunnery mission at "Flying Brothers" meet, Clark AFB.



Also at Clark for "Flying Brothers," Republic of Korea pilots dash for their jets to take off on a simulated intercept sortie. Ten nations participated in exercise.



Korean and Thai ground erew sergeants, in line with the theme of the occasion, work together at Clark AFB. PACAF, Philippine Air Force were joint hosts to other airmen.

 PACAF, like the global aerospace force of which it is a part, stands cocked and ready for action on a moment's notice. Like SAC, PACAF keeps a certain number of its aircraft armed and ready to retaliate if attack comes. Like TAC, PACAF maintains a mobile strike force ready, on short notice, to put out "brush fires" in out-of-the-way places.

In neither case is PACAF alone, except at the outset. It is a closely integrated part of the global US Air

Force.

In June of this year, PACAF teamed up with TAC for a major exercise of the Composite Air Strike Force (CASF)—the highly flexible, highly mobile, self-contained fighting unit that provides tactical airpower quickly and effectively wherever it is needed. This year's training exercise, called "Mobile Yoke," took place during the first two weeks of June. One hundred and twenty combat aircraft, 1,100 men, and many tons of support equipment were swiftly deployed from the US to Thailand, the Philippines, and Taiwan. From these locations, simulated combat missions were flown. In addition, several thousand people of Bangkok got a good look at the supersonic aircraft of their ally, the United States.

 One of PACAF's tasks, as noted, is assisting the unified commander in the development of strong and capable air forces in Free Asian countries. As part of this task, during the past year the Nationalist Chinese Air Force has begun to receive the fastest new aircraft

available-Lockheed F-104s.

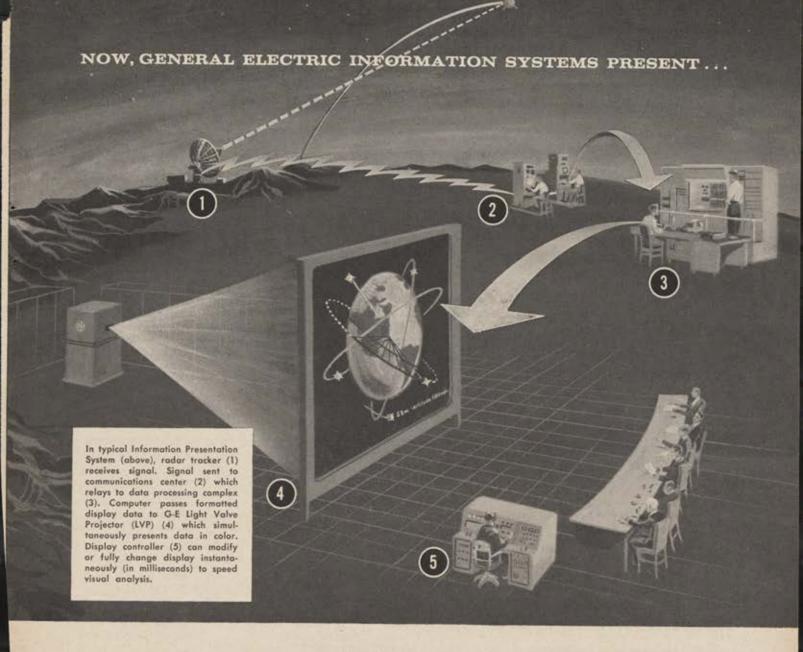
• Communism is not the only enemy that threatens the peace of Eastern Asia. Nature produces each year vastly destructive typhoons, tidal waves, floods, and earthquakes. The summer of 1959 saw Taiwan ravaged by typhoon-born floods. In late September, one of the most powerful typhoons yet recorded struck Japan and laid waste to the major city of Nagoya. In May 1960, tidal waves from Chile devastated Northern Japan. In all instances, as usual, the people and planes of PACAF were in the forefront of rescue and disaster-relief operations.

• PACAF has also progressed in the little-mentioned but very important field of administration. During the first half of this year, the command undertook a major self-examination. Under the title of "Operation Road Map," every function of the command was closely scrutinized with three questions in mind: (1) Why do we have to do this? (2) Can we do it more effectively? (3) If there is room for improvement, what needs to be done? This analytical exercise has resulted in healthy clarification of the command's multitude of complex responsibilities. It has provided a current and firm basis for future planning and administrative decision.

In addition to Operation Road Map, a number of other improvements have been developed in administrative procedures. In the manpower field, several of these improvements have been accepted and adopted

for use throughout the air forces.

In sum, the past year for PACAF has been one of steady, hard-won progress. PACAF today is more alert, better equipped, and better trained than it was a year ago—and it was in good shape then.—End



Dynamic Real-Time 2D and 3D Display of Space, Air and Seaborne Vehicles

SPACE TRAFFIC COPS may someday be a reality. But, today's ever increasing space activity demands effective information presentation systems for monitoring space vehicle activity. Collection, processing and rapid visual presentation of aircraft, missile and submarine operating information is essential to effective decision-making by military commanders.

DYNAMIC 2D AND 3D DISPLAYS-the business end of information systems-

developed by General Electric present complete operating information continuously in color on screen sizes ranging from four square feet to over 400. Inputs are from computers, sensors, TV cameras and photos. High resolution, selectively flickered data and a full complement of alphanumeric FOR MORE INFORMATION address Marcharacters and special symbols are keting Manager, Information Systems inherent characteristics. And, high brightness allows viewing even in a 4901 Fairmont Avenue, Washington fully-lighted room.

SIGNIFICANT APPLICATIONS

- · space surveillance
- · air traffic control
- · air defense
- · command control
- · logistics
- · intelligence

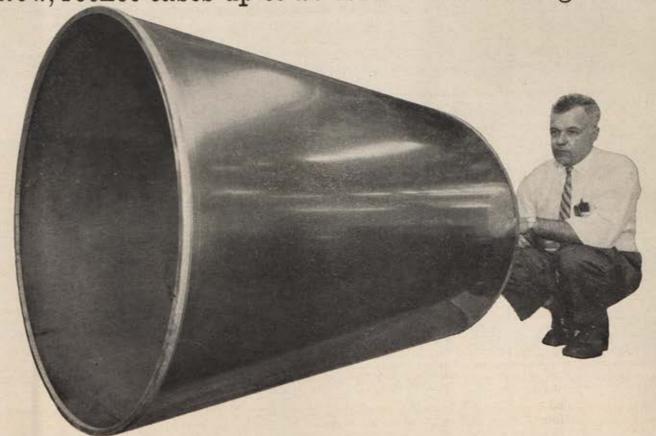
Section, General Electric Company, 14, D. C.

DEFENSE SYSTEMS DEPARTMENT

GENERAL S

A DEPARTMENT OF THE DEFENSE ELECTRONICS DIVISION

Now, rocket cases up to 20 feet without a single seam



Pratt & Whitney Aircraft now has a metalworking technique for producing rocket cases up to 20 feet long and 80 inches in diameter—without a single weld. The process is called flow-turning. It spreads and forms even the hardest metals into precise shapes and sizes.

Seamless, flow-turned rocket cases and jet engine parts are stronger, lighter and more economical to produce than welded parts. Moreover, the process of flow-turning itself increases the metal's tensile strength.

Flow-turning is among the many advanced precision manufacturing skills that Pratt & Whitney Aircraft engineers have pioneered and refined. It plays an important role in the design and development of dependable power for flight.

Pratt & Whitney Aircraft

EAST HARTFORD, CONNECTICUT/A DIVISION OF UNITED AIRCRAFT CORPORATION



General Smith, Commander in Chief of USAFE and Commander of NATO's Fourth Allied Tactical Air Force for the past year, was previously in command of the Air Training Command and United States Forces, Japan. He saw extensive service with fighter aircraft in Europe and the Pacific in World War II. He became first SAC Chief of Staff in 1946.

From the United Kingdom to Pakistan, crisis,

cold war, and acts of simple kindness

marked the past year for the . . .

UNITED STATES AIR FORCES IN EUROPE

Gen. Frederic H. Smith, Jr., USAF

N AUGUST 14, the United States Air Forces in Europe completed their fifteenth year of operation. Originally formed to provide air support to United States occupation forces following World War II, USAFE has been given ever-increasing responsibilities in a vast geographical area.

Critical events which shaped USAFE—and, indeed, the history of this generation—were the Berlin Airlift in 1948 and the formation of NATO in 1949.

The Berlin blockade brought the ideological conflict between the forces of world communism and the forces of democracy into focus. It was clear, once the Russian blockade of Berlin had been broken, that USAFE's larger role had not ended with the completion of its part in the airlift. The continuation of the cold war has provided the necessity for an ever-increasing range of missions and responsibilities.

In 1949, nine European nations as well as the United States, Canada, and Iceland joined together in the North Atlantic Treaty Organization. They agreed to consider an armed attack against any one of them as an attack against all and pledged to meet such an attack with both individual and collective resources. When NATO's military organization was set up in 1951, tactical units of USAFE were committed as the American air contribution to the newly established NATO Command.

While USAFE's command structure has been revised to provide maximum security against attack, the nature of USAFE's NATO commitments has remained basically the same. Today, USAFE's primary mission is to maintain its tactical units in constant operational readiness to fight if an attack is made upon any of the NATO nations.

In fulfillment of its responsibility to NATO, USAFE has the equivalent of fourteen combat and transport wings dispersed from the United Kingdom to Turkey.

The bulk, however, of USAFE's NATO-committed combat capability is assigned to two major air forces, the Third Air Force, with a network of bases in the United Kingdom, and the Seventeenth Air Force, with bases in the strategic central area of Europe.

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.

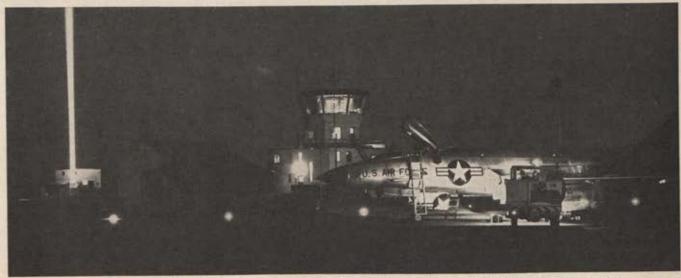
The 322d is a versatile transport force with airborne assault, air resupply, air evacuation, and logistic capability. In addition to its regular military transport assignments, the division has participated in nearly a dozen major disaster-relief missions, including the transportation of supplies and assistance to relieve the hardship following the devastating earthquake which struck the Moroccan city of Agadir in February of 1960.

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 Air Force.

The 65th Air Division's aircraft control and warning units and three fighter-interceptor squadrons provide for early warning of attack and effective air defense of SAC alert forces in Spain and Morocco.

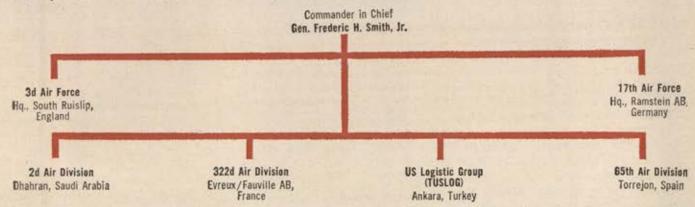
The need for increased efficiency, as well as political considerations, necessitated moving tactical fighter wings based in France to bases in Germany and England during the latter part of 1959. The move, designed to ensure the effectiveness as an atomic-age strike force



Ground crewmen work on F-101 Voodoo aircraft, a major element in USAFE and NATO striking power. USAFE tactical units are trained for joint, combined operations, take part in surprise "wartime" alerts several times a year.

UNITED STATES AIR FORCES IN EUROPE

Headquarters (Rear), Lindsey AS, Wiesbaden, Germany Headquarters (ADVON), Ramstein AB, Ramstein, Germany



of the units involved, was carried out with a minimum loss of combat effectiveness.

In the fall of 1959, Headquarters Seventeenth Air Force was transferred from Wheelus Air Base to Ramstein Air Base, Germany. This is also USAFE's Advanced Operations Unit (ADVON) Headquarters. Rear headquarters is at Lindsey AS, Wiesbaden, Germany.

One air division was lost to USAFE early in 1960, following nation-to-nation agreements between the United States and Moroccan governments. The 316th Air Division at Rabat-Sale, Morocco, was deactivated in a step preliminary to moving all US bases from Morocco by 1963. The 316th had been responsible for the air defense of Strategic Air Command bases in the Morocco area.

In order to concentrate all air defense activities in Europe under one command, the 65th Air Division in Spain, formerly part of SAC, was transferred to USAFE.

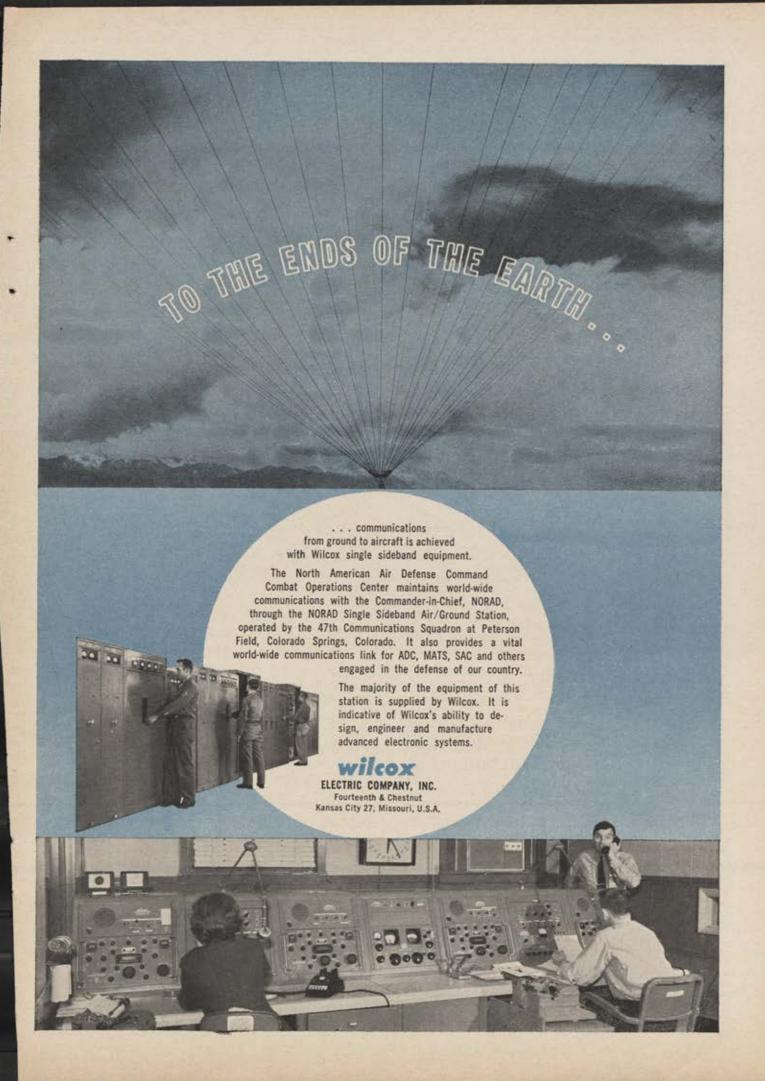
The main training for USAFE's NATO-committed, Europe-based, tactical forces is furnished by the 7272d Air Base Wing at Wheelus Air Base near Tripoli, Libya. There with wide-open spaces, year-round good flying weather, and well instrumented ranges, USAFE's tactical forces can deploy throughout the year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

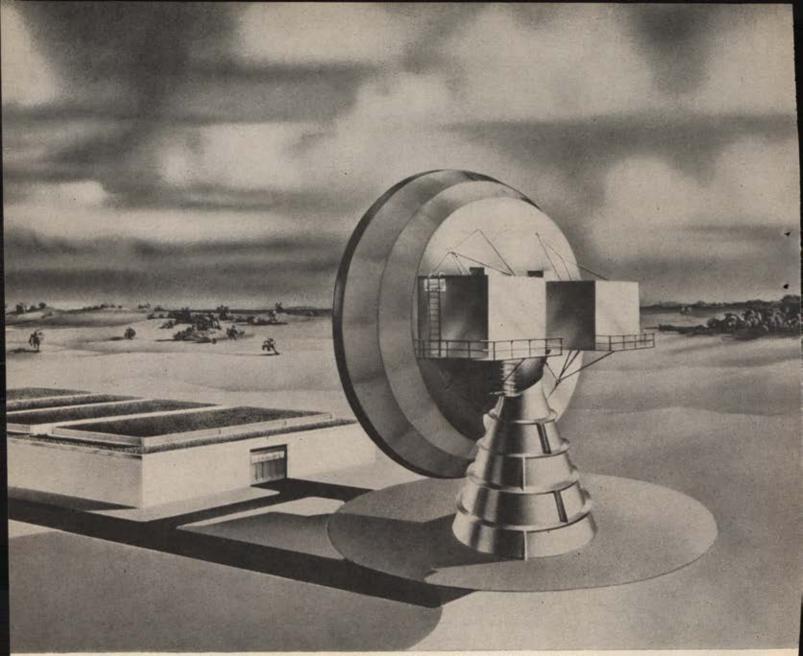
USAFE's tactical units are trained to participate in joint maneuvers conducted by SHAPE, the Supreme Headquarters Allied Powers Europe, or its subordinate commands. They are also subjected to surprise alerts several times each year, at which time they are given simulated wartime missions and their performance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

The USAFE tactical missile wing is now converting to the Martin Mace missile. An improved version of the Matador, the Mace has innovations which warrant its classification as a new missile. It is larger, faster, and has a better low-altitude capability rendering it less vulnerable to detection by enemy radar. The manned portion of USAFE's strike forces is equipped with B-66 tactical bombers and F-100 and F-101 tactical fighters.

For its air defense mission, USAFE is speedily completing the transition from F-86D to F-102 aircraft. The F-102's ability to intercept enemy bombers at stratospheric altitudes, both day and night, has vastly improved air defense capabilities in Europe.

(Continued on page 129)





Five-story high antenna for Pincushion radar will be part of a new Advanced Research Projects Agency installation to be set up in mid-Pacific.

A unique radar designed to track and identify the warhead of ICBMs thousands of miles away is now being developed by Raytheon.

Designated "Pincushion", because of its microwave beam pattern formation, the 80-ton Raytheon radar will be part of Project Defender, ARPA's program to develop advanced anti-ICBM concepts.

RAYTHEON COMPANY, WALTHAM, MASS.



EXCELLENCE IN ELECTRONICS



USAFE rushed heavy equipment, men to Agadir, Morocco, in February and March when earthquake brought disaster to North African resort city, virtually turned it to rubble.

While USAFE's reconnaissance force of RB-66s and RF-101s has remained about the same numerically, refinements and modifications have greatly improved their ability to conduct both photo and electroniccountermeasure missions under combat condition.

The 322d Air Division is equipped with squadrons of C-119 and C-130 medium-cargo transports which are augmented by a squadron of Military Air Transport Service C-124 Globemasters.

The personnel strength of USAFE includes over 65,000 officers and airmen, 1,500 American civilians, and more than 15,000 local employees. The morale and welfare of these personnel is constantly considered. A well rounded program of personnel services is provided, including recreation facilities, service clubs, competitive sports, off-duty educational facilities, and cultural pursuits. The monthly Commander's Call is used to discover and treat morale problems as they develop.

Interrelated with morale and welfare is the impact of Air Force personnel on the local communities surrounding USAFE installations. When the United States entered NATO, the way was opened for stationing large numbers of military personnel on the soil of friendly countries for an indefinite length of time. Special measures were necessary to ensure good relations between American forces and the civilian population of the various countries.

The need for maintaining good relations and winning friends for the United States has become paramount and has developed into a formal people-to-people program.

Incidents of voluntary acts of friendship on the part of Air Force personnel in the USAFE area are many and varied, but a recent example shows the kind of generosity and imagination which is sometimes brought to bear on community-relations problems. As a result of voluntary subscription, Wheelus Air Base personnel were able to present 20,000 reflectors for use by Libyan bicyclists to the Tripoli police force. The gift was made in the "interest of mutual safety and friendship." The thousands of bicycles operating in the Wheelus area had been operated without night-warning devices.

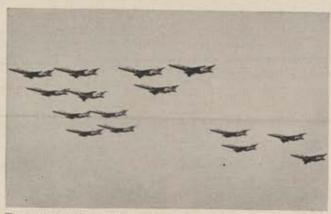
USAFE is often called upon to lend aid when disas-

ter strikes. A recent example was the earthquake in Agadir. On the initiative of local commanders, Air Force and naval personnel in the area, working with Moroccan authorities, took immediate action to relieve suffering. Following a request from the Moroccan government to the US Ambassador for assistance, a full-scale US disaster effort was put into effect. US Air Force, Navy, and Army elements cooperated with authorities in helping to clear the city and rescue trapped victims, in establishing temporary living quarters, and in providing food and clothing for survivors.

The theater of operations for USAFE extends from the United Kingdom to Pakistan in an area immediately adjacent to the Iron Curtain. While its mission is to back up the multilateral and bilateral security arrangements between the United States and its allies as well as the support of US military and civil agencies in its geographical area, USAFE is also a medium through which the people of Europe and the Middle East gain a first-hand knowledge of the United States. USAFE is proud of its role in today's world and is constantly striving to increase its contribution to the free world and to the future of mankind.—Enp



USAFE transports stand ready to carry
US paratroopers into battle if the need should arise. MATS planes augment USAFE in vital field of ready airlift.



Formation of RF-101 tactical reconnaissance aircraft in pass over USAFE base. Command also has RB-66 planes in recon force. USAFE has many widely diverse capabilities.

Our aerospace defense shield protects both the people of the nation and the deterrent force, a vital twin mission for the . . .

AIR DEFENSE COMMAND

Lt. Gen. Joseph H. Atkinson, USAF

COMMANDER, ADC



General Atkinson has commanded ADC since September 1956. Previously he served as Commander in Chief of the joint Alaskan Command from 1953 to 1956. General Atkinson commanded heavy bombers during and after the second World War, during which he saw duty in Europe and North Africa. He was Commanding General, Alaskan Air Command, from 1946 to 1949.

HE MISSION of the Air Defense Command is to discharge Air Force responsibilities for aerospace defense of the United States.

As the Commander of ADC, I have a twofold responsibility. On the one hand, I am responsible, as a major air commander, to the Chief of Staff, USAF. On the other hand, as a component commander, I am responsible to the Commander in Chief, North American Air Defense Command (CINCNORAD).

NORAD's chief at present is Gen. Laurence S. Kuter, NORAD and ADC Headquarters are at Ent AFB, Colo.

Here, briefly, is the way it works. We in ADC are the experts in advising CINCNORAD on Air Force matters and are the aerospace defense experts for the United States Air Force. We develop and submit qualitative requirements to USAF for systems and equipment needed to meet future Air Force defense responsibilities.

We organize, train, equip, and provide aerospace defense of the United States. We place these forces under the operational control of CINCNORAD. We operate, for NORAD, all Air Force aerospace defense equipment including weapons, ground environment, and the military air defense warning system. This system provides the tactical warning which would result in appropriate USAF measures in the event of hostilities.

There is a particularly close relationship between my command, the North American Air Defense Command, the Strategic Air Command, and other elements of USAF.

The best insurance for peace, in this era, is to ensure destructive retaliation to those powers who would disrupt that peace. How can this insurance be obtained? Let's examine the facts.

First, why any aerospace defense at all? If our offen-

sive posture is strong enough to inflict immediate wholesale destruction on any power foolish enough to initiate hostilities, why should we expend our resources for defensive reasons?

In the present international situation, two supergiants with enormous clubs stare at each other across the North Pole. Unfortunately, one of these giants has aggressive intentions. The other giant is the defender.

The day is rapidly approaching when the clubs they wield will be of comparable size. Then they will each have the capability that some folks like to refer to as "mutual destruction."

It seems basic to me that the first giant who picks up an effective shield will take the mutuality out of destruction and ascend to the dominant military position.

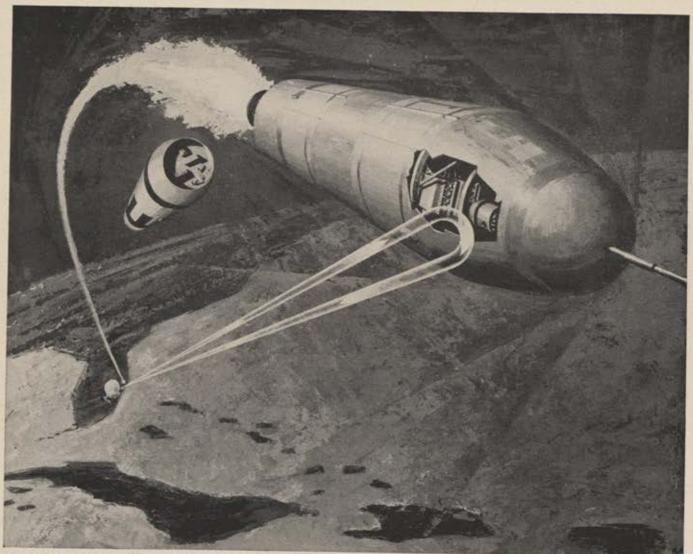
This shield would protect his club, and his country, and ensure that it retains its effectiveness after the first blow. An effective US air defense, thus, would cause the aggressor to pause because of doubt that he could succeed in gaining the effect desired in his first strike.

The bulk of the deterrent forces of the United States is, we thus see, the combination of SAC and ADC. In the event of hostilities, SAC would be alerted by ADC's military warning net, while the shield of aerospace defense is lifted to counter the enemy's attack.

Aerospace defense operates on the basis of four functions. These functions are detection, identification, interception, and destruction. These four functions operate within the basic doctrine of area defense, which means that we detect, identify, intercept, and destroy the enemy as far from his targets as possible. Advancing technology, so far, has effected modification of this concept only in the dimension of time and distance.

Our present system for accomplishing these functions has an excellent capability against the air-breath-

(Continued on page 133)



The Command Guidance System for the Air Force Titan, shown here as the first and second stages separate, was developed by Bell Telephone Laboratories and is manufactured by Western Electric. Flight information is analyzed by a Remington Rand-Univac computer.



Nose cone of an Air Force Thor-Able test missile, guided by "brains" developed for the Titan, being recovered from the South Atlantic.

How the Air Force puts Titan on Target!

Bell Telephone Laboratories Command Guidance System gives deadly accuracy to new ICBM

Suppose you were asked to guide a 110-ton missile into space with a controlled velocity so that its nose cone could then sail free of all control and hit a tiny preselected target area 6000 miles away.

This was the objective for Titan which was given by the Air Force to Bell Telephone engineers and scientists. The result was a new Command Guidance System which guides Titan with "pinpoint" accuracy.

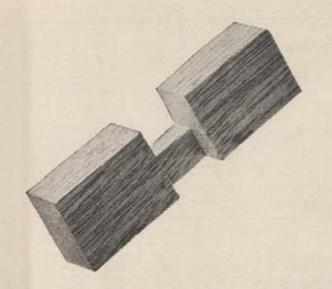
For the first few hundred miles of flight, a ground control center tracks the missile and sends instructions to keep it precisely on course. Commands are also sent to cut the engine off at the moment of proper velocity. To show how accurate this guidance must be: at the time of cut-off, when Titan may be traveling some 24,000 feet per second, a difference of one foot per second in the speed could cause a miss of one mile.

The system has already guided missile nose cones so accurately that they could be recovered thousands of miles away by waiting ships. And it will play a key role in forthcoming satellite and space probes.

This new guidance system is the product of our many years of communications research and experience—which also help bring you the finest telephone service in the world.

BELL TELEPHONE SYSTEM





Allied Research scientists, engineers and technicians in the Geophysics Division, are working directly on the frontier of knowledge utilizing the latest scientific and engineering technological advancements to perform studies in...satellite meteorology ...radar meteorology...short-range weather forecasting...cloud and fog dispersal...and other areas as diverse as the weather itself.

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Systems Engineering
Vibration Isolation
Weapon Systems Analysis

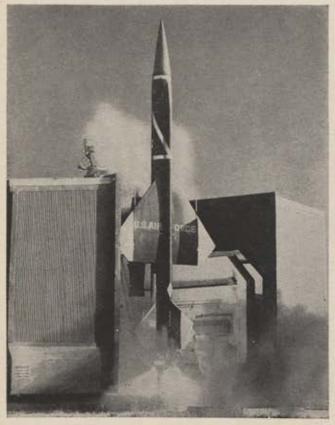
To learn more about the career positions available to qualified scientists and engineers, forward your resume in complete confidence. A booklet describing Allied Research facilities and capabilities is also available on request.



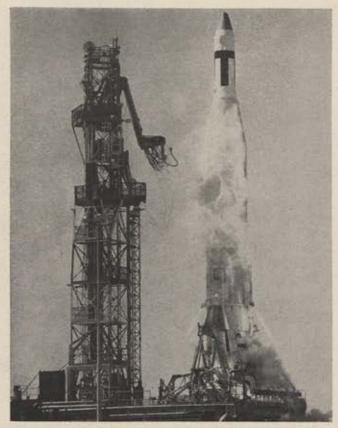
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BOEING SUBSIDIARY



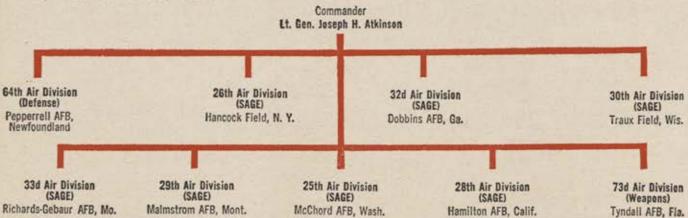
ADC Bomarc air defense missiles are effective and proven. Bomarc-A, above, is combat-ready and on site at several locations. Bomarc-B is in test stage at Eglin AFB, Fla.



The future of early-warning systems, now built around mammoth radar lines, lies with Midas and Samos warning satellites, "eyes in the sky." Above, Midas in a test.

AIR DEFENSE COMMAND

Headquarters, Ent AFB, Colo.



ing threat. The system resulted from a pooling of the best talent that the Air Force and industry could muster. It took just over seven years from conception to reality. This system is composed of two interrelated parts—environment and weapons.

The DEW (Distant Early Warning) Line stretched across the northern edge of the North American continent provides instant warning of any aircraft which penetrates it headed for the continental interior. It is extended east into the Atlantic and west into the Pacific by teams of radar-equipped ships and aircraft. The eastern extension is augmented by fixed radar stations across the Greenland ice cap.

A second row of radars extends across the middle of Canada. This "Mid-Canada" line confirms DEW Line detections.

The next radar coverage is provided by the net of stations completely covering all key target areas of southern Canada, all of the United States, and extending several hundred miles to the seaward of the most vital US target centers.

In addition, steel platforms are located east of the New York-Boston complexes and anchored in the Atlantic Ocean floor. These Texas towers are radarequipped and add to the total coverage.



Head-on view of a pilot and his F-104 interceptor, multipurpose air superiority jet at the heart of today's air defense inventory. Current jets are hot planes. But ICBM threat remains to be solved.

Our command and control system is called SAGE (Semi-Automatic Ground Environment). It employs a large digital computer in each of many geographical sectors. Each computer handles, with extreme speed, the information passed to it by radar stations and adjacent SAGE sectors. The computer combines this information into a single air situation picture which the sector commander and his staff use for performing the aerospace defense functions. Hundreds of weapons can be directed against hundreds of targets simultaneously and in an orderly fashion.

Air Force weapons consist of Century-series allweather jet interceptors and Bomarc missiles. These are effective and proven.

For the foreseeable future, the broad goals of aerospace defense will be twofold: to defend against the ICBM and other future space threats, and to defend against the air-breathing threat. So far we have discussed one of the jobs ADC is doing—that is, facing up to the air-breathing threat. This is a serious threat and is going to remain so for a long time.

However, a new threat has developed. We are faced with highly accurate intercontinental ballistic missiles. We can expect that the threat will eventually include space weapons as well as extremely sophisticated atmospheric weapons.

We know how to do the air-breathing defense job and consider that our efforts in this area contribute significantly to the credibility of our deterrent posture. We do not yet, however, have an active defense against the ICBM. Development of an area weapon system for this purpose is a most urgent need.

Without it, we will be a giant with an enormous club but no shield. As certain as death and taxes is the blunt fact that one of the two giants will develop an effective AICBM weapon system first. Through the efforts of experimental and development agencies of the government and industry, significant progress has been made toward such a system.

We have actually begun to satisfy the first of our necessities for defense against the ICBM—early-warning detection and surveillance. This beginning is the Ballistic Missile Early-Warning System (BMEWS). Next will come Midas and Samos warning satellites.

But we *must* come up with an adequate antimissile defense in the not-too-distant future. This is a blunt fact of current life.

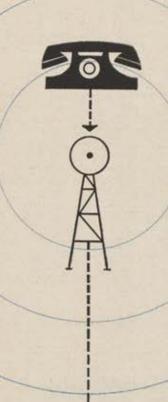
We in ADC are fully cognizant of yet another fact of life. As expanding technology points the way to new weapons, the cost of such exploration increases. I recognize that attention to economy is inherent in my responsibility as the nation's adviser in matters concerning the Air Force role in aerospace defense. My staff and I, as taxpayers and as military leaders, are deeply concerned with the cost of security.

We realize, too, that we are extremely fortunate to have been endowed by God with a land so rich in the necessities of life. The United States and the Soviet Union each have the same amount of arable landabout 500,000,000 square miles.

And yet, with a population differential of only about twenty percent less, our farmers have been outproducing the USSR. The Soviet Union has been desperately attempting to increase their productive soil acreage just to feed their own people.

In industrial and other wealth, we are also vastly the superior of the Soviets. We must remain their military superior, in air defense and elsewhere.—End

PRINTS 3,000 WORDS/MIN



FROM REMOTE POINTS

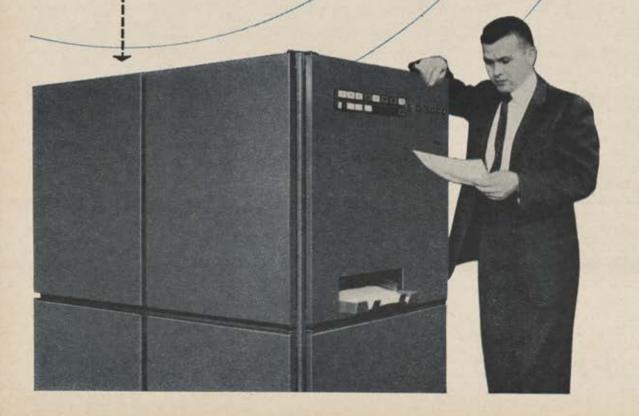
The U.S. Army Corps of Engineers is using Stromberg-Carlson— San Diego's new S-C 3000 High Speed Communications Printer to print 3000 words a minute from remote sources. The equipment can print out over great distances, using standard wire or radio links.

The S-C 3000 is compatible with most available data link systems, including the Collins Kineplex data transmission system and the Stromberg-Carlson Binary Data Link. Printing is accomplished through a unique combination of the Stromberg-Carlson CHARACTRON® shaped beam tube and Haloid Xerox, Inc's., electrostatic printing process. The S-C 3000 prints without impact on untreated paper or lithographic masters.

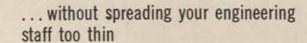
This new communications printer answers the need for equipment that can keep pace with today's high speed communications systems. It is designed for military, government, news service, business and public communications systems where speed and reliability are essential. The S-C 3000 accepts data via wire or radio link from computers located at a distant point and prints out copy of outstanding readability.

If you are interested in high-speed printing of data received from a distant point, don't fail to investigate the S-C 3000. Write for free booklet to Stromberg-Carlson-San Diego, Dept. A-79, P.O. Box 2449, San Diego 12, California. Telephone BRowning 6-3911

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PHILCO. TECHREP DIVISION



General Necrason has been Commander, AAC, since August 1958. Before going to Alaska, General Necrason served as Chief, Operations Division, at Hq. USAF. He flew in B-17s, B-24s, and B-25s in Europe and the Pacific in World War II, and was Deputy Commander of the Far East Air Forces Bomber Command during the Korean

Alaska plays an important role in US strategy,

a fact that is spelled out in

the fourfold responsibilities of the . . .

ALASKAN AIR COMMAND

Maj. Gen. Conrad F. Necrason, USAF

COMMANDER, AAC

PACE is often termed the "last frontier" mankind will face. We of the Alaskan Air Command, in a land often dubbed the "last frontier" from a national standpoint, feel particularly close not only to both frontiers, but also to the international problems that beset our globe. This feeling is, of course, enhanced by our proximity to Russian soil.

The command, with headquarters at Elmendorf AFB near Anchorage, is charged with a fourfold responsibility—early-warning, air defense of Alaska, support of SAC in Alaska, and support of special projects

authorized by DoD.

The first two tasks are accomplished by a network of radar sites arranged in two parallel arcs. The outer arc consists of the DEW Line, which extends along the Arctic Ocean and connects with our early-warning sites on the Bering coast which, in turn, link with the DEW Line extension down the Aleutian chain.

Situated inland, the second arc is formed by the radars of our ground-controlled intercept sites. The data collected by these stations is fed to four master direction centers where it is evaluated and forwarded via the Combat Operations Center at Elmendorf directly to NORAD.

The whole system is joined by the White Alice communications system. Where information is pertinent to local air defense it is flashed to interceptor locations, for which Elmendorf is home base.

In addition to these interceptors, we are hosts to SAC forces at Elmendorf and Eielson AFBs.

Among our other activities are such special projects as the Arctic Aeromedical Laboratory at Ladd AFB, Drift Station Bravo in the Arctic Ocean, and the BMEWS station now under construction at Clear, Alaska.

Several major events and developments marked our Arctic year: Best known was the evacuation of the ice floe known as "Charlie." A dramatic operation safely rescued personnel and equipment from that disintegrating fragment of ice off Point Barrow last January.

• One of our most familiar activities for the past fourteen years was the work of the 71st Air Rescue Squadron. Alaskans are an air-minded people, understandably so in a state where the only transportation between most of the major communities is by air over vast reaches of virgin terrain. When the Squadron was inactivated in March, there was a great deal of local concern.

Since then, however, it has become apparent that the Air Force is definitely not out of the rescue business in Alaska as demonstrated notably by a dramatic recent helicopter rescue on the slopes of Mt. Mc-Kinley. We continue to actively support rescue missions by the CAP and other agencies, and operate a Rescue Coordination Center.

• Construction of our BMEWS site at Clear, be-

gun late in 1959, moved ahead well.

• Establishment of an ambitious missile-tracking program was assigned to us in May in conjunction with ARDC. Data collected by Midas missile-detection satellites and our BMEWS station will be processed at a center at Donnelly Flats, Alaska, and Clear. In support, an additional microwave communications system is being built to complement White Alice and extend down Alaska's Panhandle, ensuring reliable contact with NORAD.

 One important command change came with the decision to cease flying activities at Ladd AFB effective this month. The air defense of Alaska has been performed by two fighter squadrons, the 317th based at Elmendorf flying F-102 Delta Daggers, and the 449th based at Ladd with F-89 Scorpions. The de-

cision was made to augment the strength of the 317th to carry out the mission, deactivating Ladd in the interests of efficiency and economy. It should be noted that the area previously covered by the Ladd planes will be protected by a forward interceptor site of the Elmendorf squadron.

Also in line with the Ladd move, C-123 Provider transports previously based at Ladd have moved to

Elmendorf.

Alaska is young, dynamic, geographically magnificent, strategically located. It is also a state looking to the future. We of the Alaskan Air Command are proud to be helping safeguard that future—and the future of the rest of the US and the free world.—End



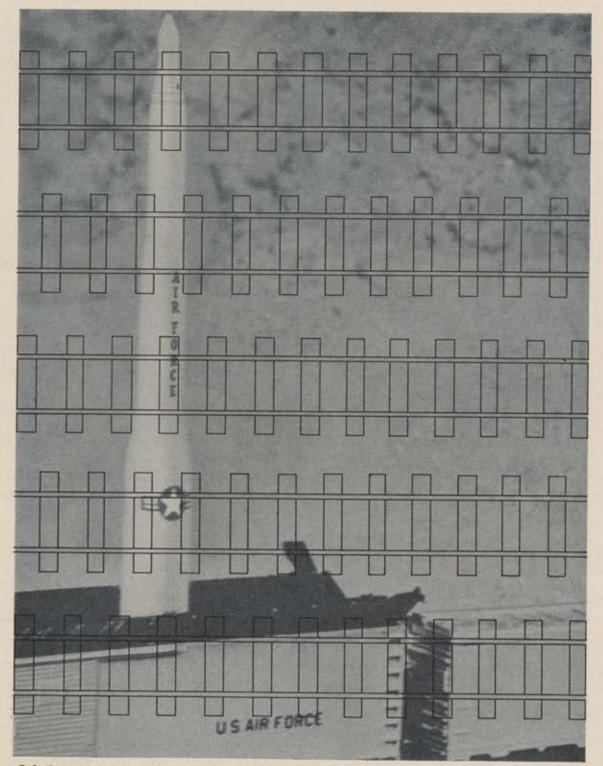
This MATS C-124 from Donaldson AFB, S. C., was one of a team of aircraft engaged in resupply of Arctic weather stations in Alaska and elsewhere during spring of 1960.



DEW Line site in the Alcutians, rugged island chain that stretches west from Alaska toward Siberia. Plexiglas forms tough shell around radar antenna at windswept site.



Alaskan Air Command F-102 fighters scramble at report of unknown aircraft somewhere in the vicinity. Interceptors based at strategic locations play major role in Alaska, along with network of early-warning, control radar sites.



24-hour commuter with an intercontinental job. Air Force Minuteman is a solid-fuel ICBM capable of instant action. It can be fired from a fixed base, railroad car or truck to a target 6,000 miles away. Its launching sites will be as flexible and widely dispersed as the country's transportation network can make them. Its important re-entry vehicle, the "business end" of the ICBM, is developed and produced by Avco—also producer of warhead-carrying nose cones for the Titan and Atlas ICBM's.



Important changes have come to Reserve

programing. But they have left

unaltered many major tasks performed by . . .

CONTINENTAL AIR COMMAND

Lt. Gen. William E. Hall, USAF



General Hall, CONAC Commander since 1957, is also USAF representative in the US delegation to the Military Staff Committee of the United Nations, He served previously as Assistant Chief of Staff for Reserve Forces, Hq. USAF, and as the service's Director of Legislative Liaison in 1950 and 1951. During World War II he saw duty in the ETO.

In Force Magazine devoted a large section of its July issue to organization of the reserve forces and CONAC under a streamlined management plan that has now been in effect for some months. Let us here briefly touch again on this new reserve setup and then go on to explore some of the lesser known, but truly vital, missions of this many-sided command.

Until the new reserve concept took effect, CONAC was responsible for supervision of training and inspection of Air National Guard and Air Force Reserve units. Now, this mission is divided among a number of major USAF commands.

CONAC retains Air Force Reserve Command responsibilities. ANG activities are moved completely out of CONAC's hands.

These changes, quite naturally, brought a new organizational look to CONAC. The three numbered Air Forces previously within CONAC were replaced under the plan by six numbered Air Reserve regions corresponding with numbered Army areas. The size of the headquarters staff, presently at Mitchel AFB, N.Y., at the same time decreased.

A new requirement was laid on CONAC in this same exercise. It called for activation of post-attack recovery units under CONAC supervision, a most challenging assignment.

While these far-reaching changes were coming into being, CONAC continues to exercise an imposing list of duties unaffected by the new reserve concept.

The command, for example, has the responsibility of formulating plans for coordination of Air Force efforts in cooperation with the Army for providing military assistance in domestic and civil defense emergencies. CONAC also represents the Air Force on national and regional boards of the Office of Civil Defense Mobilization.

CONAC acts as the executive agent, and Inland

Search and Rescue Coordinator, for the Air Force in implementing and operating the National Search and Rescue Plan in the inland region.

CONAC has supervisory responsibility for the Civil Air Patrol and accomplishes the Civil Air Patrol-USAF missions within the United States and Puerto Rico. Likewise, CONAC supervises Air Force cooperation with the Air Explorer Program in the US with the exception of Alaska and Hawaii.

CONAC supervises and administers its portion of the Military Affiliated Radio System (MARS), which includes the Air Force Reserve, individual civilian members residing in the continental US, and activeduty personnel assigned or attached to a CONAC unit.

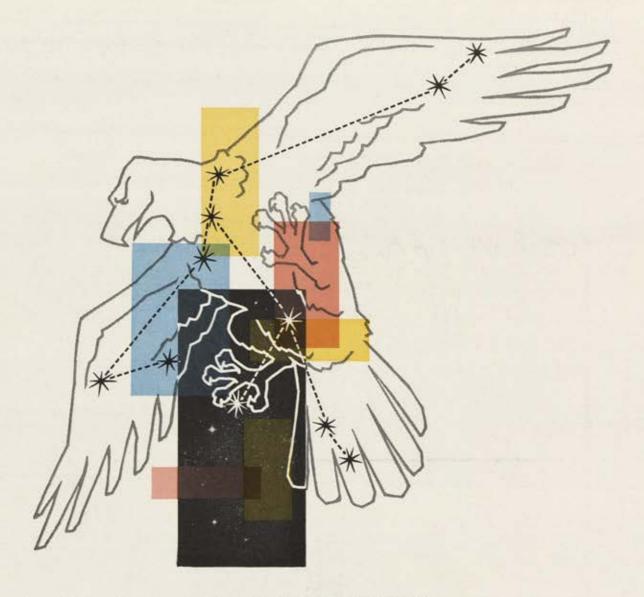
CONAC is responsible for the formulation of plans to ensure internal military protection of all national defense facilities under Air Force cognizance; and CONAC provides a single Air Force contact for cooperation with the continental armies and the naval districts in carrying out the Air Force responsibilities laid down in the basic plan for defense other than air defense of the US.

This is not a complete listing of CONAC's missions, but it is sufficient to indicate the many facets of the command and its strong link with the general public. Continental Air Command, comprised primarily of the Air Force Reserve, is, in fact, also an extremely powerful public information arm of the Air Force.

As noted previously, some of these CONAC missions are none too well known even within the active Air Force itself. However, the activities are large in scope and influence and have a compelling potential in time of emergency.

The Civil Air Patrol is an excellent case. More than 35,000 cadets of the Civil Air Patrol are engaged in aviation education, while another 35,000 CAP members

(Continued on page 145)



Look to Parsons for PERFORMANCE

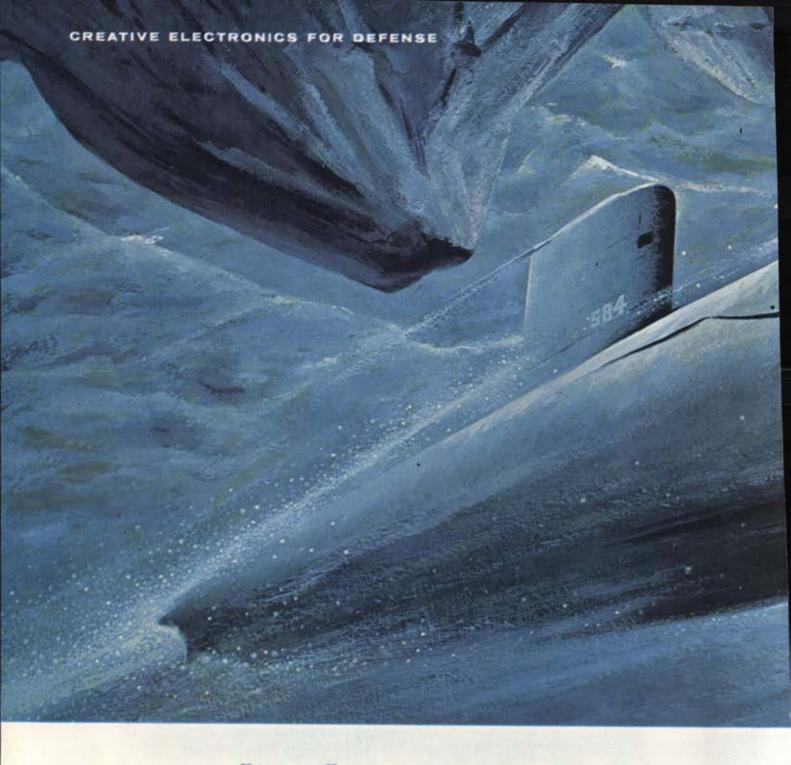
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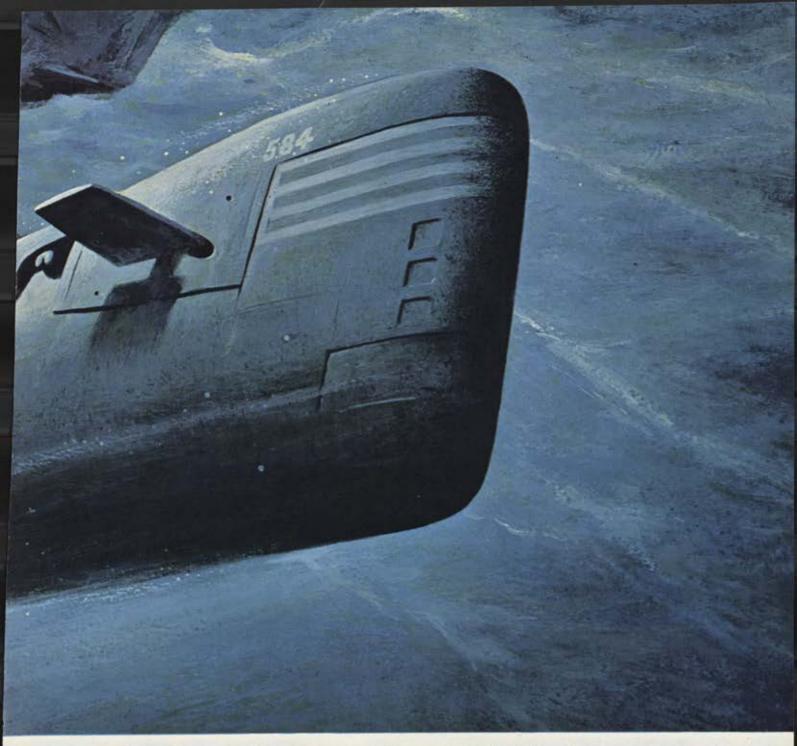


STRANGE "FISH" UNDER THE POLAR ICE!

Revolutionary RCA Magnetic Video Tape Recorder to Speed Navigation Training of Submariners

Aboard the nuclear submarine Sea Dragon, the first undersea magnetic video tape recorder will record and store data on under-the-ice characteristics from externally installed TV cameras. Upon return to base the recorded information will be displayed for the benefit of undersea service trainees, greatly increasing their understanding of hazardous polar navigation techniques. The recorder, a joint U.S. Navy-RCA effort,

is a marvel of compact design (dimensions: 20"x 20"x 100"). It nestles securely in the limited confines of a torpedo rack, yet represents a 60 per cent space reduction over existing commercial video tape equipment. Designed to the curvature of the torpedo rack it will fit through the opening of a 24-inch hatch. Though small in size, the 4 megacycle recording it produces is fully compatible with its commercial counterpart!





Coming for business—a "video file system" capable of storing an entire encyclopedia on one 12½ inch reel, contents of which would equal 20 billion bits of information!



Coming for entertainment—the ultimate in color TV and video fidelity . . . via extremely portable recorders that will provide a panoramic view of world events virtually as they happen!



Coming for science—completely unattended recorders, robot-rocketed to the moon, will, on command, provide a detailed "picture" of space, free of the earth's atmosphere!

Other exclusive RCA recorder developments now contributing to national security include—the "Tiros" satellite recorder, designed for weather observation in outer space; a radar recording system to take the first pictures of a nose cone re-entry vehicle; a unique tape cartridge adaptable to any size recorder. For information on opportunities in creative engineering write: G. R. Gordon, Defense Electronic Products, Radio Corporation of America, Camden, N. J.



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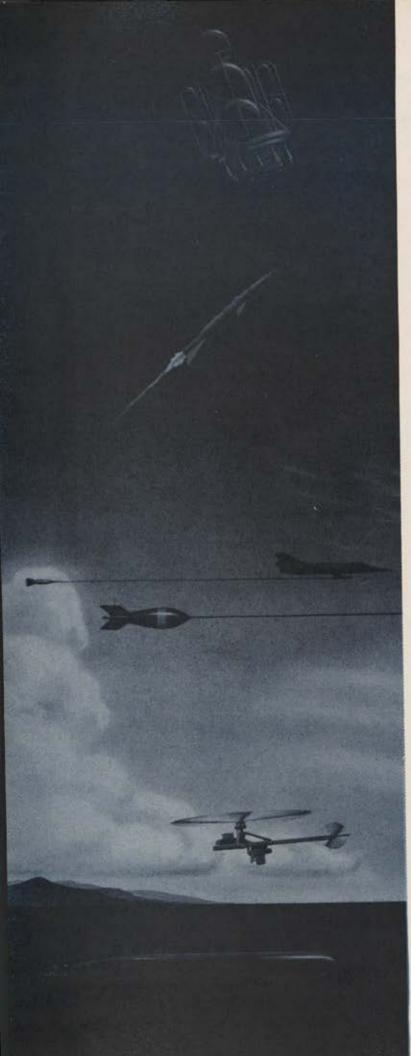
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Engineers and Scientists: investigate Del Mar for a rewarding future in hydrospace sciences, aerospace sciences, and environmental systems. take part in search and rescue missions. It is expected that about ten percent of all future graduating classes of the Air Force Academy will be made up of former CAP cadets. These youngsters not only have opportunities to prepare for the aerospace society of the future but contribute to global understanding through the International Air Cadet Exchange with eighteen foreign countries. In addition, the Air Explorer Program stimulates more than one-quarter of a million teen-age youngsters to develop the qualities required by an aerospace environment.

Possibly no single effort of CONAC reflects greater credit upon the Air Force than the mercy missions of Search and Rescue (SAR). Since June 1959, CONAC has been assigned as federal coordinator of the US Inland Search and Rescue activities. SAR coordination centers of this command have directly figured in the saving of 1,823 lives and have rendered aid to 3,481 persons in distress. Flying hours logged on these mercy missions total more than 84,700, and more than 40,900 sorties have been flown. Civil Air Patrol flies about fifty percent of these missions of mercy.

Disaster relief missions also figure prominently in CONAC's operations. Last March, for instance, national concern that heavy winter snows would result in widespread spring floods prompted CONAC to alert Air Force Reserve troop carrier units to ready themselves for disaster relief missions in stricken areas. Fifty Air Reserve crews were on standby alert throughout the flood crisis in the Middle West. Such crews flew general reconnaissance to report conditions, to locate stranded cattle herds, to search out marooned people and generally to prepare to airdrop food, medical supplies, fodder, and many other disaster needs. Obviously, the capability of performing missions of this nature would be vital to survival in case of an enemy attack.

The recovery unit mission, newly assigned to CONAC, is in its early stages of organization. Plans call for reserve recovery units to be located at carefully selected airports across the country which are not operated by active military personnel but which are capable of accommodating military aircraft. Some of these airports may be inactivated Air Force bases. Others may be operating civilian airfields.

The primary wartime job of the recovery units will be to provide safe landing sites for USAF airborne offensive or defensive aircraft returning from missions in the initial phase. At the bare strip it will be necessary to establish communications with the incoming aircraft if any traffic control is to be exercised. Crash and rescue service must be rendered to the limit of local capability. Medical care for wounded crew members will have to be provided.

The recovery unit will conceivably arrange for all types of emergency communications. Airfield status reports and weather information will be needed. Also, tasks such as the decontamination of aircraft, accomplishment of minor aircraft repairs, and billeting and messing of crews will be responsibilities of these units.

In addition, CONAC has been directed to help organize reserve base support units to be located at or near active Air Force bases. The M-day job of these organizations will be to augment the local base's support capability, to assist in damage repair, and replace active personnel whose duties may have required them to depart the base. These units will be assigned to the various using commands.

CONAC, we observe with pride, has within its total fields of activity many missions vital to the United States in peace and war.—End



Paratroops en route to drop over Carolinas in a recent exercise in which USAF, reserve forces, Army took part. Reserves provided major portion of exercise's airlift.



A closed-circuit television weather briefing for reserve personnel at CONAC facility. Under new management plan, CONAC has diminished responsibilities in reserve program.



General 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.

Science and technology are more important to

the armed forces than ever before.

So are skilled personnel, the concern of the . . .

AIR TRAINING COMMAND

Lt. Gen. James E. Briggs, USAF

COMMANDER, ATC

CLASSROOM ten times larger than a three-story airman dormitory dominates the skyline at Sheppard Technical Training Center, near Wichita Falls, Tex.

In test flights above California's Mojave Desert, the USAF's first supersonic basic flying-training aircraft is being readied for tomorrow's fledglings.

From a one-man space cabin in an Air Force aerospace medical laboratory near San Antonio, Tex., an airman emerges after a week's simulated trip into space.

This is the changing face of the Air Training Command as it meets the challenges of the dawning aerospace age.

ATC's product is people—the skilled professionals who fly, maintain, and operate the aircraft, missiles, and support equipment that make up the aerospace force.

The command operates resident schools at twentyfive bases in the United States. Field training detachments take the classroom to air bases throughout the world to give overseas personnel up-to-the-minute instruction on the latest Air Force equipment.

To keep up with the needs of the service, Air Training Command has had to develop new training philosophies as well as courses, and new management concepts as well as physical facilities.

The F-86 Sabrejet of Korean War fame required seven electronics technicians assigned to each squadron to maintain the aircraft's fire control systems. Such equipment was practically nonexistent when the P-51 Mustang and P-47 Thunderbolt dominated World War II skies. Today's F-102 Delta Dagger squadron demands fifty-nine fire-control experts.

Contrast the training necessary to qualify these men for their jobs—forty-three weeks for the F-102 against ten weeks for the Sabrejet's technicians—and you see one dimension of ATC's continuing task. Even more exacting demands may be placed on us as we move further into the missile-space era.

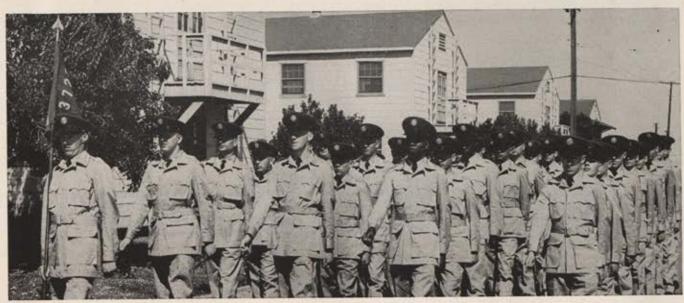
Our mission begins basically with sifting the best qualified people through the USAF Recruiting Service, an ATC function that selects almost ninety-five percent of all Air Force personnel. Selective recruiting earmarks a man for enlistment after a series of screening tests which emphasize technical, science, and mathematics aptitudes.

In a further effort to boost the quality of first-term airmen, ATC last February revised the Basic Military Training Program at Lackland Military Training Center, Tex. The revision lengthens Phase One Training, which is given to all newcomers prior to technical school or directed-duty assignments. It was formerly four weeks in length. Now, with another week of Phase One training added, commanders and instructors have more time to weed out the marginals who slip through the recruiting screening net.

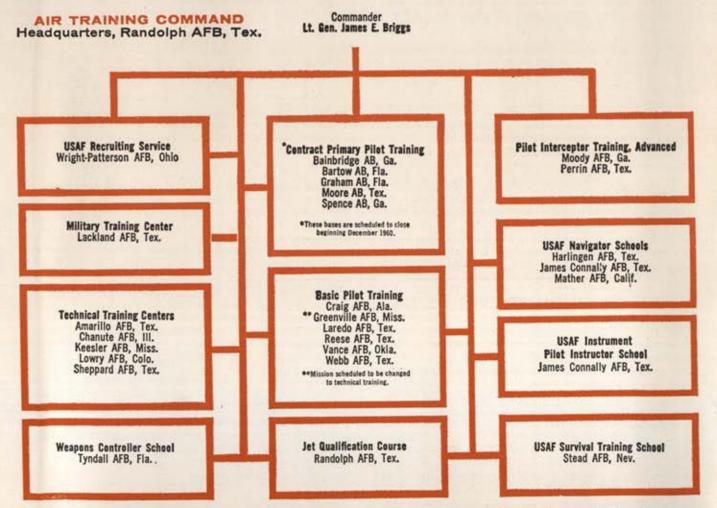
The Officers Training School was established last November at Lackland to tap new sources of officer entries into the Air Force. Non-ROTC college graduates may now win a commission through OTS if they meet selected technical, science, and mathematics skill requirements.

In a very important move, we have also adopted what we call the prime center philosophy for technical training. Under this, management of the total training requirement of a weapon system is assigned to a single training center. This responsibility includes individual training at the prime center or another ATC center; special training conducted by the manufacturer of the weapon system under contract to ATC, or by a training center; on-the-job training assistance; field training conducted at the weapon's operational sites; and crew training when requested by the using command.

(Continued on following page)



flight of basic trainees at USAF's Military Training Center, Lackland AFB, Tex. Group stays together for the first five weeks of training, then majority go on to one of five technical training centers or major USAF commands.



Each prime center has a second responsibility of support-functioning as a "subcontractor" to a prime center in a particular area.

Chanute AFB, for example, is prime center for the Bomarc. It also furnishes support training on propulsions systems for the Atlas, Titan, and Thor. Sheppard AFB, prime center for the latter missiles, backs up Chanute with airframe training support for the Bomarc.

When a new missile weapon system is programed for use by an operational command such as the Strategic Air Command, a trained-personnel requirement

(Continued on page 153)



The simple game of Tic-Tac-Toe demonstrates problems of electronic warfare. The solutions to these problems, however, are not simple.

For over ten years, a major LFE activity has been the development of techniques to maintain the effectiveness of radar and other electronic devices, despite enemy countermeasures.

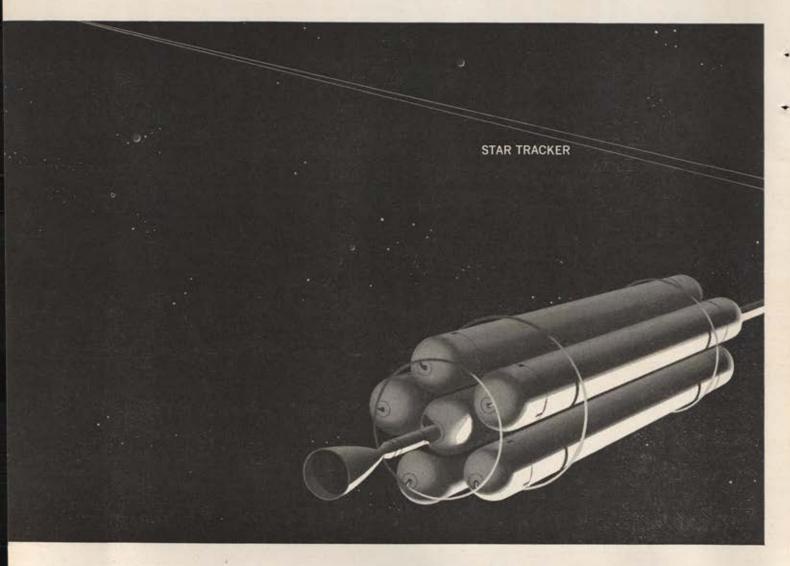
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Minuteman poses a real challenge to the New Reliability —reliability which must guarantee successful firing at any moment in the far future. Each of the missile's systems, each of its thousands of electronic components, must function perfectly at that given moment. For once the missile is lowered into its silo, no human hands again need touch it.

The Minuteman's critical guidance and control system has been entrusted to Autonetics. We are proud to be a member of this United States Air Force missile team.

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Guidance Systems by Autonetics



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is assigned to ATC. We then designate a prime center to plan and establish training on the weapon in cooperation with the manufacturers and the using command.

Training begins while the missile is still on the drawing board. The factory, either on its own site or at an ATC technical training base, trains the first operational cadres. Also trained at this stage are the ATC supervisors and instructors who will set up and teach missile courses within the Air Force. This is called Type I training.

Type II training begins when we have sufficient equipment and instructors to set up courses at our own technical training centers. After this, with a core of skilled crews on the job at the missile's initial operational sites, our centers can begin Type III training of

people for future units.

Then our field training detachments can take over where and when required at the missile's operational sites. This training-called Type IV-has two important purposes: (1) raise the skill level of apprentice personnel, and (2) keep operational and maintenance crews abreast of advances and modifications in the systems on which they are working.

Type V of ATC's weapon system training program is schooling conducted or contracted by the Army or Navy on skills that are common to either or all of the

services.

The advent of the missile has had an enormous impact on our technical training program. There were four such courses in FY '52. The missile curriculum had risen to 217 courses by the end of FY '59. Within the very next fiscal year, this total had more than doubled, to 464 courses.

From fiscal years 1952 through 1959, ATC had provided missile training for more than 11,000 people. At the end of FY '60, this total had reached more than 20,000.

Missile training construction during the past fiscal year offers examples of the facilities required for aero-

space age instruction.

Last November, Neel Kearby Hall was dedicated at Sheppard AFB, Tex., as part of a \$3 million missiletraining complex. The structure is a 214,000-squarefoot classroom laboratory which in addition houses a bay thirty-five feet high to accommodate three "birds." · At Keesler AFB, Miss., a new missile electronics facility was completed at a cost of more than \$1.3 million. Concrete foundations nestle more than a hundred feet into the earth to ensure maximum stability for the sensitive equipment which the facility contains,

A new liquid-propellant handling system at Chanute required stainless steel tubing which could withstand pressures of more than 8,000 pounds per square inch and temperature variations of from ninety to minus 375 degrees Fahrenheit. Estimated total cost of propulsion training units at Chanute is \$3.9 million.

FY '60 saw the completion of Type I training by ATC at various manufacturers' facilities and by Strategic Air Command at Vandenberg AFB to qualify the Royal Air Force personnel for maintenance and operation of Thor IRBMs. Field training detachments con-



Navigation student at work. Students put in many hours of work in the air on board T-29 navigation training airplanes.

trolled from Sheppard AFB are currently deployed in England to complete training and qualification of these personnel for operational capability.

Training was accomplished for the initial Atlas units during the fiscal year and culminated in the first oper-

ationally ready unit at Vandenberg AFB.

In the past fiscal year the diversity of ATC's techni-

cal training ranged far afield.

English language training teams, consisting of specialized ATC groups, assisted in the installation of English language training laboratories for twelve countries. Among these were Denmark, Colombia, Japan, and Ethiopia. The teams in FY '61 will install laboratories in Spain, Laos, Brazil, Greece, and Uruguay.

A major contribution to ATC's global training mission is the support we give to the air forces of nations participating in the US Military Assistance Program. During FY '60 we provided training for officers and

airmen of forty-six MAP countries.

Last July the USAF Foreign Language Training Program became a responsibility of Air Training Command. Courses are taught in fifty-nine languages, plus dialects, at twenty-two colleges and universities to prepare personnel for US Military Assistance Group, mission, and other assignments.

Announcement and planning for implementation of a new Air Force Consolidated Pilot Training Program (CPT) had a major impact on the command flyingtraining mission in the closing months of FY '60. CPT will allow a student pilot to receive all his training at one base, replacing the previous system of preflight, primary, and basic schools at three different locations. USAF instructors will provide all training, eliminating private flying schools from the program. Consolidated pilot training will be conducted at Webb and Reese AFBs, Tex.; Vance AFB, Okla.; Craig AFB, Ala.; Moody AFB, Ga.; Williams AFB, Ariz.; and a seventh base as yet unnamed.

Significant has been the success of Project All-Iet. in which two test classes-one in November 1958 and a second in March 1959-began primary flying training in the 400-mph twin-jet Cessna T-37 without previous time in conventional aircraft. Until these tests were conducted, all primary flying trainees received thirty hours in the propeller-driven Beechcraft T-34 to familiarize them with flying procedures before flying the North American T-28 or the Cessna T-37.

As a result of Project All-Jet, ATC is able to train

(Continued on following page)

quality students without the need to maintain an additional type aircraft in the training inventory. Also, by June 1960, the T-37 had replaced the T-28 in all but

one primary flight training school.

Meanwhile the Northrop T-38 Talon, the nation's first supersonic basic trainer, will be ready for students in 1961. The twin-jet, tandem-seat aircraft is scheduled to begin operational testing at Randolph AFB, Tex., in

Phasing into interceptor pilot training at Perrin AFB, Tex., is the Convair TF-102A Delta Dagger. First students in the all-weather fighter-interceptor aircraft are scheduled to begin training this month and graduate combat-ready approximately six months later.

Advanced aircraft, equipment, and methods were being tested or programed for our other flying-training schools, such as navigator, specialized flying, and

survival, as we ended FY '60.

Last April, navigator preflight training was moved from Lackland and incorporated into the primarybasic navigator program conducted at Harlingen and James Connally AFBs, Tex.

Bombardier-navigator courses at Mather AFB, Calif., and electronic warfare officer instruction at Keesler AFB, Miss., have begun for crews who will man the

supersonic Convair B-58 Hustler.

There were two nostalgic items in the FY '60 flying-

training activity.

The North American B-25, which had been in the training inventory throughout the history of Air Training Command, phased out of the command in December 1959. The plane left the USAF inventory early this year. The Mitchell, last used in the radar-intercept officer program at James Connally AFB, was replaced in December 1959 by the Northrop F-89 Scorpion.

In August 1959, the command received the last Lockheed T-33 for its training inventory. Nearing the end of its brilliant career, the "Tee-Bird"-a trainer version of the F-80 Shooting Star-has been used in the training of more than 27,000 pilots since July 1949.

The command's space-age tasks increased last October with establishment of the USAF Aerospace Medical Center at Brooks AFB, near San Antonio, Tex.

Assigned to ATC, the center is made up of the School of Aviation Medicine, which in July 1959 transferred from Randolph AFB to the new complex at Brooks; the USAF Hospital and Epidemiological Laboratory at Lackland AFB, Tex., and the Medical Services School at Gunter AFB, Ala.

FY '60 was a year of aerospace medical significance, particularly in Air Force research in support of the

NASA's Project Mercury.

Two rhesus primates, specially trained by the School of Aviation Medicine, were placed in miniaturized space cabins and rocketed to great heights to furnish

data for manned spaceflight.

The school's scientists and pilots gave weightlessness training to the seven Mercury Astronauts to prepare them for the outer world of zero gravity, and a young flight surgeon spent a week in a special tank of water to determine the effects of prolonged, simulated weightlessness on the human body.

The educational phase of the center's mission is absorbed by the Medical Services School at Gunter and Lackland's huge 1,000-bed "teaching" hospital. The Gunter school trains officers and airmen in almost all USAF medical specialties. Lackland conducts an intern and residency training program for USAF physicians and also trains officers and airmen for USAF medical tasks.

Air Training Command has six nonflying training centers. Five are Technical Training Centers. They are: Amarillo AFB, Tex.; Chanute AFB, Ill.; Keesler AFB, Miss.; Lowry AFB, Colo.; and Sheppard AFB, Tex. The sixth is Lackland's military training center, home of Air Force basic and officer training.

Here is a brief rundown:

Amarillo conducts training in maintenance of aircraft airframes and subsystems, manages the entire training program on the Snark intercontinental cruise missile, and conducts ATC's Retraining School for personnel convicted of offenses.

Keesler trains in maintenance of communications and electronics systems, air traffic control, electronic countermeasures, electronic counter-countermeasures, and utilization and maintenance of electronic data-

processing equipment.

At Lackland all Air Force recruits receive their initial basic military training; also here are officer precommissioning schools; courses for cryptographic operators and repairmen, recruiters, and air police;

and the USAF Marksmanship School.

Chanute specializes in maintenance of aircraft engines, missile propulsion systems, missile fueling systems, and gas generating systems, manages all courses on the Bomarc interceptor missile, the Hound Dog guided aircraft missile, and the Minuteman ICBM. Other courses include weather, metalworking, supply, personnel, and production control.

Lowry is the Armament Training Center, both offensive and defensive, of the Air Force. People who take care of missile nose cones, reentry vehicles, and atomic weapons learn their jobs at Lowry. Training in support of ground and aerial photography is provided. Maintenance and launch personnel for the Mace surface-tosurface missile get their training at Lowry. Radiological defense instruction is conducted here. A calibration school instructs people in the exacting job of setting and checking intricate measurement equipment.

Sheppard graduates perform such jobs as maintenance of fixed communications and care of groundsupport equipment for aircraft and missiles. Sheppard also conducts all training in four AF career fields: comptroller, transportation, intelligence, and utilities. Training program management on four AF ballistic missiles-Atlas, Titan, Thor, and Jupiter-is centered

Today, members of the Air Training Command stand astride a paradox unique to the aerospace age. In an era when scientific and technological advances ironically encourage speculation concerning the decline of manned aircraft, perhaps never in the history of the Air Force has there been a period in which the skill of man was more important. This is ATC's mission.-END



MACE TITAN HAWK ATLAS SNARK NIKE B BOMARC NIKE ZEUS SPARROW I SPARROW II SPARROW III NIKE HERCULES SIDEWINDER REGULUS II VANGUARD REDSTONE JUPITER C PERSHING BULL PUP MERCURY TERRIER POLARIS TARTAR CORVUS FALCON

THOR

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replaced this assembly with a special N/D double row high precision instrument ball bearing with integral outer race guide roller . . . and shaft mounted with a nut. This one recommendation produced cost savings of over 400%1 In turn, the customer was able to reduce the potentiometer selling price to the government. What's more, the New Departure Instrument Ball Bearings improved potentiometer reliability!

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proved reliability you can build around

The word "transition" has a special meaning for

the organization that provides

support for America's global Air Force . . .

AIR MATERIEL COMMAND

Gen. Samuel E. Anderson, USAF

COMMANDER, AMC



General Anderson took command of AMC in March 1959 after serving for two years as Commander, Air Research and Development Command. He saw duty with the Eighth Air Force in Europe in World War II, held staff posts in Washington during the postwar years, and was Commander of FEAF's Fifth Air Force in Japan during the Korean War.

HE STORY of the Air Materiel Command at the start of the '60s is the story of a logistic system in transition.

The aerospace forces it supports are undergoing dramatic and continuous change; missiles already are here, spacecraft are but a horizon away. The types of actions AMC must be prepared to support are diverse, ranging all the way from the conduct of both local and general war to show-of-force actions and support of United Nations activities in areas of tension throughout the world.

The weapon systems required to meet these military challenges continue to increase in cost and complexity, yet the challenges must be met within resource limitations established by public policy.

These factors combine to produce a logistic system in transition, a system which must support the forces of today, procure weapon systems for the forces of tomorrow, and prepare itself to support the forces of tomorrow-and all the while it must be engaged in a ceaseless search for logistic economy, ways of reducing the costs of this vast program. This report constitutes a summary of some of the major recent actions taken by the Air Materiel Command. It describes some of the ways we are discharging our logistic responsibilities in these days of constant crisis and continuous change.

During the past year we further developed our concept of weapon system management. The Air Forceindustry team weapon system concept as used in the development and production of a weapon is now well understood. AMC acts jointly with ARDC and the using combat command in establishing a Weapon System Project Office to serve as the focal point for problems associated with each new weapon system and to perform the management function of total system integration during the early stages of the weapon's life.

These Weapon System Project Offices have been grouped together at geographical locations at which AMC has established appropriate centers: the Aeronautical Systems Center at Wright-Patterson AFB in Ohio and the Ballistic Missiles Center near Los Angeles. This past year the pattern was made complete with the establishment of the Electronic Systems Center at Laurence G. Hanscom Field, Mass.

AMC, through its Project Offices at these three centers, and in close coordination with ARDC and the using commands, accomplishes the functions of planning, programing, scheduling, and procuring the weapon system and its ancillary supporting equipment, The three centers, utilizing the weapon system management concept, provide the necessary management to shepherd each new system through the early years of its life.

There are operational support problems, as well, associated with modern complex weapons which need to be considered within a total weapon system framework. During the past year the Air Materiel Command further developed the weapon system management concept by strengthening the logistic support managers at the nine Air Materiel Area Headquarters. These managers have worldwide responsibility for the support of their assigned weapon system throughout its operational life including supplying it, maintaining it, and modifying it as necessary. They also serve as the point of contact between industry as the source and the combat commands as users of these weapons.

Air Force weapons now are "system managed" from their earliest conception through their development, production, and operational lives to final disposal.

The tremendous potential of the weapon system management concept is illustrated by the system we have been employing to support the Thor IRBM in

(Continued on page 158)



New Concept in Group Communications for the rapid, accurate exchange of information in Briefing, Training, Conference Room Presentation. ■ With flexible, multi-screen, automatic rear projection techniques, vital information is imparted clearly, concisely and graphically. ■ These are just a few of the military installations which now use TelePrompTer Group Communications techniques and equipment:

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- Army Chemical Proving Grounds, Utah
- Army Electronic Proving Grounds, Arizona
- Army Signal School, New Jersey
- Army Transportation School, Fort Eustis

- The Ordnance School, Aberdeen
- Atlantic Fleet Headquarters, Norfolk
- Defense Atomic Support Agency, Pentagon
- Pacific Missile Range, California
- Army Quartermaster Depot, Richmond
- Air Force Intelligence Room, Pentagon
- Air Force Command Post, Pentagon
- Camp Pendleton Marine Base, California

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Mission: to keep 'em flying. Here jet engines stretch as far as the eye can see at a streamlined command depot.

AIR MATERIEL COMMAND

Headquarters, Wright-Patterson AFB, Ohio

Commander Gen. Samuel E. Anderson

AIR MATERIEL AREAS

Warner Robins Air Materiel Area Robins AFB, Ga.

Rome Air Materiel Area Griffiss AFB, N. Y.

Sacramento Air Materiel Area McClellan AFB, Calif.

San Bernardino Air Materiel Area Norton AFB, Calif.

San Antonio Air Materiel Area Kelly AFB, Tex.

Oklahoma City Air Materiel Area Tinker AFB, Okla.

Ogden Air Materiel Area Hill AFB, Utah

Mobile Air Materiel Area Brookley AFB, Ala.

> Middletown Air Materiel Area Olmsted AFB, Pa.

AIR FORCE

Topeka Air Force Depot Topeka AF Station, Kan

DEPOTS

Dayton Air Force Depot Gentile AF Station, Ohio

Shelby Air Force Depot Wilkins AF Station, Ohio

CONTRACT MANAGEMENT REGIONS

Eastern Contract Management Region Olmsted AFB, Pa.

Central Contract Management Region Wright-Patterson AFB, Ohio

Western Contract Management Region Mira Loma AF Station,

Calif.

AMC Aeronautical Systems Center Ho Wright-Patterson AFR

Hq. Wright-Patterson AFB, Ohio

> AMC Ballistic Missiles Center Hq. Inglewood, Calif.

AMC Electronic Systems Center

Hq. Laurence G. Hanscom Field, Mass.

> Air Materiel Force, Pacific Area Hq. Wheeler AFB, Oahu, Hawaii

Air Materiel Force, European Area Hq. Chateauroux AS, France

England and the Atlas missiles now becoming operational here. Utilizing highly developed techniques of system design, and the latest high-speed data-processing devices, we have been able to create a support system with the following characteristics:

(1) Central knowledge of total system assets for items vital to the mission support of a weapon system no matter where these items are located geographically. Any item whether awaiting shipment on the contractor's dock, in possession of AMC in a depot or weapon system storage site, or located in the hands of a user, can be located almost instantly. It is also possible to

determine whether this item is serviceable or unserviceable.

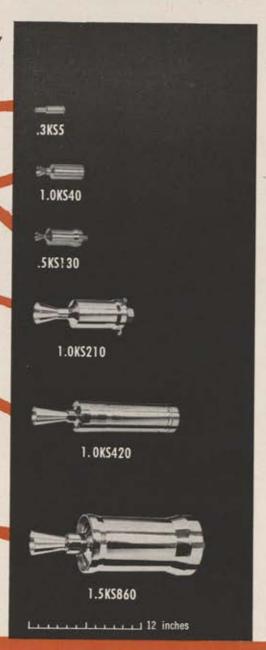
(2) The instantaneous accumulation and updating of consumption and failure information relating to the weapon system. This information allows us to make optimum use of the assets in the system.

(3) The utilization of automatic resupply for these weapon systems. By evaluating the asset information and the consumption and failure information, we can forward replacement items directly to the point of use, thus eliminating much of the record keeping and req-

CONTROL

Used on the Nation's major missiles, space vehicles and satellites

T	YPICAL APPLICAT	IONS
Project	Rocket	Function
ATLAS	MARC 7	Retro
THOR	MARC 8	Retro
EXPLORER (Series)	MARC 7	Satellite Ejection
	MARC 5	Spin Stabilization
DISCOVERER (Series)	MARC 4	Spin Stabilization
	MARC 4	De-Spin
MERCURY	MARC 7	Capsule Separation
	MARC 8	Safety Rocket Jettison
TIROS	MARC 3	Spin Boost
TIROS	MARC 3	Spin Boost



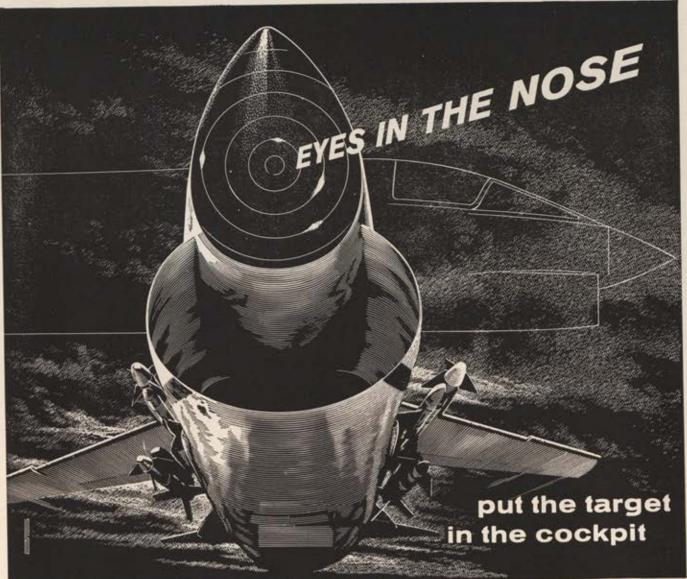
MARC 3 4 5 6 7 8

Modifications of standard control rocket motors can be made to obtain a wide range of performance characteristics. For example, the MARC-7 was modified for a Venus probe that required half the original 420 pound thrust. Special mounting brackets, variations in expansion ratios, igniter alterations and other modifications can be made for each standard control rocket. Further information about ARC's control rockets and a detailed brochure can be obtained from our Development Department.



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MISSILES

uisition activities of the using command. This technique also enables us to reduce significantly the total stocks required for the support of a given system.

During the past twelve months AMC has also strengthened its concept of item management and has established policies governing the relationships between item management and weapon system management. Despite the vital role which weapon system management now plays in logistics, the fact remains that we must buy, modify, repair, and distribute by item in order to obtain the maximum economy in providing support to the over-all USAF program. During the past year AMC made significant headway in bringing about homogeneous groupings of these item management responsibilities under the control of inventory managers at the various Air Materiel Areas.

During the past year we also significantly improved our techniques of direct support to combat units. Combat commands now are supplied directly from Air Materiel Areas located in the US. This method reduces the need for stockpiling supplies at overseas depots. Accordingly, during the past year we have been able to eliminate the two Pacific Air Materiel Areas just as earlier we were able to eliminate the

Air Materiel Area in Europe.

This direct support would be impossible without the most responsive type of transportation system. An important element of this system, LOGAIR-in effect since 1954-has been expanded during the past year. LOGAIR now serves eighty-seven bases through scheduled airlift by four commercial carriers for critical and high-value cargo. This system is operated by AMC within the US and ties in with the Military Air Transport Service for support of units overseas.

Introduction of new aircraft into the LOGAIR system is greatly streamlining its operation. Aircraft now programed, such as the Argosy cargo transport produced by Hawker Siddeley of Great Britian and the C-130B Hercules produced by Lockheed Aircraft Corporation, are capable of straight-in loading from truck-bed height. They will make possible the efficient, speedy handling of large pieces of equipment such as

complete jet engines.

An orderly transition to the future can only be achieved if the main outlines of the future are perceived with sufficient clarity to enable them to become a basis for planning actions. During the past year, the problem of long-range planning has been attacked with renewed vigor. An AMC Long-Range Logistics Guidance document was published to establish a common context for long-range planning throughout the command. It contains an analysis of the major trends at work, an estimate of the nature of the logistic system of the future.

In our planning efforts, we have followed the philosophy that orderly evolution which provides continuity of adequate support is the hallmark of logistic system excellence. The inherent byproduct of this orderly evolution is economy. This document and the annual revisions of it which follow will contribute significantly to the achievement of such an orderly evolution.

The Air Materiel Command was one of the first or-

ganizations to realize the tremendous potential inherent in large-scale computers; automatic data-processing equipment was first employed in AMC in 1954. During the intervening period the development of logistics systems to utilize the potentials of ADPE was performed on a decentralized basis by various Air Materiel Areas. On May 26, 1960 the decision was announced to centralize the development of new ADPE systems and the improvement of existing ones with the establishment of the Directorate of Data Systems at Hq. AMC.

This new directorate will be responsible for development of standard data systems throughout the Air Force and of logistics management data systems within AMC. Contractors for the Air Force will have a single point for resolving problems relating to processing and transmitting information between AMC and the contractors. The electronic data-processing industry itself will benefit similarly in having a single point

of contact on data development.

Another major function of the directorate is the evaluation and selection of data communications and processing equipment. The data-communications equipment includes transceivers used in the Air Force's worldwide supply requisitioning system. However, the new directorate's duties will involve only the selection of equipment, and not the operation of the transceiver system.

Several steps have been taken during the past year to capitalize on the savings which occur through centralized management of major logistics actions. One of the most important of these steps was the formation of three AMC Regional Contract Management Offices. The eastern office is located at Olmsted AFB, Pa., the central office at Wright-Patterson AFB, Ohio, and the western office at Mira Loma Air Force Station, Riverside, Calif. All Air Procurement Districts and Air Force Plant Representative offices will come under the jurisdiction of one of these regions.

The new regions were established to provide more flexibility in operation, to reduce costs by concentrating top skills in fewer locations, and to bring about a greater measure of control over the vitally important

(Continued on following page)



"Direct support would be impossible without the most responsive type of transportation system." Modern airlift provides this support. Here, loading a USAF cargo plane.



Jet engine maintenance at Air Materiel Command facility. Maintenance of Air Force materiel is one of the command's functions. New management concepts facilitate the vast task.

procurement field. Specifically, their mission is to supervise Procurement Districts and Plant Representatives in the many aspects of contract administration, including contract surveillance, production, industrial property control, flight test, readjustment, quality control, transportation, accounting and finance, and legal and inspection functions relating to contracts initiated by the Air Force and other government agencies. Organizationally, the regions are on the same level as the Air Materiel Areas and the Centers. Their commanders report directly to the Commander, AMC.

Another project which promises significant economies for the future is the study we are presently conducting at the request of the Department of Defense pointing the way toward a DoD single managership for electrical and electronic items. The purpose of this study is to recommend to USAF and DoD a plan for managing common-use electrical and electronic items to eliminate overlapping and duplication of service responsibilities in the supply of such items. The criteria we have established require that the method developed cause a minimum disruption to existing practices and a maximum use of existing assets.

One of our continuing tasks is the development of detailed plans for the support of oncoming weapon systems. An interesting example of AMC's efforts along these lines is the Minuteman ICBM train test program currently being supported from Ogden Air Materiel Area at Hill AFB, Utah. The Minuteman force will consist of missiles deployed both in underground launchers and on mobile railroad trains. Traveling at random over portions of the rail network in the United States, the missiles can be launched directly from the trains.

The Air Materiel Command is developing detailed plans for the logistic support of this new weapon. In this present test it is responsible for providing rail facilities and on-base switching services, for initiating bills of lading covering the train's movements, for outfitting the train, for repairing and checking out all communications equipment prior to each test run, and for making emergency repairs while it is moving.



Loading a Thor IRBM into a C-124 transport. Airlift was used extensively in moving Thors to sites in Britain, becomes more and more essential to support modern weapons.

Housekeeping services for the Strategic Air Command task force operating the trains also are being supplied by AMC. The test train is designed to operate entirely as a self-contained unit. It carries all its food and water for crewmen and even laundry service is provided on the train. Each trip lasts from one to two weeks. In the period between runs there is an intensive analysis of the results and of the different tactics employed.

Still another indication of the increasingly important role AMC is playing in developing and supporting our vital deterrent force of the future is the ballistic missile site activation program. Until recently the construction of ballistic missile sites had been the responsibility of the Air Research and Development Command; however, this program has now been brought under AMC. It will be responsible for the management of sites during construction, installation, and check out of the systems and will negotiate all base support agreements.

AMC will not have the responsibility for the three existing ICBM sites but will be in charge of seventeen other sites now in initial or proposed stages. This shift in responsibility is a reflection of the importance of the ground complex surrounding the ballistic missile to its logistic support. It is a further expression of the necessity for coordinated, integrated management of all the many items of equipment and materiel which directly support a weapon system.

Throughout all these actions of the past year a recurrent theme has been evident. There is a definite move to tighten up the total logistic system, both in terms of control and costs, to prepare it for the increasing responsibilities which lie ahead.

There has been a constant drive to provide effective logistic support with the minimum resources possible. And there has been an increasing emphasis placed on forecasting the requirements of the future and on establishing an orderly evolution to the logistic system of the future. These are the elements of logistic responsibility; they are the main guidelines of our logistic system in transition.—End

engine power By CATERPILLAR

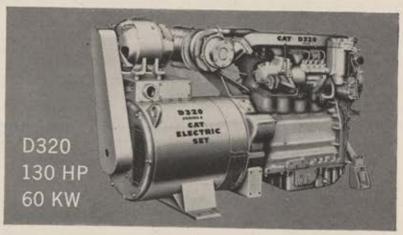
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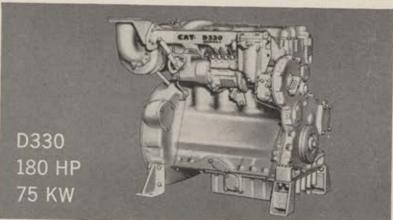
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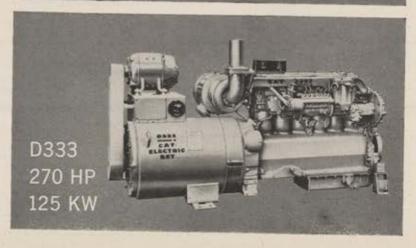
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- Clean Burning of Fuel
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- Available in Industrial, Marine or Electric Set Configurations

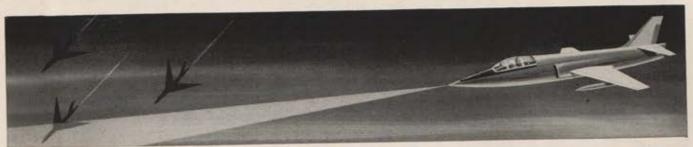
For complete performance specifications on these new Caterpillar Diesels or on the complete line, see your Caterpillar Dealer. Or, write to Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U. S. A. Ask for the catalog on the complete Caterpillar Engine line.



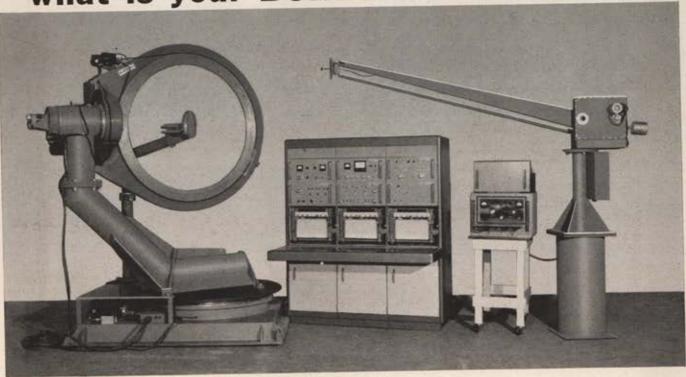








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The effectiveness of the best airborne radar tracking system can be completely destroyed by deflection of the radar beam as it passes through the plastic radome. Now, for the first time, radome manufacturers and aircraft firms installing radomes can be completely assured of radome quality. CTI Automatic Radome Boresight-Error Measuring System replaces tedious spot checking with a continuous recording of beam shift across radome.

In the system shown above, as the motor-driven holding fixture rotates the radome under test, the servo-controlled null-seeking antenna on the boom traces the position of the deflected radar beam. At the control console, which provides single-point control of the entire system, three recorders plot the total magnitude and horizontal and vertical components of the beam deflection angle directly in milliradians. Rate of change of beam deflection, essential to missile applications, is readily obtainable from the recordings.

Additional features include automatic plotting of antenna patterns with or without the radome and radome transmission efficiency measurements. The system is available in frequencies from S through Ka bands and infrared.

Engineers: Career opportunities are currently available at CTI





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General Schriever has commanded the Air Research and Development Command since 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. General Schriever saw extensive duty as pilot and commander of heavy bombers in the Pacific in World War II.

Tomorrow's national security can be assured only by adequate planning, research, and development today . . .

AIR RESEARCH AND DEVELOPMENT COMMAND

Lt. Gen. Bernard A. Schriever, USAF

COMMANDER, ARDC

F I were asked to sum up in a single word the significance of the past year in Air Force air research and development, I would say that it has been a year of *realization*.

Giant steps have been taken in the ultimate goal of the United States and its partners in freedom—to achieve maximum security against nuclear-missile aggression.

During the year just ended, the pattern of American strength in the space age has continued to assume physical shape and dimensions. Plans conceived only six years ago for ballistic missiles and military space systems are now being translated into a tangible deterrent structure.

The Air Research and Development Command bears a large part of the responsibility for these plans, as well as for the research, development, and test of the systems that implement these plans. The burden of formulating operational concepts has become an important element in the evolution of new aerospace systems.

The Air Force now is thrusting well beyond the traditional frontiers of weapon design and deployment. The systems which are coming into use rely upon methods of propulsion, principles of motion, and techniques of guidance which have never been a part of man's experience before, and on life processes in a novel environment.

As one of its chief architects, ARDC has a direct interest in the nature of the program which is being put together for the defense of freedom in the world. ARDC's field of action includes the whole extent of the environment around our planet—the aerospace continuum.

The past year has seen the foundation laid, and the framework fitted into place, for a dynamic military organization operating in that environment.

Its foundation is the aerospace striking force, consisting of intercontinental ballistic missiles in close coordination with piloted craft for missions requiring decision, judgment, and flexibility. These characteristics of manned systems are essential to supplement and support the massive power, tremendous speed, and deep penetration of the missile.

The framework of this organization consists of the auxiliary systems for command and reconnaissance, communication, and control that protect the striking force from surprise and enable it to move with swift precision in case the need arises.

As the basis of our missile force, the Atlas ICBM became operational in the late summer of 1959, when the first units were delivered to the Strategic Air Command. This event was the culmination of a development effort unparalleled in the nation's past, reaching back over a span of five years. More than any other single accomplishment, it marked the coming of age of the United States as a military power in the space age.

Atlas is a long-range missile of great power, capable of answering any attack that might be launched against us in the next year or two. In the hardened bases that are being prepared for it, with the abbreviated launching techniques that have been devised to assure that it gets off the ground without delay, Atlas can make this country's formidable strength felt if a military crisis should occur.

At the same time, more sophisticated missile systems have made great strides. The Titan ICBM is near the end of its test phase, and will become operational within the next year. Deployed in the hard bases which are now being prepared for it, Titan will add materially to the strength and invulnerability of our missile counterattack capability. An advanced ver-

(Continued on following page)

sion of this ICBM, Titan II, is presently being programed.

Titan II will feature longer range, heavier warhead, and shorter reaction time than the earlier version of the missile. Titan II's liquid propellant will be prepackaged. Consequent ease of handling will allow salvo firing from underground silos. Titan I will be raised from the storage silo for firing. Titan II will be fired direct from the silo.

The most impressive developmental achievement during the past year, however, has been the remarkable speed-up in the progress of Minuteman, the compact second-generation ICBM. Burning solid propellants which can be stored for long periods, ready for instant launching at the first sign of an attack, Minuteman will add mobility, swiftness of reaction, and economy to our missile operations.

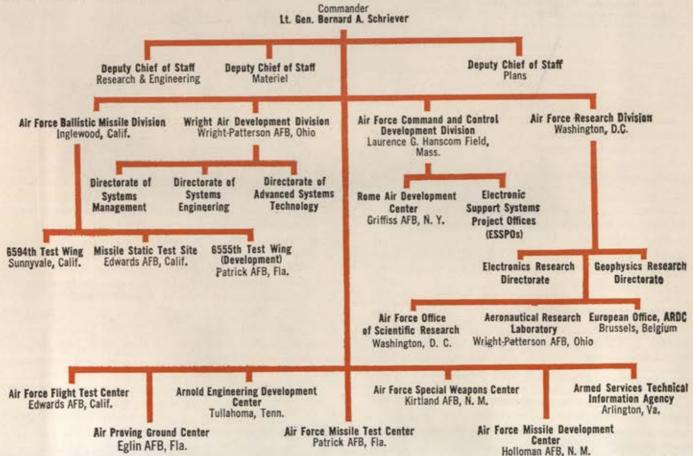
view. We consider that manned vehicles and automatic missiles are complementary, each type performing missions for which it is peculiarly fitted.

At the present time, the largest part of our deterrence consists of B-52 and B-47 jet bombers, capable of carrying the most effective modern weapons to any target on earth. It is envisioned that a substantial proportion of these aircraft will in time be replaced by the growing inventory of long-range missiles. On the other hand, a continuing need of manned aircraft is foreseen, as far as we can now look into the future.

Among the irreplaceable characteristics of piloted craft is the fact that they can be recalled, or can change their targets, if the situation alters after they have been launched. Furthermore, there are specific kinds of missions in which the pilot's powers of observation, evaluation, and decision are essential.

AIR RESEARCH AND DEVELOPMENT COMMAND

Headquarters, Andrews AFB, Md.



In addition to the tethered tests for fixed-site operations, experiments have begun with a railwaymounted launching system, which will deploy Minuteman squadrons over the countryside on the nation's vast rail network. This will have the effect of giving land-based missile operations extreme mobility, with maximum immunity to enemy attack.

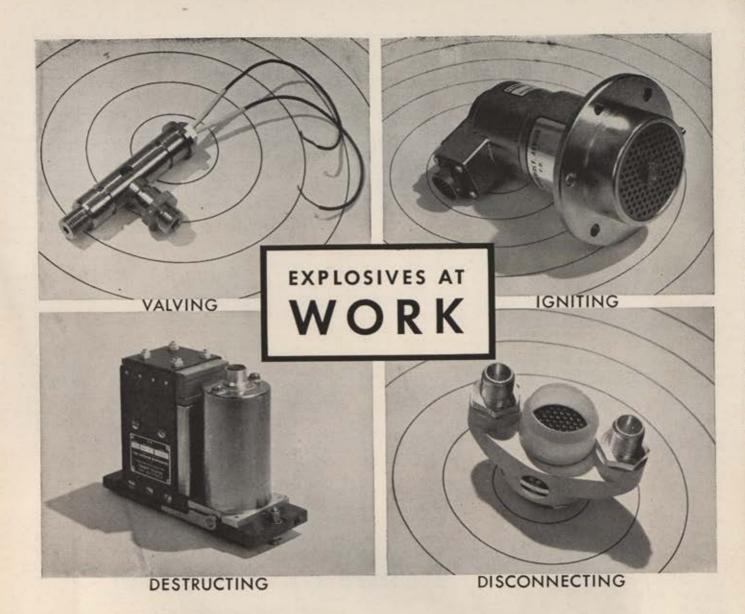
There has been a tendency for the civilian public to assume that these missile forces, with their supporting space systems, eventually will replace piloted craft altogether. This, of course, is not the Air Force

It is also a factor of considerable importance that a manned craft-unlike a missile, which is used once and expended-can be used a number of times, following up the initial strike. A long-range strategic bomber force gives us reserve strength, after the first massive assault is spent.

Effective as they are in the situation that exists today, our present jet bombers are limited in speed and endurance for the lightning-fast operations which will come with hypersonic missiles and space systems. As

(Continued on page 171)





missile hardware

When it comes to the problems of putting propellants and explosives to work on the actuating jobs in and around missiles, Beckman & Whitley offers a background gained in ten years of pioneering. Examples shown are just a few selections of solutions to typical problems.

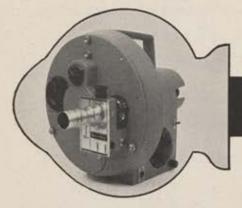
They include a zero-leakage re-usable noncontaminating valve, a lanyard-armed destruct package, a rocket-engine starter for operation at altitude, and a standard electrical connector adapted for propellant-actuated disconnecting. Our case-history files are full of other examples, and if these don't happen to touch on your present problems, some of the others undoubtedly will.

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Visit our Exhibit at the Air Force Association's 1960 Aerospace Panorama, Brooks Hall, in San Francisco Booth 708 Beckman & Whitley INC.

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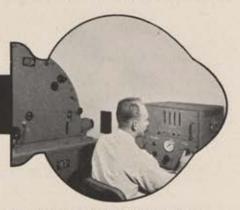
the five keys to TIME MICROSCOPY



Dynafax Continuous-Writing Framing Camera These photo instruments cover the ranges from 200 to 4.3 million frames per second, and up to 9 millimeters per microsecond sweeping-image rates. In their various ways, they provide access to magnified segments of time for quantitative analysis of high-speed events throughout science and industry.

For object speeds from 100 to 2,000 meters per second at 0.1 magnification. No synchronization necessary. Produces 224 16-mm frames on 35-mm film. Rates, 200 to 26,000 pps.

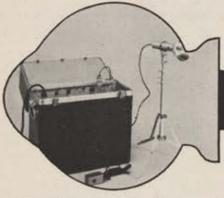
Model 189 Synchronized Framing Camera



Model 357

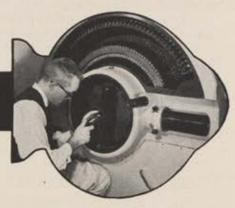
Electronic Flash Unit

For object speeds from 500 to 25,000 meters per second at 0.1 magnification. Twenty-five 35-mm frames. Rate, to 4.3 million per second.

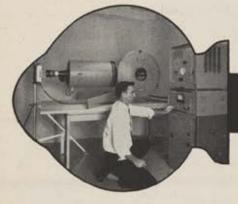


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Model 192 Continuous-Writing Framing Camera



For object speeds from 1,000 to 13,000 meters per second at 0.1 magnification. No synchronization necessary. Eighty 35-mm frames. Rates to 1.4 million per second.



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Model 339 Continuous-Writing Streak Camera

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Highly productive ARDC project has been Discoverer satellite program, designed to attain space capsule recovery capability, vehicle stabilization, other vital space-technical know-how.



ARDC chutist, Capt. Joseph W. Kittinger, plummets 76,400 feet from balloon over New Mexico in command's continuing program to gain needed data on maximum human tolerance to stress.



Silo-test model of Air Force Minuteman ICBM undergoes successful tethered launch from underground site, Edwards AFB, Calif., late last year. Missile capability has been prime ARDC product.

a replacement for the years ahead, when they become obsolete, the Air Force has proposed the development of new vehicles, including the powerful B-70.

The six-jet B-70 will cruise above 70,000 feet, where it is difficult to intercept with present defensive systems, and at a speed of about 2,000 miles per hour—three times the velocity of sound. Its range without refueling will be over 6,000 miles, giving it a true intercontinental capability. It will carry air-launched ballistic missiles, extending its effective striking radius even farther. The past year has seen this element of tomorrow's aerospace deterrence started on an active development program.

In the same category, but farther in the future, is the Dyna-Soar boost-glide vehicle. Carried aloft by a rocket booster, it will operate in the lower regions of space, at orbital and suborbital speeds, gliding back to the ground through the atmosphere after its mission is completed.

So far, Dyna-Soar has been programed solely as an experimental craft for research purposes. However, as the first piloted military space system planned by the United States, Dyna-Soar has important operational potentialities which are now being explored by ARDC.

A factor contributing to increased confidence in the Dyna-Soar concept has been the encouraging progress made in flight tests of the rocket-powered X-15. This experimental aerospace craft has been designed to study environmental conditions at the border of the atmosphere, where Dyna-Soar will operate.

Performance of the X-15 in the manufacturer's trials during the past year was highly satisfactory, in spite of several random mishaps which were not directly related to its flight characteristics. Turned over to the Air Force and the National Aeronautics and Space Administration in August of this year for joint conduct of research flights, the X-15 has now set a speed record of 2,196 miles per hour and an altitude record of 136,500 feet, even though it was using an interim engine of less power than the one designed for its ultimate use.

Earlier, I mentioned the framework of command and communications, within which these missile and aerospace forces would operate. The importance of these supporting systems lies in the tremendous speed of attack which has been brought into military operations by rocket-propelled ballistic missiles.

Since the interval from the launching of an ICBM to its arrival at the target is only about thirty minutes, the nation that receives warning of an attack must be capable of very rapid reaction. We must be able to get a large part of our counteroffensive forces

(Continued on following page)

off the ground and on their way, before the enemy attack arrives.

One solution to this problem is to put our information and command systems in permanent satellite orbits in space, traveling at speeds similar to those of the attacking missiles, on a constant alert for the surprise assault which is the enemy's best hope of success. In the space age which is now beginning, it is expected that many of the functions of observation, warning, command, and communication with our widely dispersed forces eventually will be carried out in satellite vehicles.

A start has been made in this direction, during the past year, with the warning and reconnaissance satellite programs, Midas and Samos. Both have progressed closer to realization as functioning systems.

Midas is intended to serve solely as a missile-warning device. Carrying infrared sensors, it will detect a flight of enemy missiles by the heat of their engines as they rise out of the atmosphere in the first few minutes after launching. Thus Midas will alert us to the fact that an attack is on its way about half an hour before the missiles arrive, doubling the length of the best alert we can expect from present early-warning systems.

On May 24, at Cape Canaveral, the Air Force placed in orbit with the Atlas booster the first of a series of Midas test satellites. Weighing 3,600 pounds, it was by far the heaviest payload which the United States had orbited, and was exceeded only by the dummycarrying Soviet Sputnik IV, launched a week or so earlier.

This Midas launch was exceptional for another reason. With a mean radius of about 4,270 miles in its circuit around the earth, it varied less than thirty miles in altitude—from 292.5 miles at perigee to 322 miles at apogee. Thus it had the most nearly circular orbit of any artificial satellite thus far—American or Soviet. In fact, none of the natural bodies in the solar system can match the regularity of its orbit.

This is an important characteristic in a military space vehicle. Whether it is used as a navigational aid, for observation, or as part of an operating system, in a circular orbit it maintains constant speed and altitude, so that its position can be plotted or predicted with ease.

The close approach of Midas to perfect regularity was due to the exceptionally fine performance of its guidance mechanisms. Hereafter, Midas will have this capability as a built-in characteristic—a product of the second-stage Agena-B rocket which will send it into orbit. Developed by Lockheed for the Air Force as an outgrowth of the Discoverer series of experimental satellites, Agena-B has the unique ability to cut off and then restart its engines in space. Thus it is able to correct the normal eccentricity of an orbit based on a simple ballistic trajectory.

The combination of Atlas with Agena-B gives the Air Force a highly sophisticated and reliable launching vehicle for future satellite systems of substantial size, carrying either men or instruments. Hence, Midas represents a combination of systems having a utility in space operations beyond their immediate value as the prototype of a much-needed strategic warning device.

Other contributions by ARDC to the over-all effectiveness of our national aerospace effort—both in military defense and in scientific exploration—might be noted. For example, two important new facilities were inaugurated, about midway through the year.

At Sunnyvale, on the outskirts of Palo Alto, Calif., our Satellite Test Annex of Air Force Ballistic Missile Division went into operation at the end of January. It monitors the present Midas, Samos, and Discoverer satellite programs, coordinating activities at launching sites and tracking stations as far away as New Hampshire, Hawaii, and Kodiak, Alaska.

Early in February, at Laurence G. Hanscom Field, Mass., we opened the National Space Surveillance Control Center. Its purpose is to collect, analyze, and report information on the orbits and positions of all known satellites and space probes. Also it will identify and follow unknown objects when they appear in the space around our planet.

The command has also undergone a thorough reorganization, making it more responsive to today's accelerated pace of research and development.

Essentially, this reorganization has extended the delegation of supervisory authority for new systems—which has worked so well in ballistic missile development—to the four major subcommands of ARDC in the field. At the same time, this decentralization of day-to-day program management leaves the staff at ARDC Headquarters free to concentrate on the vital function of long-range planning for the aerospace needs of the nation in the years ahead.

Under this new organization, the various centers and other facilities of ARDC are directly responsible to one or another of its semiautonomous divisions. The Air Force Ballistic Missile Division, at Inglewood, Calif., will continue to direct the development of ballistic missiles and space systems. Aerodynamic systems like the B-70 or Dyna-Soar are under the care of the newly formed Wright Air Development Division in Dayton, Ohio.

The other two divisions—both recently established—play an important part in the search for advanced techniques and components to assure the performance of aerospace systems of both types. The Command and Control Development Division—C²D² for short—is in charge of electronic developments of all kinds, including the new Surveillance Center at Hanscom Field.

The Air Force Research Division, in Washington, D.C., is broadening the emphasis on basic research. It is responsible for all of ARDC's experimental studies except in the actual development of systems.

The object of these programs and administrative actions was the same in every case—to make the free nations of the world as nearly invulnerable as possible. The essence of invulnerability today consists in the possession of an aerospace force of so much power and variety, and so alert to any challenge, that no adversary will risk certain defeat by attacking it.

In the year just past, the United States has moved measurably closer to this kind of strength.—End



RCA VIDICONS

KEEP ONE EYE ON THE WORLD'S WEATHER...
ANOTHER ON THE NATION'S DEFENSE

RCA Vidicon tubes operate successfully in Tiros weather satellite and in Redstone target damage assessment cameras

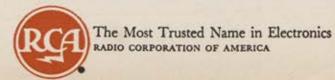
A new era in the application of television techniques opened on April 1st, when Tiros began sending back to earth its cloud-cover pictures. These pictures, produced by RCA Vidicons, are giving man his first "star's eye" view of his world and its weather. Not only do the vidicons promise to revolutionize the science of meteorology, but they open up new prospects for the exploration of the moon and solar system via vidicon-equipped TV cameras.

Another historic "first" was achieved by an RCA vidicon on March 15, when a TV-camera capsule was ejected in flight from a Redstone missile, and sent back pictures of the missile's impact. The camera, like the ones used in Tiros, utilized an extremely slow scan, permitting the transmission of high-quality pictures over a very narrow bandwidth.

It is no accident that RCA was chosen to supply the vidicons for these critical tasks. Long the leader in camera tube development, RCA currently manufactures four standard vidicon types: RCA-7038, for broadcast use; RCA-7735, for industrial use—featuring extremely high sensitivity; RCA-7262-A, a short, low-heater-power version of the RCA-7735; and the RCA-7263, a short, low-heater-power type, which is environmentalized for military applications. All feature the high resolution capability, high uniformity and broad spectral response that have become identified with RCA vidicons.

For complete information about RCA's vidicon line or about special adaptations to meet unusual requirements, get in touch with: Marketing Manager, RCA Industrial Tube Products, Lancaster, Pa.

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After years of achievement, the concept of
mass strategic airlift scored a major
breakthrough in the past twelve months . . .

MILITARY AIR TRANSPORT SERVICE

Lt. Gen. Joe W. Kelly, Jr., USAF

COMMANDER, MATS



General Kelly took command of MATS on June 1 of this year. 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.

THE IMPORTANT road center of Bastogne could not have been held by the 101st Division during the German counteroffensive in December 1944 except for the airplanes that delivered 800,000 pounds of supplies to the division during the critical days between December 23-27."

These were the words of President Eisenhower when, as a General of the Army, he wrote of the "Cru-

sade in Europe."

During the period he described, less than sixteen years ago, the word "breakthrough" stood simply for the physical breach by two SS Panzer armies in the Ardennes sector. Since those days, however, the word has taken on a much deeper significance. In my own recent association with the Air Research and Development Command, for example, breakthrough denoted a radical scientific or technological advance, a great step forward.

There has also been another kind of breakthrough, less dramatic perhaps, but—from the standpoint of national defense—of equivalent importance. I think

of this as the "airlift breakthrough."

It was in 1948-49 that the word "airlift" came into the English language as a result of the supremely successful Berlin Airlift. Here was concrete proof that this means of logistical mobility, which had, with the World War II "Hump," prevented the Japanese from overrunning all of China and helped deliver the crucial blow to Hitler's last desperate offensive, was indispensable to both hot wars and cold.

Yet it was not until 1959-60 that mass strategic airlift achieved its breakthrough and became something more than the military "orphan" it had been for so many years. Why did it take more than a decade for a proven military system to achieve this recognition? There are many possible reasons.

With the tremendous cost of modern weapon sys-

tems, budgetary competition is certainly one of these. A general misunderstanding of the basic difference between general air transportation and strategic military airlift is another. Natural controversy on the likely nature of the next war may well be a third. There are undoubtedly many other reasons too complex to delve into at this time.

More to the point, why is it that I consider fiscal year 1960 to be the year of the airlift breakthrough? Here are some of the reasons and their background:

First, the Air Force's Military Air Transport Service had been testing and proving the doctrine of strategic airlift ever since, as an infant organization, it helped break the blockade of Berlin in 1948-49. Through the intervening years, emergency, diplomatic, and humanitarian airlifts became almost the order of the day for MATS. Our airlift force demonstrated beyond question that the battles of the cold war—from Berlin and Korea to Lebanon and Taiwan—could be kept within bounds through the swift responsiveness of strategic military airlift.

During the same period, advanced-weapon technology and evolving global strategy made it clear that in a possible nuclear war, time—and particularly the crucial opening minutes and hours—would be a more decisive factor than ever before in history. It would be expected, then, that a nuclear war would impose extraordinary demands for strategic airlift, to deploy and supply the Strategic Air Command and Tactical Air Command and strike forces of the Army and Navy, and to bolster the strength of our armed forces in all theaters. That this is indeed the case is attested by the Emergency War Plans of the Joint Chiefs of Staff, which call upon MATS for tremendous amounts of airlift during the opening hours, days, and weeks of conflict, and a consistently high rate thereafter.

So it became increasingly clear, despite the fact that

rockets, missiles, and advanced bombers had to be fed a good portion of the military budget, that strategic airlift would have to be kept ready for global war or any other national emergency. Keeping the strategic airlift force of MATS ready necessarily involved two fundamental considerations.

First, the equipment—the strategic airlift aircraft of MATS—would have to be capable of performing its job. And, second, the entire command, with its supporting services, would have to be kept in fighting trim at all times in order to be able to go into full action without a moment's delay. The latter consideration implies, of course, that any help drawn from outside of MATS must also be trained and ready.

These are the two basic problems, and MATS entered fiscal 1960 with no real resolution for either. While the Air Force had requested modest funding in the 1960 budget for a beginning of MATS modernization, the Defense Appropriations Act contained no funds for this purpose. The bulk of the force was eight

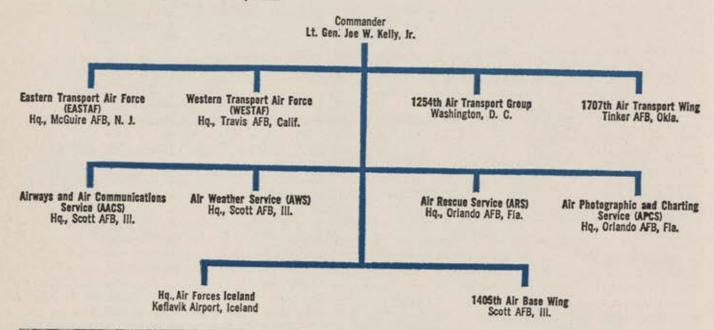
to ten years old; our main reliance was on the C-124 that had first flown in 1948.

As to our fighting trim, we were confident that we could maintain an instant readiness capability by flying our aircraft at about five hours a day each-thereby giving our aircrews, maintenance technicians, supply channels, traffic specialists, technical services, and route facilities sufficient exercise to guarantee their instantaneous responsiveness. In war or other emergency, of course, the immediate and sustained demand would be for many more flying hours than five per day on each airframe, and we felt that war-readiness training at anything lower would not provide an adequate base for a sudden surge to and maintenance of the higher level. This hypothesis was based on the experience of previous mass airlifts, in which a too-low training level had delayed the achievement of the desired emergency tempo for periods of time that could not be tolerated in today's world.

(Continued on page 179)

MILITARY AIR TRANSPORT SERVICE

Headquarters, Scott AFB, ILL.

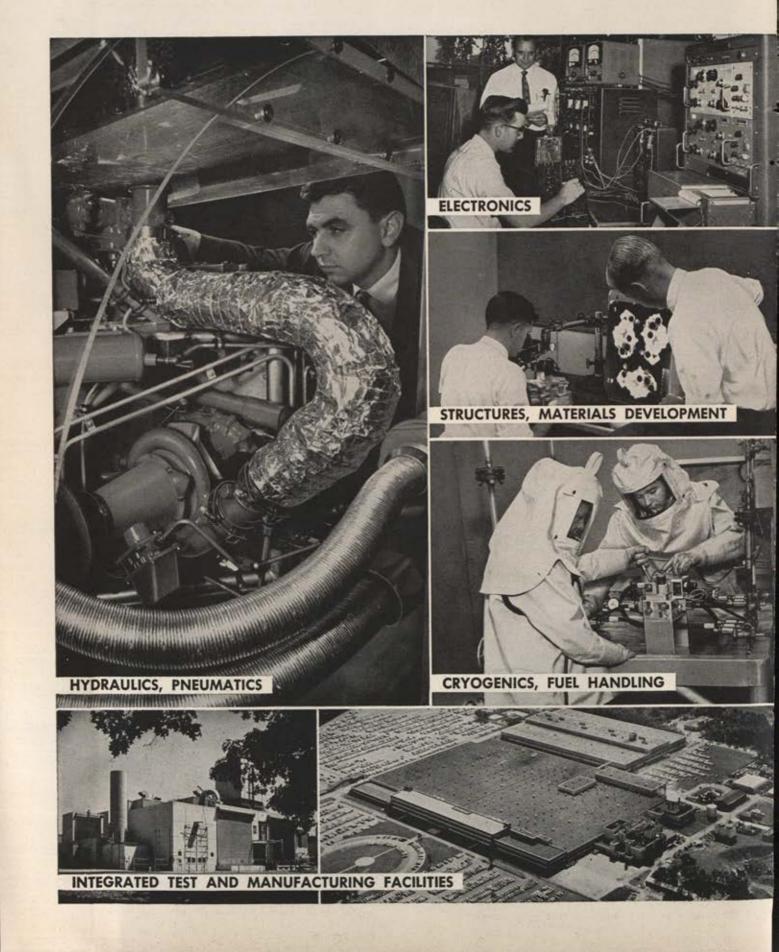




Exercise Big Slam/Puerto Pine in March 1960, saw MATS aircraft perform history's largest peacetime troop airlift.

AIR FORCE Magazine • September 1960

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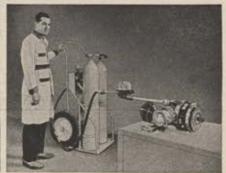
SOME OF THE MANY FIELDS OF GROWTH AT HAMILTON STANDARD



ENVIRONMENTAL CONDITIONING SYSTEMS for space vehicles and such advanced aircraft as the B-58, 880, B-70 are important aspects of Hamilton Standard diversification.



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STARTERS. Over 15,000 pneumatic and fuel-air starters are in service on many of the nation's front-line aircraft. The new Hi-Lo system, above, permits drastic weight, cost savings.

NOTHING IS TOO FAR OUT....

FOR GRUMMAN TO BE IN

This is a vapor screen
photograph of hypersonic
Mach 8 flow about a delta
wing with underslung cone, taken in
Arnold Engineering Development Center tunnel B.
Photo was made during Grumman research experiments,
partially supported by Air Force Wright Air
Development Division Flight Control Laboratory.

Shock pattern is discernible along the shock layer on wing (light area), boundary layer on wing (dark region), and shock layer on body (dark region). Bright white line on underside of wing and body is reflection of light screen.

This photo characterizes the work Grumman is doing in hypersonic aerodynamics. Other efforts at Grumman include continuing design and development work on orbiting observatories, interplanetary communication systems, re-entry vehicles and reconnaissance satellites, to name a few.

Most important: Grumman has the "people capability" to transform advanced ideas to reality. So . . . if you have a problem that's far out . . . call Grumman in.

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As FY 1960 began, we were flying the strategic airlift force at very close to the five-hour goal. However, there was criticism from some quarters at our doing so, and far from universal agreement that the Department of Defense should utilize the airlift we naturally produced for carrying defense cargoes and personnel to our armed forces around the globe. The "distant drums" of Berlin and Korea had somehow lost their boom in the years between, and to many the marriage of the rocket motor to the thermonuclear warhead seemed to solve all military problems. The quick deployment of air strike forces, and of fighting men and their arms to distant trouble spots, appeared to many to be no longer a valid requirement, despite the more recent lessons of Lebanon and Taiwan.

As a result, both modernization of the strategic airlift force and firm national agreement on its warreadiness training program—the two basic ingredients governing our ability to meet the demands of war or emergency—were up in the air.

Then, during this past fiscal year, a number of related events took place which led me to think of 1960 as a "year of resolution" for MATS.

First, the Department of Defense, in response to a request from the President, concluded a study of the role of MATS in peace and war, and the President approved the courses of action contained therein. The Secretary of the Air Force appointed a committee of prominent industrialists (the Reed Committee) to recommend ways and means of implementing the actions.

The report of this committee recognized, among other considerations, that (1) the deterioration of the MATS fleet should be corrected quickly, and brought up to SAC, TAC, and air defense standards; (2) MATS's worldwide training exercises should be continued to the degree necessary to maintain a high state of readiness; and (3) the Air Force Reserve and the Air National Guard are considered generally reliable and can be counted on for approximately four hours per day per aircraft in an emergency provided these units are equipped with suitable transport aircraft and provided that a peacetime aircraft utilization rate of one-half the projected emergency utilization rate is established.

At about the same time that this report was being written, six squadrons of two wings of the Air National Guard were busily making the transition from fighters to the C-97 Stratocruisers that the Air Force had transferred from MATS to the ANG. Their record in making the changeover to this new global mission was superb, and the prospect of having airlift augmentation answerable to military control and discipline was encouraging indeed to MATS planners.

It was also during this same period that the Chairman of the House Committee on Armed Services appointed a special subcommittee (the Rivers Subcommittee) to probe into the entire area of national military airlift. One of the immediate results of the hearings of this body was a recognition throughout the Congress of the immediacy of the requirement for airlift modernization. The Defense Appropriations Act

(Public Law 86601) provides \$200 million to commence interim airlift modernization, as well as \$50 million for development of the Air Force Specific Operational Requirement (SOR) cargo aircraft.

And, finally, the Military Air Transport Service, in conjunction with the United States Continental Army Command, conducted Exercise Big Slam/Puerto Pine from March 14-28, 1960. The primary and original purpose of this operation was to test the validity of the five-hour war-readiness training hypothesis. From the outset, the test was designed to evaluate the capability of MATS to surge from its peacetime rate to one of approximately eight hours and to sustain the higher rate over an extended period of time. Here, after all, was the crux of the problem. The need for a five-hour training rate and the resultant practical use of the generated airlift were what most of the shouting had been about.

However, almost doubling our airlift productivity for a two-week stretch naturally left us with an extra supply of flying hours and ton-mile capability. It was therefore decided to explore another area that had been a bone of controversy—the ability of MATS to deploy a sizable Army force for small-war action.

The operation, as finally conducted, was divided into two areas. Big Slam was the test of increased utilization; all 447 aircraft of the strategic airlift force were involved. Half of these continued the global air logistics supply route, but at an expanded rate. The other half of the force was diverted to Big Slam/Puerto Pine, airlifting 21,000 troops of the crack Strategic Army Corps and 11,000 tons of their combat equipment from fourteen United States onload bases to two staging areas in Puerto Rico, and return, within a fourteenday period.

Exercise Big Slam/Puerto Pine was a success in that it showed beyond doubt what could be done and, perhaps more important, what could not be done under existing limitations.

First, it was definitely concluded that the strategic airlift force can, in practice as well as theory, accelerate to wartime flying rates—as long as realistic training is (Continued on following page)



Inside a MATS C-124 in the Amigos Airlift, the Air Force mercy operation in relief of earthquake-stricken Chile this spring. MATS flew in supplies, airlifted survivors.



Atlas missile slides into cavernous cargo compartment of a MATS C-133 Cargomaster transport. Command now has thirty-five C-133s, ultimately will have fifty in its strategic airlift force under the Air Force's present plans.

sustained at a five-hour-per-day level on each airframe. Interestingly enough, the increase in output required our people to up their working hours by 110 percent, but they proved to a man that they could meet this demand for at least fifteen days with no discernible detriment to either safety or efficiency.

Second, it was proved that the MATS strategic airlift force and the USCONARC STRAC forces, working directly together, are capable of large-scale air movements of troops and their equipment, precisely timed and executed. And, significantly, despite the worst offshore flying weather in a half century, there was not a single aircraft accident in Big Slam/Puerto Pine, and no fatalities in more than 50,000 flying hours.

On the negative side, the fact had to be faced that Big Slam/Puerto Pine was a short-distance deployment and that 11,000 tons was only about one-third of the equipment the troops would have required for true and immediate combat readiness. Here, the key factor was the limitations imposed by MATS obso-

Flying hospital ward in a MATS C-131 Samaritan aircraft. Such flights pick up patients at numerous locations and move them to military hospitals throughout United States.

lescent aircraft, lacking the speed, range, and carrying capacity to airlift fully equipped battle divisions to distant trouble spots in the minimum of time.

Thus, in order to wring the maximum use out of each aircraft, even on such a short-range operation, ample advance notice and a relatively long period of preparation were required. Obviously, these little luxuries would not be available in an actual emergency any more than we could hope for the focus of trouble to be spotted a mere 1,000 miles from the United States.

Thus, in showing what the people of MATS could do under stress, Big Slam/Puerto Pine was also invaluable in dramatizing what the aircraft of MATS could not do. And this very vexing problem, as I have indicated, would seem to be on its way toward a solution.

As an integral component of USAF's aerospace force we also continued our intensive training with SAC and TAC under simulated wartime conditions during 1959-60. One case in point: November 1959's Operation Spearhead, the movement of a TAC Composite Air Strike Force from US bases as far west as New Mexico to a destination in Europe. F-100s, RF-101s, C-130s, and KB-50s of TAC's Nineteenth Air Force were deployed under simulated combat conditions.

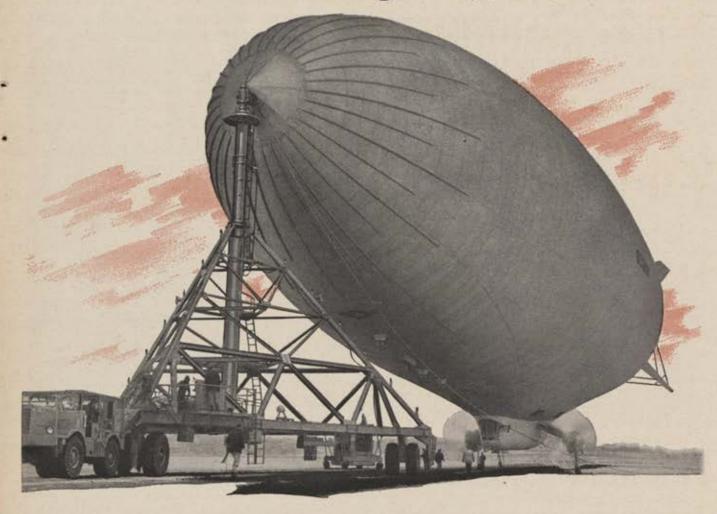
In the best traditions of the dawning space age, MATS continued its logistical support of the Atlantic and Pacific Missile Test Ranges, cut critical delivery times by airlifting missiles from manufacturer to launching sites, delivered IRBMs from the US to Europe for emplacement, and—in November 1959—scored a historic first in airlifting an operational Atlas ICBM in a C-133 Cargomaster from San Diego, Calif., to the Air Force Ballistic Missile Division Field Office at Francis E. Warren AFB, Wyo., for acceptance, checkout, and turnover to SAC.

Likewise in November, MATS completed its support of Deep Freeze V fifteen days ahead of schedule, airlifting cargo and passengers to stations located deep in Antarctica. At the other global extreme, tons of fuel, food, and machinery were airlifted from Greenland to five Arctic scientific stations, and construction materials were airdropped to a research station on floating ice north of Point Barrow, Alaska.

(Continued on page 183)

"Hitching Post" for Navy Blimp!

uses a 19-foot Saginaw b/b Screw!



A Saginaw Ball Bearing Screw is located in the vertical column of these telescoping Goodyear Blimp Mooring Masts! The screw's extremely low friction and rapid positioning ability synchronizes the mooring fixture with the nose of the blimp to quickly and safely secure the Navy craft.

The huge high-efficiency Saginaw b/b Screw used here is over 19 feet long and with a B.C.D. of 6 inches. From the tiniest Saginaw Screw used in instrumentation, to this giant used in the Goodyear Mooring Mast, the principle of the Saginaw Ball Bearing Screw is almost universally adaptable. Its ability to replace acme screws and

hydraulic devices with over 90% efficiency has already assured smoother, more dependable actuation for over 5,000 satisfied customers!

The Saginaw Screw may be able to improve your product's performance, give you greater power and maintenance savings, and lower your initial cost. Talk your actuation problem over with Saginaw's engineers. Just write or phone Saginaw Steering Gear Division, General Motors Corporation, Saginaw, Michigan—world's largest producers of b/b screws and splines.

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The Itek prototype system was designed basically to automatically process, index, reproduce and display 70 mm high-resolution panoramic aerial photographs. The entire process from receipt of raw exposed film to finished duplicates for viewing or plotting can be completed within two hours.

Through development projects such as this aerial reconnaissance ground handling system and Company funded research programs that encompass all the basic disciplines of advanced communications theories, Itek has established itself as a leader in the development of systems and equipment for information processing.



Information Technology Laboratories, Waltham, Mass. Vidya, Inc., Palo Alto, Cal. Photostat Corporation, Rochester, N. Y. Hermes Electronics Company, Cambridge, Mass.

Throughout the year, MATS's 1254th Air Transport Group provided safe, swift transportation for President Eisenhower on his global journeys, Vice President Nixon, cabinet members, and numerous foreign dignitaries including Charles de Gaulle and Nikita Khrushchev.

Along with its other special missions, joint exercises, and war-readiness training, MATS, with the help of the US commercial airlines, continued to operate air logistics lifelines to every corner of the free world, delivering cargo and personnel to our armed forces everywhere. It is this reliable supply line of the air that has saved the Air Force alone more than \$7 billion in inventory costs since the Korean War and about

13,000 manpower spaces every year.

For commercial air transportation to augment the military airlift capability on overseas routes, MATS paid the airlines more than \$64 million in fiscal year 1960. Adding the contracts let by MATS for domestic air services, the total for the fiscal year is something over \$93 million; projected to the end of the contract year, ending September 30, the aggregate paid to the US civil airlines for DoD contract air transportation will be more than \$126 million.

If we add the common carriage costs for military personnel traveling on individual transportation requests, I feel certain that total DoD disbursements to the commercial airlines will exceed the \$231 million total of fiscal year 1959. This is clearly in keeping with the MATS policy to bolster the capability of the air transportation industry wherever possible in order to ensure their ability to respond in emergencies.

The MATS Domestic Aeromedical Evacuation System continued its humane activities, although the scale necessarily had to be reduced because of a one-third

reduction in assigned aircraft.

In other ways, too, 1960 was a mercy year for MATS. It is extremely heartening, and a source of pride to everyone in the strategic airlift force, that what is essentially a war machine is so adaptable to extending the friendly hand of humanity. In September 1959, for example, when Nagoya, Japan, was ravaged by Typhoon Vera, MATS C-124s shuttled more than 200 tons of food, clothing, blankets, and medical supplies from Tachikawa to Komaki Air Base.

Then, early in 1960, MATS aircraft airlifted 371,000 pounds of emergency equipment-shelters, cots, and bedding-to Agadir, Morocco, after earthquakes had buried that city. This was followed up by an airlift of medical crews and supplies, water, and an Army battalion with earth-moving equipment to relieve the

buried city.

Again in early 1960, the Ceara and Tiauim areas of Brazil were devastated by floods, and MATS C-124s responded with emergency equipment, medical

supplies, and rescue helicopters.

Then, more recently, MATS flew seventy-seven mercy missions to Chile after earthquakes during May and June literally remade parts of the stricken country. Millions of homeless Chileans were aided by 880 tons of clothing, food, helicopters, medical supplies, and two Army field hospitals, flown down by MATS on the 4,500-mile run from the United States to Santiago.

Then, when those severe disturbances in this hemisphere lashed a furious seismic wave against Hilo, Hawaii, MATS flew to the rescue of that community with refrigerated vans, generators, clothing, cooking utensils, and food.

In reviewing the past year, it is obvious that, as in all other years, the strategic airlift force of MATS could not have succeeded in its mission were it not for the four MATS technical services. The Air Weather Service, Airways and Air Communications Service, Air Rescue Service, and Air Photographic & Charting Service serve not only MATS as the parent command, but all other Air Force operational commands, in some cases the US Army and Navy, and, on occasion, civilian airlines.

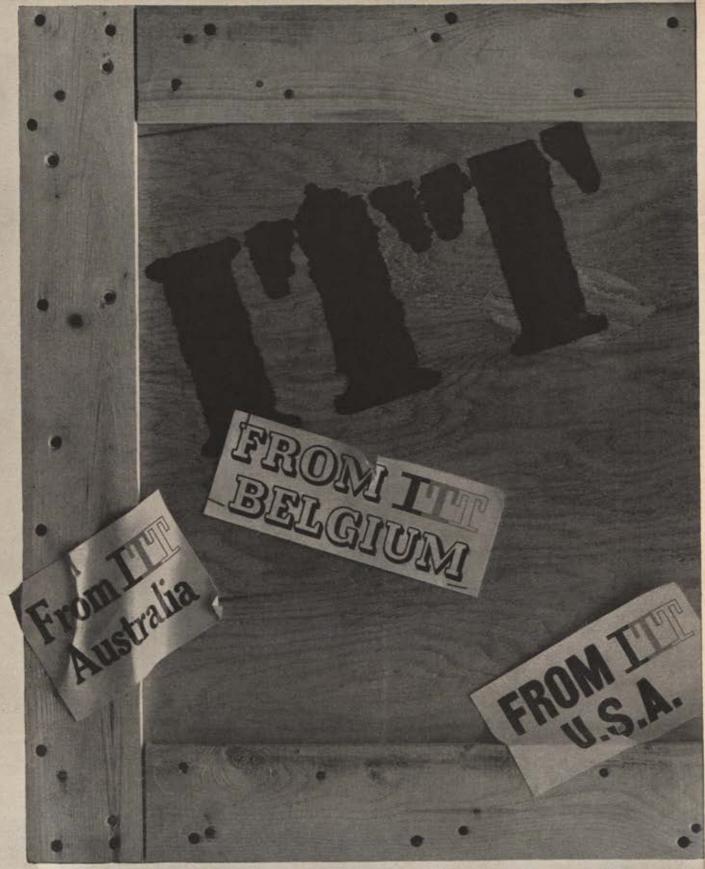
Whether it be Big Slam/Puerto Pine, the airlift of missiles, the Amigos Airlift to Chile, resupply at the North and South Poles, or logistical missions around the world-AACS provides the electronic eyes and ears of the strategic airlift force; AWS observes, plots, and forecasts the weather and computes the flight plans; ARS is ever ready to save life in any emergency; and APCS accomplishes the geodesy and charting to get us where we're going, creates the training films that help teach us our jobs, and then documents our operations on film for historical, research, and planning

But the technical services, as I say, go beyond MATS. ARS, for example, is heavily involved in both the Mercury and Discoverer programs and other aspects of satellite and missile recovery. In fiscal year 1960 rescue aircraft flew more than 2,000 missions logging 23,000 hours, saved 350 persons from certain death, and assisted 1,700 others in situations of ex-

AWS is busily engaged in analyzing and evaluating the television weather pictures transmitted by Tiros I and testing weather maps prepared from those pictures. AACS, among a multitude of new projects, is taking over more and more responsibility for all Air Force ground communications and has been designated as the operating agency for the ground environment of the communications satellite program. This command was also assigned the responsibility for technical control and transmission engineering for BMEWS circuits on all routes. And APCS, during 1960, was correlating geodetic launch-site positions with those of potential targets, making precise aerial electronic surveys for missile guidance systems and chart references, flying almost 83,000 scale-miles of aerial mapping photography and producing more than 450 reels of motion pictures-training films, full-length features, training aids, and Air Force News Reviews.

There have been many millions of flying hours since the time of Bastogne, supplied by C-47s, and the Hump with its aerial lifeline of C-46s. But the strategic airlift lessons we learned in that far time, amplified and thoroughly tested in the years between, are finally achieving the recognition that was inevitable. This, to me, indelibly marks 1960 as the year of resolution

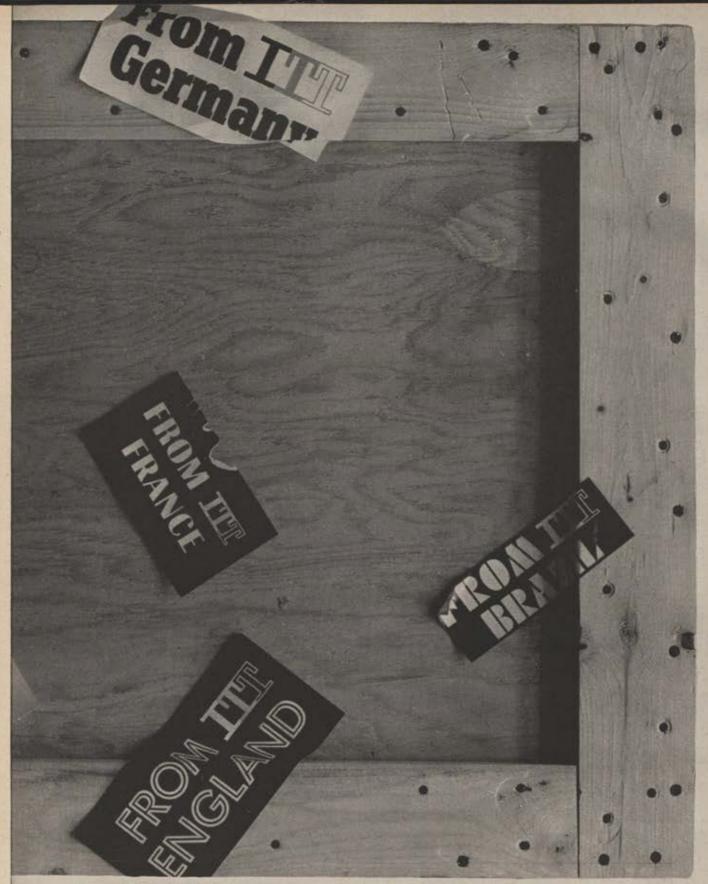
for MATS.-END



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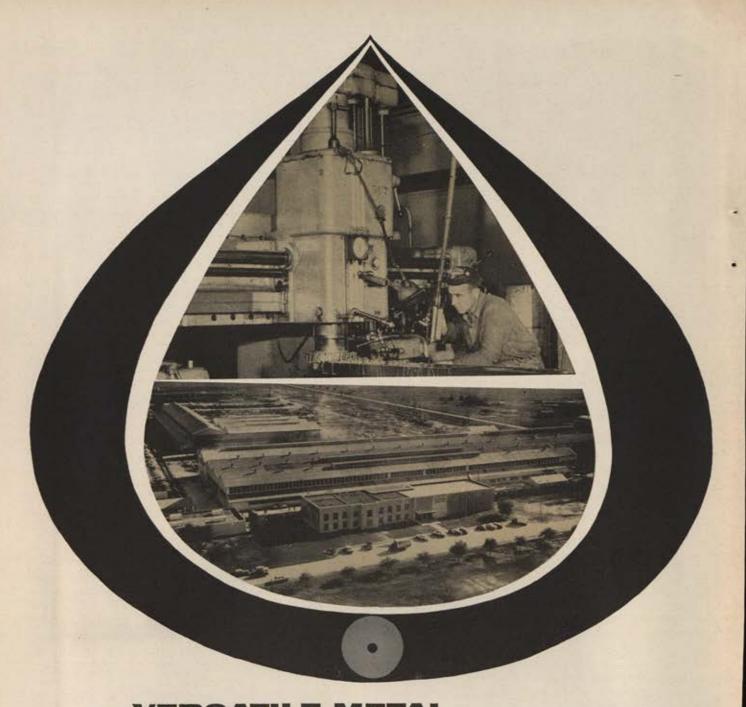
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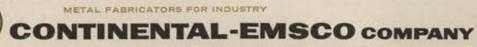
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General Todd assumed command of Air University in August 1958 after a two-year tour in the Far East, first as Vice Commander, FEAF, then as Chief of Staff, UN Command and US Forces, Korea. General Todd saw duty in the Eighth Air Force in Europe during World War II, and postwar service as Air Attache to Russia in 1945 and 1946.

In the aerospace age, "Our educational system must represent a thoughtful blending of many complex factors . . ."

AIR UNIVERSITY

Lt. Gen. Walter E. Todd, USAF

COMMANDER, AU

IR UNIVERSITY was active and productive in all aspects of its educational mission during FY '60. The basic mission remained unchanged. Formally stated, that mission is: to prepare officers for command and/or staff duties with all types of Air Force organizations; to provide education and training to meet requirements of the Air Force in scientific, technological, and other professional areas; to administer the Air Force ROTC and provide instructional support to participating colleges and universities; and to function as an Air Force educational, doctrinal, and research center.

Note that under our mission we deal almost exclusively with people and ideas. We reject the notion that in this technological age the individual's part in the scheme of things is diminished. We are committed to the faith that dedicated people, thoroughly skilled and schooled in all aspects of aerospace power, are the key to free-world survival.

Since aerospace survival embraces practically all fields of human knowledge, our educational system must represent a thoughtful blending of many complex factors. What subjects to teach, to whom, and why, are knotty problems requiring continuous study.

The latest USAF Education Board, comprised of fourteen ranking generals and chaired by Gen. Thomas S. Power, Commander in Chief, Strategic Air Command, met at Maxwell AFB, Ala., home of AU, last November. From that meeting came recommendations to further attune educational programs to today's operational requirements.

Another far-reaching study is being conducted by the Air Force Educational Requirements Board. Centered at Air University under my chairmanship, the newly created board is well along in a comprehensive, objective appraisal of each officer career speciality.

The board includes four USAF members representing Plans and Programs, Comptroller, Operations, and Materiel, and one each from Air University, Air Research and Development Command, and the Air Force Academy.

Findings will eventually be reflected in AU programing.

During the year, a significant milepost was reached in the Air Force's relationship with colleges and universities participating in the AFROTC program. A meeting of college officials and Air Force members at Maxwell AFB in December led to the establishment of the Air Force ROTC Advisory Panel to the Secretary of the Air Force. The panel is made up of eight college presidents and one dean, each nominated by and to represent one of the nine major associations of colleges and universities. Chairman is Dr. William C. Friday, President of the University of North Carolina.

Purpose of the panel is to provide the machinery for planning AFROTC programs and for solving mutual problems. Discussions have resulted in some schools placing AFROTC on a voluntary instead of a compulsory basis and the substitution in the freshman and sophomore years of equivalent college courses for AFROTC.

An important innovation was the launching of the Airman Education and Commissioning Program (AECP). AECP provides undergraduate education followed by officer training and commissioning for qualified, career-minded airmen. There are two phases:

The academic phase, an AU responsibility exercised by the Institute of Technology, includes final selection of applicants, placement at civilian institutions, and administrative and academic supervision on campus.

 The military phase, an Air Training Command responsibility, features military training with subsequent commissioning for graduates.

In June sixty airmen entered college to receive up (Continued on following page)

to twenty-four credit hours in eight fields of study. Quota for FY '60 is 200, divided among engineering, geodesy, mathematics, international relations, meteorology, transportation, business administration, sanitary and industrial hygiene, and medical technology.

Closed-circuit television, in limited use at the Command and Staff College since 1958, was expanded to include about ten percent of the presentations.

Up to this point I have intentionally dwelt on some of our newer activities. To complete the record, here are some vital statistics on established elements of the Air University:

THE WAR COLLEGE class of 1960, the fourteenth since the college began, graduated 166 students this year. This was the first class in which all USAF members were lieutenant colonels at the time of selection.

THE COMMAND AND STAFF COLLEGE graduated 542 officers. Sixty-one (Reserve, National Guard, and allied officers) graduated at the end of Phase One in December, and the remainder in June. Also in June, CSC conducted a two-week orientation course updating 445 reserve officers from all parts of the United States.

Three SQUADRON OFFICER SCHOOL classes (59-B, 59-C, and 60-A) graduated 2,783 first lieutenants and captains.

THE INSTITUTE OF TECHNOLOGY at Wright-Patterson AFB, Ohio, continued its resident and civilian institutions programs providing the Air Force with vitally

AU student body includes officers of all services, allied nations. Here Greek Air Force officer gives briefing. needed skills. In FY '60, 2,610 graduated from Resident School (RS) courses and 4,066 from Civilian Institution Program (CIP) courses. RS totals included 159 in engineering, seventy in management, and 2,381 in logistics, civil engineering, and short courses. CIP totals included a wide range of specialties including engineering, physical sciences, medical, management, meteorology, and foreign languages. In all, more than 40,000 have graduated from the two programs to date.

THE AIR FORCE ROTC commissioned more than 3,800 cadets. Over-all enrollment topped 100,000.

THE AIR UNIVERSITY LIBRARY added substantially to its already impressive accumulation of aerospace documents, papers, pamphlets, films, maps, and books.

THE RESEARCH STUDIES INSTITUTE continued studies in depth in such fields as aerospace concepts, military science, doctrine, language, and history.

THE WARFARE SYSTEMS SCHOOL revised its curriculum to include an up-to-the-minute space systems orientation course. More than 1,800 attended the four principal courses taught during FY '60.

THE ACADEMIC INSTRUCTOR SCHOOL graduated 1,091 officers, airmen, and civilians. Additionally, AIS monitors the Allied Officer Program which over the years has added significantly to free-world strength and international understanding.

THE 3894TH SCHOOL GROUP which supports Air Force faculty and students at non-Air Force schools added to their support activities bringing the number of operating locations to twenty-five.

EXTENSION COURSE INSTITUTE, literally bursting at the seams, reached an all-time-high enrollment exceeding 330,000. Large segments of the curriculum have been updated with more course revisions slated for completion by fall.

A major change in organization occurred on October 1, 1959, when the School of Aviation Medicine, Brooks AFB, Tex., was transferred from Air University to the Air Training Command.—END

AIR UNIVERSITY
Headquarters, Maxwell AFB, Ala.

Commander Lt. Gen. Walter E. Todd War College Command & Staff Squadron Officer Warfare Systems Academic Instructor Hq. Air Force ROTC College School Maxwell AFB, Ala. School School Maxwell AFB, Ala. Institute of Research Studies **Extension Course** Air University Library Technology Institute Institute Maxwell AFB, Ala. Wright-Patterson AFB, Maxwell AFB, Ala. Gunter AFB, Ala. Ohio 3800th Air Base Wing 3894th School Group 3851st Support Group Maxwell AFB, Ala. Maxwell AFB, Ala. Maxwell AFB, Ala.



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In low-level flights, ground-launching saves time and costs because now the Firebee can be brought to low altitudes faster and more simply than from high air-launch altitudes. All Firebees of the future will have this important capability.

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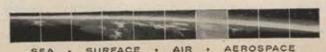
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To "zero in" a supersonic bomber on a remote strategic target by inertial guidance techniques . . . to control a drone through precision maneuvers hundreds of miles away . . . to guide a jetliner across ocean or continent . . . to "take over" for a business plane pilot with airline efficiency . . . to provide, from the ground, a "navigational path" for planes to fly . . . to simplify and integrate flight instruments in the modern aircraft . . . or to navigate and control a helicopter automati-

cally . . . these are typical jobs that Sperry systems are doing daily. And doing them with superior precision and dependability, for commercial aviation and for the military's most advanced programs.

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The result is precision navigation which itself has a common denominator: reliability. Sperry capabilities in air navigation—as in navigation on the sea, and under it, and out in space—are contributing significantly to today's defense and to progress for tomorrow. General offices: Great Neck, N. Y.







General 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 Asst. DCS/Personnel at Hq. USAF before assuming his duties at the Academy.

Major changes in curriculum and continued dedication to the future of the Air Force highlighted the year at the . . .

UNITED STATES AIR FORCE ACADEMY

Maj. Gen. William S. Stone, USAF

SUPERINTENDENT, USAFA

HIS HAS been a year of new progress and achievement at the youthful Air Force Academy.

We made, first of all, major improvements and modifications in our curriculum to keep abreast of current requirements in the changing world around us.

• In one important revision, full-scale aerial navigator training was eliminated. In its place we substituted pilot and navigation indoctrination and an expanded space technology program.

Under the new plans, all Cadets, during their last summer at the Academy, will receive pilot indoctrination consisting of ten hours of flying in light aircraft and ten hours of ground school, as well as four semester hours of classroom instruction in space technology. The summer instruction will be in addition to the six semester hours of astronautics already in the required Cadet curriculum.

Then, during the fall and spring terms of the Cadet's first-class or senior year, he will have his choice of one of the following depending upon his physical qualifications and personal desires:

Pilot Screening, consisting of an additional thirty hours of flying in light aircraft and thirty hours of ground school.

Navigation Indoctrination, including thirty hours of navigation flights and sixty hours of ground school.

Enrichment Study, for Cadets not participating in pilot screening or navigation indoctrination. These Cadets will take two and one-half semester hours of courses available in the Enrichment Program.

Cadets of the Class of 1961 will be the last to graduate with the wings of a rated Air Force navigator. The class of 1962 will be the first to graduate under the new flying and space technology program.

The pilot program will not be implemented at the Academy until approval for a lightplane airfield at or near the site is granted. Cadets have received some pilot indoctrination in the past at Air Training Command bases during the summer,

 Another curriculum innovation at the Air Force Academy during the past year was the reorganizing of the academic year into three semesters. These are the Fall Term, running from late August through December; the Spring Term, from January through April; and finally, the May Term, lasting for one month.

The philosophy prompting this change was the desire to concentrate military studies at one time for greater effectiveness, rather than spreading them throughout the academic year. All military and leadership courses, therefore, are now taught during the month of May. During the summer, as previously, upper-class Cadets take overseas and domestic field trips, summer leave, and conduct the basic training for the incoming fourth class.

• The impact of space technology is clearly seen in our revised curriculum. The third classmen, or sophomores, learn to compute terminal velocities of rockets in their calculus courses; the second class, or juniors, learn about rocket engines in thermodynamics, and the fluid-flow course in the Aerodynamics Department now emphasizes the reentry problem. So it can be seen that space technology is ever present in the curriculum and is not limited to the astronautics courses.

In the Astronautics Department itself, the Cadet studies powered and free flight; reentry trajectories of ballistic missiles; space trajectories for satellites and interplanetary vehicles; and propulsion of nuclear and advanced air vehicles. The course is capped by a design problem for an intercontinental ballistic missile with specified accuracy, fuel, mass ratio, and range.

Our primary purpose in these courses is to develop in the Cadet an understanding of the Air Force's problems and potentialities in the aerospace age.

(Continued on following page)

Right, upper classman performs his duties with respect to lower classman in traditional service academy scene. Disciplined military life plays important Academy role.



An Academy lecture in American constitutional law some months ago. US senators, representatives sat in on this one as part of annual visit of Academy Board of Visitors.

• In the curriculum enrichment program, the Air Force Academy now provides increased opportunity for gifted students and for those who have completed college-level courses in other accredited institutions of higher learning. Under this program a student is permitted to meet prescribed curriculum requirements in any department by transfer of credits, validation examinations, or acceleration of prescribed courses. In the time thus made available, students may take substitute elective courses offered by any department. They are also given the opportunity each semester to take extra elective courses over and above the prescribed semester-hour load.

Enthusiastic response to these opportunities has been reflected in the growth of the completely voluntary student participation in the program. The over-all participation has grown from fifty-six percent in the academic year 1957-58 to seventy-eight percent during the academic year 1959-60. It is significant to note that participation in the enrichment program by Cadet intercollegiate athletes and Cadet officers runs as high or higher than that by the Cadet Wing as a whole.

Cadets are given an opportunity to follow an enrichment program in one of four areas: basic sciences, engineering sciences, public policy, and humanities.

In June 1960, seven Cadets became the first service academy graduates in history to be awarded a bachelor



of science diploma with a double major. Two of the seven double majors were in the fields of basic sciences and engineering sciences, the other five in engineering sciences and sciences with an aeronautical option. In addition, fifty-nine Cadets graduated with single majors. In order to be granted a "major," a Cadet must take an additional seventeen and one-half credit hours beyond the required curriculum with twice that amount required for a double major.

• In October 1959, the Air Force Academy considered an extension of the enrichment program to include a master's degree program for selected Cadets. Starting with the Class of 1963, the first full-strength class to enter the Academy, Cadets who have extensive college transfer or a validation credit, estimated presently at approximately fifty Cadets per class, will be given the opportunity to complete the requirements for the award of a master's degree during their four calendar years at the Academy. The actual award of a master's degree will depend upon congressional authorization and accreditation of the program by the North Central Association of Colleges and Secondary Schools. Initially, it is planned to award master's degrees in only two areas, astronautics and public policy.

• During this year of change, the Academy has also continued to place emphasis on its basic curriculum for officer education—the main function of the Academy. On the broad foundation thus provided, the enrichment program builds peaks of excellence. The inspiring results of this academic structure have been reflected in student performance in many standardized achievement tests. One such was the Graduate Record Examination given to the Class of 1959 after only three and one-half years at the Academy. This examination is usually given to students going on to graduate school, and taken at the end of four years of college.

In both the natural sciences and social sciences our (Continued on page 195)

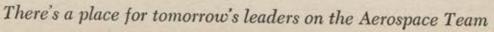
The Middle Years...

These are the careerbuilding years. These are the years when everything you do is weighed in the balance. The success you will merit in the later years is being built right now.

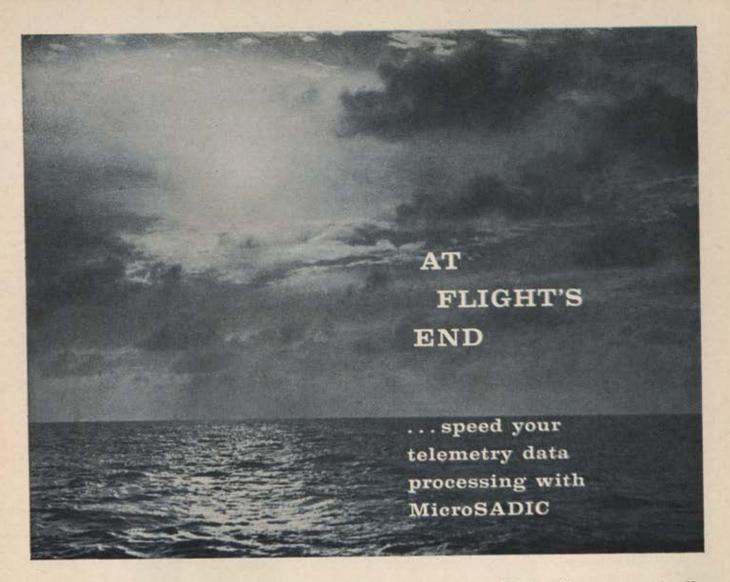
If you are one of those young officers selected for a full Air Force career, you will find these middle years a period of challenge-a period for great strides career-wise. You will be able to take advantage of the excellent opportunities for further education and training. Your advancement will depend on you. And during this time your family's financial status and general sense of security will be assured. Equally important to their happiness-they will be building lasting friendships.

Later a man looks back at these middle years. He questions if what he did with them was important and meaningful. As a comfortably retired Air Force senior officer you will recognize them for what they were...a preface to success.

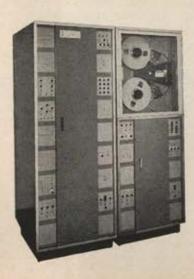








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Cadets made a mean score higher than all but one of the 187 schools taking the exams in 1958 and 1959. In the humanities the mean score of the Air Force Acad-

emy Cadets ranked twenty-first of 187.

Seven members of the Class of 1959 went directly to graduate school. One received a Rhodes Scholarship and is now at Oxford University. Four were selected to enter Massachusetts Institute of Technology and study astronautics. Another entered the California Institute of Technology and in June of this year was granted a master of science degree in aeronautics. The latest report on the four Academy graduates at MIT showed three with "A" averages and one with a "B" average.

I think the performance of the 1959 graduates in pilot training also provides a significant indication of the promise of Academy graduates. Of the 1959 class, 186 entered flying training. Of that number, only six and one-half percent were washed out. I consider this a remarkable figure, compared to the normal washout

rate of thirty-one percent.

It is too early to cite the performance of the Class of 1960. In June a total of 227 Cadets graduated. Of these, 218 were commissioned second lieutenants in the Regular Air Force, six elected to become US Marine Corps second lieutenants, and two were commissioned ensigns in the US Navy. One was graduated but not commissioned because he could not meet the physical requirements.

Of the 218 who became Air Force officers, 187 entered full-scale Air Force pilot training this summer, fifteen became nagivators in Air Force units, ten entered training in missile technology, and one took advanced navigation training. Four of the Cadets have been accepted for graduate study in astronautics in civilian colleges and universities under the Air Force

Institute of Technology program.

In March 1960, the Air Force Academy and Columbia University sponsored the second Air Force Academy Assembly, a student conference devoted to vital issues affecting national security. In attendance were eighty outstanding student delegates from thirty-four colleges and universities in nineteen states.

The topic of discussion at the Assembly was "The Representation of the United States Abroad." During the four-day meeting the delegates heard military and civilian speakers outstanding in the field of foreign affairs, and held small, intense group discussions.

Recently we have been experimenting with the operation of the Cadet Wing. Some control over Cadet social activities has been relaxed in an attempt to prepare Cadets for the responsibilities and privileges of an Air Force officer. At the same time, we are providing an increased number of opportunities for Cadet responsibility in leadership positions. Cadets administer their own command training program, serve on disciplinary boards, administer their own Honor Code, and, as upperclassmen, conduct instruction for the third- and fourth-class Cadets.

Some changes have also been made in the program of discipline and privileges for the fourth-class Cadets. Strict discipline and observance of fourth-class customs

still apply during the basic training in the first summer. From that point on it gradually tapers off to enable the Cadet to concentrate on his full academic and training schedule. By June Week at the end of his first year, the Cadet is recognized as an upperclassman, with the privileges and prerogatives that accompany that status.

The first football meeting with Army, which resulted in a 13-13 tie, highlighted the 1959-60 sports year at the Air Force Academy. It was a year in which Falcon teams, almost without exception, posted winning records. Academy teams take part in fifteen intercollegiate sports. This year, the Academy grid schedule will in-

clude the first game with Navy.

In this connection, mention should be made of the Air Force Academy Foundation, an organization of public-spirited private citizens. Its purpose is to provide the support normally made available by a college alumni group. In the case of the Academy, this includes financing of cultural and recreational facilities not available through funds appropriated by Congress.

The Foundation's plans include four major projects, two of which have been virtually completed. One is the Farish Memorial Recreational Area northwest of the Academy. The other completed project is the Eisenhower Golf Course which opened last fall on the

Academy grounds.

In the Foundation's future plans is an Air Force Memorial Center at the Academy, that will serve as the focal point for the Academy's 2,000,000 annual visitors. The Memorial Center will present displays and exhibits demonstrating the entire Air Force, its history, and its mission. The current, as well as the biggest, undertaking of the Foundation is the construction of a football stadium. The drive to raise \$3.5 million for the Falcon Stadium started on April 15 of this year and included an Air Force drive and a public campaign.

The construction program at the Air Force Academy passed the ninety-eight percent mark during fiscal year 1960. Only two major projects remain unfinished. Of these, the 135-bed hospital is nearing completion and should be ready for the first patient early next month. The contract for the Cadet chapel was awarded last month. We hope it will be finished by June Week 1961.

Another highlight of the year was the visit of the Board of Visitors in April. In its report to President Eisenhower, the Board strongly endorsed the program and facilities at the Academy and remarked on the high level of morale in the Cadet Wing. As in previous years they recommended congressional approval of an airfield at the Academy. In addition they indicated a need for a fieldhouse where the Cadet physical-education program could be conducted in inclement weather.

To conclude this discussion of the Air Force Academy in the past year, it is fitting to report that a new class entered earlier this summer. The Class of 1964 is the largest we have had to date, numbering 772, and it also boasted a higher average on the College Entrance Board Examinations than any previous classanother omen of continuing Academy success in preparing aerospace leaders for the free world,-END

Nuclear claws for a new breed



of Falcons

The Hughes Falcon GAR-11 is the first air-to-air guided missile to pack a nuclear punch.

Developed by Hughes, the "Nuclear Falcon" adds a major new weapon capability to our defense arsenal. A weapon that can down any bomber in the skies.

Because of its heavy blast intensity and high degree of accuracy, the "Nuclear Falcon" is particularly effective in high-speed closures against bombers carrying the deadliest of weapons.

The Falcon family has proven itself in operational service - every modern U.S. all-weather interceptor carries Falcon missiles. In simulated tactical firings Falcons have achieved unexcelled records for accuracy and reliability.

Like other Hughes weapons, systems and components, the Falcon is a product of Hughes' unique capabilities in virtually every area of advanced electronics. These include projects in space systems, airborne control systems, microwave communications, data processing and display systems, ASW systems, radar and IR detection systems-and many others.

These advancements in the state of the electronic art are based on foresight, imagination, and proven management capability. Their reliability and operational capabilities have earned them the confidence of users throughout the free world.



Larger than earlier Falcons, yet small considering its nuclear capability, the GAR-11 is 7 feet long, 11 inches in diameter and weighs slightly more than 200 pounds.

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General 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.

Latin America, a region of growing importance on the world stage, presents a

challenging field of operations for the . . .

CARIBBEAN AIR COMMAND

Maj. Gen. Leland S. Stranathan, USAF

COMMANDER, CAIRC

HE continuing aim of the USAF in Latin America is to assist the nations of the area in the training of their air forces, utilizing USAF methods and procedures. In addition, there is a continuing effort toward the standardization of military equipment within the Western Hemisphere.

This is the mission of the Caribbean Air Command. It is pursued through USAF Training Missions throughout Latin America and USAF's School for Latin America at Albrook AFB, C. Z., headquarters of the command.

The Training Mission system consists of fourteen Missions and one air section of a joint commission accredited to the government of Brazil. They are present in all countries south of the border with the exception of Costa Rica, Cuba, Dominican Republic, Mexico, and Panama.

The USAF Training Missions provide assistance and advice to the host air forces. Close identification between military and commercial aviation in some countries, and the need for expansion and modernization of both military and commercial air facilities, have in addition tended to modify the original intent of the Missions.

Through its response to requests for assistance in airport planning, development and standardization of communications systems, and training of national airline personnel, the Caribbean Air Command has made a very real contribution to the improvement of transportation throughout South and Central America.

During USAF's recent Chilean airlift, the Missions in Peru and Chile also made significant contributions to the success of the operation. Their on-the-spot locations, their experienced personnel, and their radio communications capabilties enabled them to serve an effective liaison function.

As guests of the host governments, Mission per-

sonnel work closely with their host government counterparts and mingle freely with civilians of the country. The nature of the objectives assigned to the Missions requires a high degree of cooperation and mutual trust. For that reason, personnel selected for Training Mission duty are screened not only for their technical skills but for their ability to live in a foreign country as good representatives of the United States. The USAF Mission System has, we believe, been successful in its objective of winning friends for the United States and the US Air Force.

The command operates the School for Latin America in support of the Missions. The school provides technical training for Latin American officers and airmen. The school has graduated approximately 4,600 students representing all of the Latin American countries. While the school supports the objectives of the Missions, entrance is not limited to those countries in which the Missions are located. Mexico and Panama, for example, have frequently utilized the training advantages offered by the school.

The school offers instruction in some eighteen technical fields, based on the training requirements established by the chiefs of the Training Missions. The curriculum is under constant revision in order to ensure that it is kept abreast of needs. In line with that policy, the school has inaugurated a new program to provide communications and electronics training from basic to highly specialized. Elaborate laboratories and training facilities have been installed for the program.

This new program has attracted favorable reactions throughout Latin America. A shortage of highly skilled personnel in these areas has been a growing problem.

In addition to the training offered by the School for Latin America, the Caribbean Air Command assists Latin American air forces through a program which

(Continued on following page)



The Aeronautical Chart and Information Office at Albrook AFB, Canal Zone, which is run by MATS personnel, makes up flight charts, maps covering all of Latin America.



School for Latin America offers instruction in classes, shops, hangars. Above, practical instruction is given to Latin American airmen by bilingual Air Force instructor.



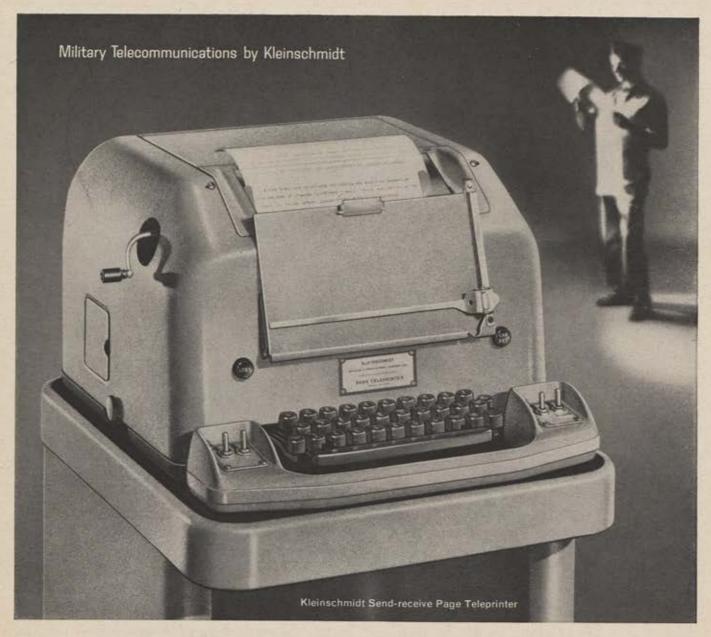
One Caribbean Air Command responsibility is to provide air traffic control in Panama area. Here members of MATS AACS squadron at Albrook man radio, air control boards.

provides for training at USAF facilities Stateside. Every year, a number of officers and airmen are sent to the US for advanced training in flying, technical fields, administration, aeromedical training, and command and staff schooling.

The Caribbean Air Command is responsible for the coordination of all US civil and military search and rescue operations throughout the land mass of Latin America excluding Mexico, an area of approximately 7,000,000 square miles, and for humanitarian flights within a radius of 100 miles of Albrook AFB. The SAR operations are conducted with the cooperation of other US agencies in Latin America and in many cases with the assistance of the national air forces.

The Tropic Survival School at Albrook is responsible for providing flying personnel with survival techniques and training in tropical areas. The school has now extended its training to include selected members of Panama's Guardia Nacional, the national police; students from the School for Latin America; and other personnel from the Latin American Air Forces on a request basis.

Through its diverse Training Mission assignments, the Caribbean Air Command makes a tangible contribution to the strengthening of hemispheric friendship, solidarity, and military might in a time of world crisis that simmers in Latin America as elsewhere.—End



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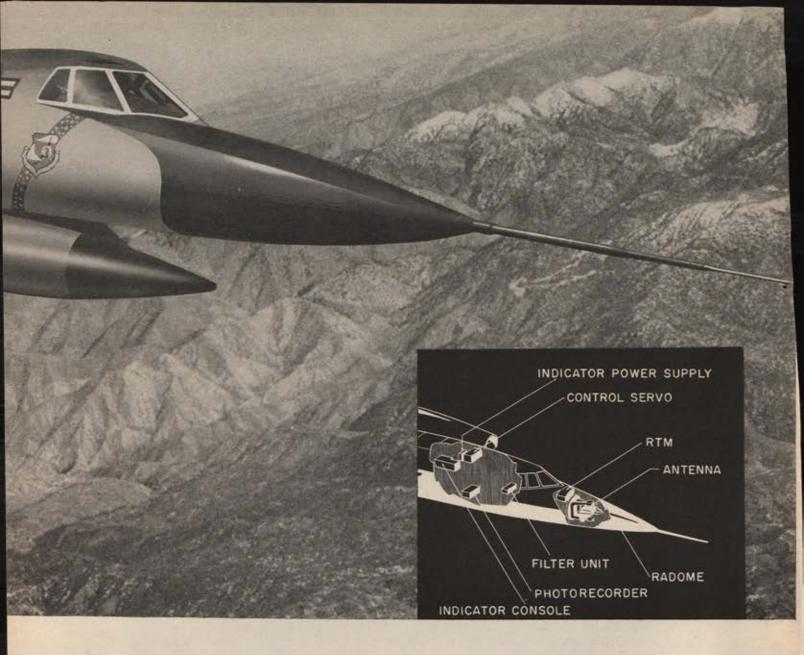


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Radar and Boeing B-52's Search Radar.

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Raytheon's systems approach to cooling, weight and package problems assures that this equipment meets or exceeds the most advanced requirements for operational performance and reliability.

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High-speed networks that link command control computers require facilities to assemble and direct masses of data.

Time is important. IBM data communication capabilities are evident in systems such as SABRE, a real-time activity control network; and INFORMER, a rugged, mobile field control center. These systems employ communication techniques involving real-time data channels, data conversion and message switching.

Data Processing and Control

Information must be quickly reduced and refined through computer processing to prepare it for command decision. Here again time is paramount. IBM has solved special data processing problems with standard systems such as the 709, installed for space vehicle orbit computations, and advanced systems such as the AN/FSQ 31V, in production for the Strategic Air Command Control System.

...all systems capabilities of IBM

IBM solutions to command control requirements range in scope from antisubmarine warfare studies to Air Force control systems like project 473L, and from the compact INFORMER to STRETCH, the world's largest computer. From study to implementation, IBM has proved its ability to solve the problem of time in all three elements of command control systems.

Federal Systems Division, 326 East Montgomery Avenue, Rockville, Maryland

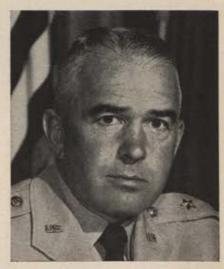
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AIR FORCE ACCOUNTING AND FINANCE CENTER

Brig. Gen. Paul W. Scheidecker, USAF

COMMANDER, AFAFC



General Scheidecker assumed command of the AFAFC during the past year after four years as ADC Comptroller. 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, now AMC Comptroller, at the AFAFC.

HE AIR Force Accounting and Finance Center is headquarters for USAF's worldwide fiscal network. As such, it is primarily a service organization—one whose technical supervision of accounting and finance matters supports America's global aerospace power.

Through their major air commanders, field accounting and finance officers everywhere report to the Center. It is here that accounting figures are assembled to give a meaningful picture of the financial status of the Air Force—so that important decisions can be made by the Air Staff to meet Air Force requirements throughout the world.

Developments during FY 1960 in the technical supervision of the Air Force fiscal network included:

 Project MAFR (Merged Accountability and Fund Reporting), a significant systems development whereby the quality of reporting disbursement data was improved.



Computers and other machines perform essential services at AFAFC. Here staff member operates a sorting machine that separates dependents' checks into various groups.

 Three major projects designed to reduce accounting costs as well as to alleviate hardships caused by overpayments:

(1) Hawkeye—to achieve complete and coordinated adjustment action in the individual accounts of active, required, and separated Air Force members.

(2) Periscope—to establish and maintain an Air Force-wide accounting and finance quality examination program.

(3) Hotline—to reduce the amount of time used to feed quality data on military pay records back to the field so that they in turn will know what action to take to prevent errors.

 Extensive studies of the capabilities and limitations of ADPS (Automatic Data-Processing System) related to Center requirements resulted in the decision to modernize the Center's data-processing capability.

AFAFC legal staff members continued to participate in the development of new legislation and the modification of existing legislation relative to accounting and finance.

The Center made substantial progress in the quality and timeliness of service to active and retired Air Force members and their dependents, other allottees, the Air Force as a whole, and other government agencies.

Management techniques employed at the Center through quality examination, financial-reports compilation, claims adjudication, and advisory services are all vital tools of the Air Force to control and ensure that Air Force monies are appropriately used and accounted for.

Finally, aiding our Air Force members in the handling of their family responsibilities, the Center accomplishes its allotments, retired pay, and claims adjudication smoothly and effectively.—End





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It's a helicopter from a proven line of workhorses. For instance, its sister ship, the Hiller 12 E, rewrote aviation records by landing and picking up payload at 18,000 ft. on Mt. McKinley, Alaska.

It's this kind of performance that gives the E4 helicopter its wide margin of safety.

It's the lowest cost 4-place helicopter available.

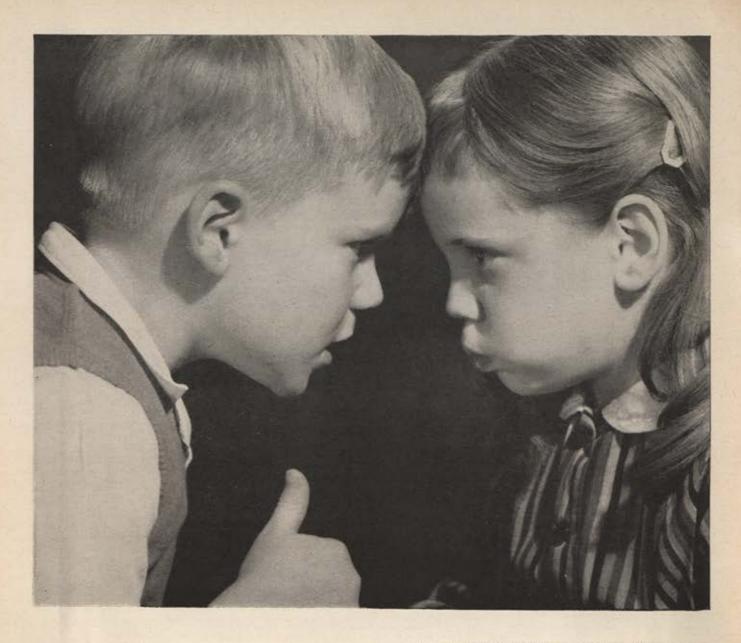
The Hiller E4 - in production, and ready now for USAF missile site support.

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General Allen has been Commander of Headquarters Command since last July. 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 few B-17s that got airborne from Hickam Field on December 7, 1941, to search for the attackers.

President Eisenhower, Prime Minister Macmillan,

President de Gaulle,

Premier Khrushchev, and countless others stepped

onto the welcome mat here at . . .

HEADQUARTERS COMMAND

Maj. Gen. Brooke E. Allen, USAF

COMMANDER, HEADQUARTERS COMMAND

EADQUARTERS Command is the only major Air Force command that performs one of its primary missions with a welcome mat.

Countless foreign dignitaries cross the threshold into America each year with aerial arrival at the command's Andrews AFB near Washington, D. C. Among those who flew into Andrews this past year were Soviet Premier Khrushchev, British Prime Minister Macmillan, and French President de Gaulle. President Eisenhower also flew in and out of Andrews on trips abroad this year.

The command handles the USAF share of arrival preparations and provides a suitable welcome. The guest usually proceeds from Andrews to the capital—in the case of a top-level personage, in a motorcade.

Headquarters Command's task does not usually end with departure of the guest from the base. The USAF Band and Drill Team, both under the command, as well as security personnel, generally take part in welcoming ceremonies after a major guest has reached the District of Columbia.

As the pace of foreign affairs has stepped up in recent years, so has the VIP traffic in and out of Andrews. Handling it sometimes seems like a full-time job in itself. But actually, this is only one duty of the multirole outfit called Headquarters Command. Others range from ballooning to symphony concerts.

Here is a list of the command's main responsibilities:

 Supply aircraft for and supervise administrative and proficiency flying in the Washington area.

 Provide administrative and logistics support for Headquarters USAF and nonself-supporting Air Force units in the vicinity.

 Operate the 1020th Special Activities Wing, Fort Myer, Va., to which are assigned USAF Military Missions throughout the world.

Perform disbursing services for Headquarters

USAF, and statistical services for assigned Air Force units.

 Organize, train, and maintain a unit to represent the Air Force at ceremonial and commemorative functions. This includes the band and drill team.

 Act as "housekeeper" for airmen on duty within the Military District of Washington, providing housing and dining facilities.

 Provide medical services for area armed forces personnel. The USAF Hospital at Andrews falls within the command.

Conduct and support AF balloon operations.

Monitor a reserve training program.

 Stand ready to participate, through its hospital and trained personnel, in relief of disasters and other domestic emergencies.

Bolling AFB at the edge of downtown Washington is command headquarters. It and Andrews are the major command facilities.

Headquarters Command has administrative control of aircraft spread around the world. Personnel assigned to military missions, MAAG groups, joint staff activities, and such wherever they are around the globe—including remote locations in the Far East and Africa—use command planes to meet their flying requirements.

The band, under command of Col. George S. Howard, includes the Symphony Orchestra, the Drum and Bugle Corps, the Airmen of Note, and the Singing Sergeants. These groups and the USAF Drill Team perform throughout the year for the general public here and abroad as well as for service activities. The Symphony Orchestra performs outdoor concerts in Washington through the summer months. In this connection, the command also operates a bandsman school.

Last year Headquarters Command could report in this space that the USAF Hospital, Andrews, had been

(Continued on following page)







Headquarters Command's mission in support of flying by USAF aviators in capital area requires many hours of work on aircraft. Here, some of it at Bolling AFB on Potomac.

President Eisenhower and Soviet Premier Khrushchev view US honor guard upon Russian leader's arrival at Andrews AFB near Washington on visit to this country last year.

Left, a formal shot of the US Air Force Band in familiar locale in nation's capital. Band represents USAF at many functions in Washington, as well as traveling over globe.

set up in 1958 and was a proud addition to the command and Air Force medicine. At present, we believe it is becoming one of the leading hospitals in the Air Force.

Major news for the command in this past year has been the progress of construction and expansion work going on at Andrews. In the not-too-distant future, the base will take over military flying now assigned to Bolling, the Anacostia Naval Air Station that adjoins Bolling, and Washington's National Airport,

Andrews is also the home of the Air Research and Development Command, perhaps the most extensive organization of its kind in the world.

USAF's 1110th Balloon Squadron, only organization of its type in the service, is located at Goodfellow AFB, Tex. It is under direct Headquarters Command control.

One of the command's proudest activities takes place each year at Andrews. It is the Armed Forces Day exhibit and demonstration for the capital area. This year several hundred thousand persons swarmed to the base on May 14 and 15 to view a giant collection of military hardware and the use of same in demonstrations by each service.

Col. William T. Smith, USAF, is Commander of the 1001st Air Base Wing, responsible for operations of Andrews. Col. E. B. Miller, USAF, heads Bolling's 1100th Air Base Wing, and Col. George W. Johnson the 1100th Support Group. Col. Lawrence P. Dash is chief of the 1020th USAF Special Activities Wing.—End



Avco/Crosley

Crosley

creates new aerial highways

Stacked aircraft in the skies over the nation's busy airports may soon become a problem of the past. Avco's Crosley Division, working with the U.S. Air Force's Cambridge Research Center, has developed a new, improved system for directing high-density air traffic accurately and reliably.

This unique solution to the air traffic control problem is *Volscan*, a ground-operated electronic system that employs surveillance radar and vectoring techniques in scheduling aircraft to touchdown. It can work at any airport, with any aircraft carrying a two-way radio.

With Volscan, a crowd of randomly arriving aircraft can be converted into an orderly, safe procession. Not only does Volscan enhance safety in the air, but it greatly increases the traffic-handling capability of any airport. The flight of as many as 24 aircraft can be directed at one time with Volscan and up to 120 landings and take-offs—one every 30 seconds—can be made in an hour.

Volscan has undergone complete systems testing, and is about to be installed at Atlantic City for careful and extensive field testing under direction of the Federal Aviation Agency and the U.S. Air Force.

For further information on Volscan write: Director of Marketing, Crosley Division, Avco Corporation, Cincinnati 25, Ohio.



OFFICE of the SECRETARY of the AIR FORCE



Secretary of the Air Force Dudley C. Sharp



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Deputy for Requirements Review Philip F. Hilbert



Ass't Secretary of the Air Force, Financial Management Lyle S. Garlock



Ass't Secretary of the Air Force, Research and Development Courtland D. Perkins



Ass't Secretary of the Air Force, Materiel Philip B. Taylor



Special Ass't for Installations John M. Ferry



Special Ass't for Manpower, Personnel, and Reserve Forces Lewis S. Thompson



Administrative Ass't John J. McLaughlin



General Counsel, Department of the Air Force Max Golden



Office of Legislative Liaison Director Maj. Gen. Thomas C. Musgrave, Jr.



Office of Information Services
Director
Maj. Gen. Arno H. Luehman



Air Force Commanders in Special Assignments



Chairman of the Joint Chiefs of Staff Gen. Nathan F. Twining



North American Air Defense Command Commander in Chief Gen. Laurence S. Kuter Hq. Ent AFB, Colo.



Supreme Allied Commander, Europe Gen. Lauris Norstad Hq. Paris, France



Commander in Chief Lt. Gen. Frank A. Armstrong Hq. Elmendorf AFB, Alaska



Alaskan Command



Scientific Advisory Board Chairman Lt. Gen. Donald L. Putt, USAF (Ret.)



Ass't Chief of Staff, Reserve Forces Maj. Gen. Robert E. L. Eaton

Guided Missiles Brig. Gen. Milton B. Adams

Ass't Chief of Staff,

Intelligence



Chief of Staff Gen. Thomas D. White



Vice Chief of Staff Gen. Curtis E. LeMay



Ass't Vice Chief of Staff Maj. Gen. Richard M. Montgomery



Chief Scientist, USAF Or. Alexander H. Flax



Director of **Administrative Services** Col. James L. Tarr



Secretary of the Air Staff Col. John A. Brooks, III



Chief, Operations Analysis Carroll L. Zimmerman



The Surgeon General Maj. Gen. Oliver K. Niess



The Inspector General Lt. Gen. Joseph F. Carroll



The Judge Advocate General Maj. Gen. Albert M. Kuhfeld

(As of August 15, 1960)

An AIR FORCE Magazine Photochart

The DEPUTY CHIEFS of STAFF



Comptroller of the Air Force Deputy Comptroller of the Lt. Gen. William D. Eckert



Air Force William B. Petty



Ass't Comptroller of the Air Force Maj. Gen. Albert T. Wilson



Auditor General Maj. Gen. William P. Farnsworth



Director of Accounting and Finance Brig. Gen. Joseph F. Delaney



Deputy Chief of Staff, Development Lt. Gen. Roscoe C. Wilson



Ass't Deputy Chief of Staff Maj. Gen. Victor R. Haugen



Ass't DCS for **Nuclear System** Brig. Gen. Irving L. Branch



Director of **Development Programming** Col. John R. V. Dickson



Director of Development Planning Maj. Gen. William B. Keese



Deputy Chief of Staff, Materiel Lt. Gen. Mark E. Bradley, Jr.



Ass't Deputy Chief of Staff Maj. Gen. William O. Senter



Ass't for Mutual Security Maj. Gen. Donald R. Hutchinson



Director of Logistics Plans Brig. Gen. Paul L. Barton



Director of Maintenance Engineering Maj. Gen. T. Alan Bennett



Deputy Chief of Staff, Lt. Gen. Dean C. Strother



Ass't Deputy Chief of Staff



Ass't for Weather



Director of Civil Engineering



Director of Ass't Deputy Chief of Stan

Ass Clor Measure, Jr. Maj. Gen. Augustus M. Minton

Telecommunications

Maj. Gen. Harold W. Grant



Deputy Chief of Staff, Lt. Gen. Truman H. Landon



Chief of Air Force Chaplains Maj. Gen. Terence P. Finnegan



Director of Civilian Personnel John A. Watts



Director of Military Personnel Maj. Gen. Albert P. Clark



Director of Personnel Planning Maj. Gen. Elvin S. Ligon



Deputy Chief of Staff, Plans and Programs Lt. Gen. John K. Gerhart



Ass't Deputy Chief of Staff Maj. Gen. Cecil H. Childre



Ass't for Coordination Brig. Gen. Noel F. Parrish



Ass't for National Security Council Affairs Col. John L. Weber



Ass't for Western Hemisphere Affairs Maj. Gen. Thomas C. Darcy



Director of Statistical Services Col. George H. Krieger



Director of Budget

Maj. Gen. Robert J. Friedman

Col. Elbert D. Reynolds





Director of Research and Technology



Director of Systems Development Brig. Gen. Ralph L. Wassell Maj. Gen. Marvin C. Demler Col. Willis F. Chapman



Foreign Developments





Oirector of Materiel Programs Director of Procurement Brig. Gen. Carl W. Andrews and Production Col. Marion C. Smith



Director of Supply and Services Brig. Gen. Melvin F. McNickle Brig. Gen. Earl C. Hedlund (As of September 1, 1960)



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(As of August 15, 1960)

Director of Transportation



Director of Director of Director of Manpower and Organization Operational Requirements



Maj. Gen. Thomas J. Gent, Jr. Maj. Gen. Bruce K. Holloway



Director of Operations



Director of Personnel Procurement and Training



Women in the Air Force Director Maj. Gen. James V. Edmundson Col. Emma Jane Riley



Director of Plans Director of Programs Maj. Gen. Hewitt T. Wheless Maj.Gen. Prescott M. Spicer



The MAJOR



Air Defense Command Lt. Gen. Joseph H. Atkinson Hq. Ent AFB, Colo.



Alaskan Air Command Maj. Gen. Conrad F. Necrason Hq. Elmendorf AFB, Alaska



Strategic Air Command Commander in Chief Gen. Thomas S. Power Hq. Offutt AFB, Neb.

United States Air Forces

in Europe Commander in Chief

Air Training Command Lt. Gen. James E. Briggs Hq. Randolph AFB, Tex.



85 Caribbean Air Command Maj. Gen. Leland S. Stranathan Hg. Albrook AFB, Balboa, C. Z.



Hq. (Rear), Lindsey Air Station, Wiesbaden, Germany Hq.(ADVON), Ramstein AB, Germany



Air Research and Development Command Lt. Gen. Bernard A. Schriever Hq. Andrews AFB, Md.



Air University Lt. Gen. Walter E. Todd Hq. Maxwell AFB, Ala.



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United States Air Force Academy Superintendent Maj. Gen. William S. Stone Colorado Springs, Colo.



Tactical Air Command Gen. Frank F. Everest Hq. Langley AFB, Va.

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Air Materiel Command Gen. Samuel E. Anderson Hq. Wright-Patterson AFB, Ohio

Military Air Transport Service Lt. Gen. Joe W. Kelly, Jr. Hq. Scott AFB, III.

Headquarters Command Maj. Gen. Brooke E. Allen Hq. Bolling AFB, Washington, D. C.



Air Force Accounting and Finance Center Brig. Gen. Paul W. Scheidecker



USAF Security Service Maj. Gen. Millard Lewis Hq. San Antonio, Tex.



Continental Air Command Lt. Gen. William E. Hall Hq. Mitchel AFB, N. Y.

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2d Air Force

8th Air Force



15th Air Force Lt.Gen. John P. McConnell Lt. Gen. Walter C. Sweeney, Jr. Lt. Gen. Archie J. Old, Jr. Hq. Barksdale AFB, La. Hq. Westover AFB, Mass. Hq. March AFB, Calif.



Maj. Gen. John D. Ryan Hq. Torrejon AB, Spain



1st Missile Division



3d Air Division



7th Air Division Maj. Gen. David Wade Maj. Gen. John M. Reynolds Maj. Gen. Charles B. Westover Hq. Vandenberg AFB, Calif. Hq. Andersen AFB, Guam Hq. South Ruislip, England





3d Air Force



17th Air Force Maj. Gen. Ernest Moore Maj. Gen. Henry R. Spicer Hq. South Ruislip, England Ramstein AB, Germany



322d Air Division (Combat Cargo) Col. Tarleton H. Watkins



5th Air Force

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13th Air Force



315th Air Division Lt. Gen. Robert W. Burns Maj Gen.ThomasS.Moorman Brig.Gen.Theodore G.Kershaw





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19th Air Force

9th Air Force 12th Air Force Maj. Gen. David W.Hutchison Maj.Gen.Karl Truesdell, Jr., Maj. Gen. Maurice A. Preston Hq. Shaw AFB, S. C. Hq. Waco, Tex. Hq. Seymour Johnson AFB, N. C.



1st Reserve Region Col. Charles W. Bicking Hq. Mitchel AFB, N. Y.



2d Reserve Region



3d Reserve Region Brig. Gen. Felix L. Vidal Maj. Gen. Chester E. McCarty Hq. Andrews AFB, Md. Hq. Robins AFB, Ga.



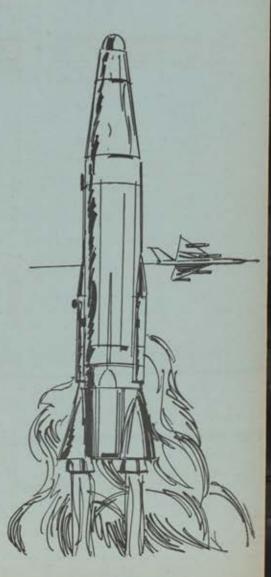
114 4th Reserve Region



5th Reserve Region Brig. Gen. Williamk.Skaer Maj.Gen.Harold R.Maddux Hq. Randolph AFB, Tex. Hq. Selfridge AFB, Mich. (As of September 6, 1960)



6th Reserve Region Maj. Gen. Sory Smith Hq. Hamilton AFB, Calif.



LEADERS OF THE AIR FORCE

Chief of the US Highest Rank Air Arm Attained		Title as Commander	Held Office From-to		
James Allen	Brig. Gen.	Chief Signal	Aug. 1, 1907		
		Officer	Feb. 13, 1913		
George P. Scriven	Brig. Gen.	Chief Signal	Feb. 13, 1913		
		Officer	Feb. 13, 1917		
George O. Squier	Maj. Gen.	Chief Signal	Feb. 14, 1917		
and the second second second	110000 1100000	Officer	May 20, 1918		
William L. Kenly	Maj. Gen.	Chief, Div. of	May 20, 1918		
	100000000000000000000000000000000000000	Military Aeronautics	Dec. 22, 1918		
Charles T. Menoher	Maj. Gen.	Chief of the	Dec. 23, 1918		
	AWARE	Air Service	Oct. 4,1921		
Mason M. Patrick	Maj. Gen.	Chief of the	Oct. 5, 1921		
		Air Service	July 1, 1926		
		Chief of the	July 2, 1926		
		Air Corps	Dec. 12, 1927		
James E. Fechet	Maj. Gen.	Chief of the	Dec. 14, 1927		
	100000000000000000000000000000000000000	Air Corps	Dec. 19, 1931		
Benjamin D. Foulois	Maj. Gen.	Chief of the	Dec. 19, 1931		
	20040000000	Air Corps	Dec. 21, 1935		
Oscar Westover	Maj. Gen.	Chief of the	Dec. 22, 1935		
	TANK COUNTY	Air Corps	Sept. 21, 1938		
Henry H. Arnold	Gen. of the	Chief of the	Sept. 29, 1931		
	Air Force	Air Corps	June 30, 1941		
	*************	Chief of the	June 30, 1941		
		Army Air Forces	Mar. 8, 1942		
		Cmdg. Gen.,	Mar. 9, 1942		
		Army Air Forces	Feb. 28, 1946		
Carl Spaatz	General	Cmdg. Gen.,	Mar. 1, 1946		
		Army Air Forces	Sept. 25, 1947		
		Chief of Staff,	Sept. 26, 1947		
		USAF	Apr. 30,1948		
Hoyt S. Vandenberg	General	Chief of Staff,	Apr. 30,1948		
	- X	USAF	June 30, 1953		
Nothon F. Twining	General	Chief of Staff,	June 30, 1953		
	400	USAF	June 30, 1957		
Thomas D. White	General	Chief of Staff,	July 1, 1957		
		USAF	present		

*On this date,	Aeronoutics	wos	removed	from	Signal	Corps	jurisdiction.
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Secr	etar	V of	De	fense

James V. Forrestal	Sept. 18, 1947-March 27, 1949
Louis Johnson	March 28, 1949-Sept. 19, 1950
George C. Marshall	Sept. 21, 1950-Sept. 12, 1951
Robert A. Lovett	Sept. 17, 1951-Jan. 20, 1953
Charles E. Wilson	Jan. 28, 1953-Oct. 8, 1957
Neil H. McElroy	Oct. 9, 1957-Dec. 1, 1959
Thomas S. Gates, Jr.	Dec. 2, 1959—

Assistant Secretary of War for Air

F. Trubee Davison	July 16, 1926-March 2, 1933
Robert A. Lovett	April 10, 1941-Dec. 8, 1945
Stuart Symington	Jan. 31, 1946-Sept. 17, 1947

Secretary of the Air Force

Stuart Symington	Sept. 18, 1947-April 24, 1	950
Thomas K. Finletter	April 24, 1950-Jan. 19, 1	953
Harold E. Talbott	Feb. 4, 1953-Aug. 1, 1	955
Donald A. Quarles	Aug. 15, 1955-May 1, 1	957
James H. Douglas	May 1, 1957-Dec. 10, 1	959
Dudley C. Shorp	Dec. 11, 1959-	

Under Secretary of the Air Force

Arthur S. Barrows	Sept. 26, 1947-April 21, 1950
John A. McCone	June 15, 1950-Oct. 9, 1951
Roswell L. Gilpatric	Oct. 29, 1951-Feb. 15, 1953
James H. Douglas	April 3, 1953-May 1, 1957
Malcolm A. MacIntyre	June 5, 1957-July 3, 1959
Dudley C. Sharp	Aug. 3, 1959-Dec. 10, 1959
Dr. Joseph V. Charyk	Jan. 28, 1960-

Assistant Secretary, Financial Management

Eugene M. Zuckert	Sept. 26, 1947-Feb. 24, 1952
James T. Hill	July 5, 1952-Jan. 20, 1953
H. Lee White	Feb. 17, 1953-July 2, 1954
Lyle S. Garlock	Aug. 23, 1954-

Assistant Secretary, Materiel

Cornelius V. Whitney Sept. 2	6, 1947	-April	11,	1949
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Horold C. Stuart	Oct. 17, 1949-May 24, 1951
Roswell L. Gilpatric	May 25, 1951-Oct. 29, 1951
Edwin V. Huggins	Nov. 29, 1951-Jan. 20, 1953
Roger Lewis	April 3, 1953-Sept. 30, 1955
Dudley C. Sharp	Oct. 1, 1955-Jan. 31, 1959
Philip B. Taylor	

Assistant Secretary, Research & Development

Trevor Gordner	March 1, 1955-Feb. 11, 195	56
Richard E. Horner	Feb. 20, 1956-May 31, 195	59
Dr. Joseph V. Charyk	June 10, 1959-Jan. 27, 196	60
Dr. Courtland D. Perkins	April 25, 1960-	

Assistant Secretary, Manpower, Personnel, & Reserve

Forces					
David H. Smith	 Oct.	19,	1954-Jan.	31,	1959

Special Assistant, Manpower, Personnel & Reserve Forces

Chief Scientist

Dr. Louis N. Ridenour	Sept. 11, 1950-Aug. 31, 1951
	Dec. 12, 1952-June 30, 1953
	Feb. 1, 1954-Jan. 31, 1955
	Feb. 1, 1955-July 31, 1956
	Aug. 1, 1956-July 31, 1957
	Sept. 1, 1957-Dec. 31, 1958
	Jan. 1, 1959-June 9, 1959
Dr. Alexander H. Flax	

Deputy Chief of Staff, Plans and Programs

Lt. Gen. John K. Gerhart July 1, 1957-

Deputy Chief of Staff, Operations

Lt. Gen. Lauris Norstad	Oct. 10, 1947-March 1, 1950
Lt. Gen. Idwal H. Edwards	March 1, 1950-July 27, 1951
Lt. Gen. Thomas D. White	July 29, 1951-June 30 ,1953
Lt. Gen. Earle E. Partridge	June 30 ,1953-March 25, 1954
Lt. Gen. Frank F. Everest	April 1, 1954-June 30, 1957
Lt. Gen. William H. Turner	July 1, 1957-June 30, 1958
Lt. Gen. Dean C. Strother	July 1, 1958-

Deputy Chief of Staff, Personnel

Lt. Gen. Idwal H. Edwards	Oct. 10, 1947-March 1, 1950
Lt. Gen. Richard E. Nugent	March 1, 1950-Aug. 31, 1951
Maj. Gen. Emery S. Wetzel	Aug. 31, 1951-Oct. 29, 1951
Lt. Gen. Laurence S. Kuter	Oct. 29, 1951-April 14, 1953
Lt. Gen. Emmett O'Donnell, Jr.	May 1, 1953-July 31, 1959
It Gen Trumon H Landon	Aug. 1. 1959—

Deputy Chief of Staff, Materiel

Lt. Gen. Howard A. Craig	Oct. 10, 1949-Sept. 15, 1949
Maj. Gen. Kenneth B. Wolfe.	Sept. 16, 1949-June 30, 1951
Maj. Gen. Carl A. Brandt	July 1 ,1951-July 15, 1951
Lt. Gen. Orval R. Cook	July 16, 1951-March 31, 1954
Lt. Gen. Bryant L. Boatner	April 1, 1954-May 9, 1955
Lt. Gen. Clarence S. Irvine	May 10, 1955-April 30 ,1959
Lt. Gen. Mark E. Bradley, Jr.	May 1, 1959—

Deputy Chief of Staff, Development

Maj. Gen. Gordon P. Saville	Jan. 23, 1950-July 2, 1951
Maj. Gen. Donald L. Putt	July 2, 1951-Nov. 13, 1951
Lt. Gen. Laurence C. Craigie	Nov. 14, 1951-April 14, 1954
Lt. Gen. Donald L. Putt	April 15, 1954-June 30, 1958
Lt. Gen. Roscoe C. Wilson	July 1, 1958—

Judge Advocate General

Maj. Gen.	Reginald C	. Harmon	Sept. 18, 1948-Mc	arch 31, 1960
Maj. Gen.	Albert M. K	Suhfield	April 1, 1960-	Security of the second

Surgeon General

Maj. Gen. M. C. Grow	. Oct. 10, 1947-Nov. 30, 1949
Maj. Gen. Harry G. Armstrong	Dec. 1, 1949-July 1, 1954
Maj. Gen. Dan C. Ogle	. July 15, 1954-Nov. 30, 1958
Mai, Gen. Oliver K. Niess	Dec. 1, 1958-

Chief of Chaplains

Maj.	Gen.	Charles I. Carpenter	Dec. 26, 1945-Aug. 20,	1958
Mai.	Gen.	Terence P. Finnegan	Aug. 21, 1958-	

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Lo	mp	tro	ler

Lt. Gen. Edwin W. Rawlings	Nov. 15,	1946-July	27.	1951
It. Gen. Charles B. Stone, III	July 28,	1951-Dec.	14.	1955
Lt. Gen. Manuel J. Asensio	Dec. 15,	1955-Jan.	31,	1960
Lt. Gen. William D. Eckert	Feb.	1, 1960-	Heli	

Inspector General

Maj. Gen. Hugh J. Knerr	Jan. 2, 1948-Sept. 16, 1949
Lt. Gen. Howard A. Craig	Sept. 16, 1949-July 30, 1952
Lt. Gen. Bryant L. Boatner	July 31, 1952-March 31, 1954
Lt. Gen. Truman H. Landon	April 1, 1954-June 20, 1956
Lt. Gen. Elmer J. Rogers, Jr.	June 21, 1956-Feb. 1, 1960
Lt. Gen. Joseph F. Carroll	Feb. 2, 1960—

Strategic Air Command (SAC)

Established March 21, 1946.		
Gen. George C. Kenney	April 21, 1946-Oct. 15	5. 1948
Gen. Curtis E. LeMay	Oct. 16, 1948-June 30	1957
Gen. Thomas S. Power	July 1, 1957—	A CONTRACT

Air Defense Command (ADC)

Established March 21, 1946; reassigned	to Continental Air Command,
Dec. 1, 1948; discontinued July 1, 1950	and reestablished as a major
air command Jan. 1, 1951.	The contract of the second

Lt. Gen. George E. Stratemeyer	March 1946-April 1949
Maj. Gen. Gordon P. Saville	Sept. 1949-Dec. 1950
Lt. Gen. Ennis C. Whitehead	Jan. 1, 1951-July 31, 1951
Gen. Benjamin W. Chidlaw	Aug. 1, 1951-May 31, 1955
Maj. Gen. Frederic H. Smith, Jr.	June 1, 1955-July 19, 1955
Gen. Earle E. Partridge	July 20, 1955-Sept. 16, 1956
Lt. Gen. Joseph H. Atkinson	Sept. 17, 1956-

Tactical Air Command (TAC)

Established March 21,	1946; reassigned to Continents	Air Command,
Dec. 1, 1948; relieved	of assignment to Continental A	ir Command and
designated a major air	command, Dec. 1, 1950.	

designated a major air command, Dec	. 1, 1950.	
Lt. Gen. E. R. Quesada	March 21, 1946-Nov. 23,	1948
Maj. Gen. Robert M. Lee	Dec. 24, 1948-June 20.	1950
Maj Gen. Glenn O. Barcus	July 17, 1950-Jan. 25.	1951
Gen. John K. Cannon	Jan. 25, 1951-March 31.	1954
Gen. O. P. Weyland	April 1, 1954-July 31.	1959
Gen. Frank F. Everest	Aug. 1. 1959-	

Air Training Command (ATC)

Established as Army Air Forces Training redesignated as Air Training Command,	G Command, July 7, 1943, and July 1, 1946.
Lt. Gen. John K. Cannon	April 1946-Oct, 15, 1948
Lt. Gen. Robert W. Harper	Oct. 15, 1948-June 30, 1954
Maj. Gen. Glenn O. Barcus	July 1, 1954-July 25, 1954
Lt. Gen. Charles T. Myers	July 26, 1954-July 31, 1958
Lt. Gen. Frederic H. Smith, Jr	Aug. 1, 1958-July 31, 1959
Lt. Gen. James E. Briggs	Aug. 1, 1959—

Air Research & Development Command (ARDC)

Established as Research and Development Command, Jan. 23, 1950;
radainated at Ali Development Command, Jan. 23, 1930;
redesignated as Air Research and Development Command, Sept. 15,
1950, and assumed powers, missions, functions, and responsibilities of
the Air Force Special Weapon Center (formerly Special Weapons Com-
mand), April 1, 1952.

mand), April 1, 1952.	
Maj. Gen. David M. Schlatter	Feb. 1, 1950-June 24, 1951
Lt. Gen. Earle E. Partridge	June 24, 1951-June 20, 1953
Lt. Gen. Donald L. Putt	June 30, 1953-April 14, 1954
Lt. Gen. Thomas S. Power	April 15, 1954-June 30, 1957
Maj. Gen. John W. Sessums, Jr.	July 1, 1957-July 31, 1957
Lt. Gen. Samuel E. Anderson	Aug. 1, 1957-March 9, 1959
Maj. Gen. John W. Sessums, Jr.	March 10, 1959-April 23, 1959
Lt. Gen. Bernard A. Schriever	April 25, 1959—

Air Materiel Command (AMC)

Established July 17, 1944, as AAF Materiel and Services; redesignated as AAF Air Technical Service Command, Aug. 31, 1944; redesignated as Air Technical Service Command, July 1, 1945; and redesignated as Air Materiel Command, March 9, 1946.

All materies Commana, March 7, 13	40.
Gen. Joseph T. McNarney	Oct. 1, 1947-Sept. 1, 1949
Lt. Gen. Benjamin W. Chidlaw	Sept. 1, 1949-July 24, 1951
Gen. Edwin W. Rawlings	July 28, 1951-Feb. 28, 1959
Gen. Samuel E. Anderson	March 10, 1959-

Military Air Transport Service (MATS)

Established June 1, 1948, assuming all active units of the discontinued Air Transport Command and Air Transport Service; and assumed powers, missions, functions, and responsibilities of Air Pictorial Service, April 16, 1952.

16, 1952.	
Lt. Gen. Laurence S. Kuter	June 1, 1948-Oct. 28, 1951
Lt. Gen. Joseph Smith	Nov. 15, 1951-June 30, 1958
Lt. Gen. William H. Tunner	July 1, 1958-May 31, 1960
Lt. Gen. Joe W. Kelly, Jr.	June 1, 1960-

Continental Air Command (CONAC)

Established Dec. 1, 1948.	
Lt. Gen. Ennis C. Whitehead	April 5, 1949-Jan, 1, 1951
Moj. Gen. Willis H. Hale	Jan. 1, 1951-Feb. 18, 1952
Lt. Gen. Leon W. Johnson	Feb. 18, 1952-Dec. 14, 1955
Lt. Gen. Charles B. Stone, III	Dec. 15, 1955-June 30, 1957
Lt. Gen. William E. Hall	July 1, 1957—

Air University (AU)

Established as AAF School of Appli	ed Tactics, Nov. 1, 1943; radasia-
nated as Army Air Forces School, Jun	e 1, 1945; and redesignated as Air
University, March 12, 1946.	
Maj. Gen. Muir S. Fairchild	March 15, 1946-May 17, 1948
Maj. Gen. Orvil A. Anderson	May 17, 1948-Oct. 15, 1948
Gen. George C. Kenney	Oct. 16, 1948-July 27, 1951
Lt. Gen. Idwal H. Edwards	July 28, 1951-Feb. 28, 1953
Maj. Gen. John DeF. Barker	March 1, 1953-April 14, 1953
Lt. Gen. Laurence S. Kuter	April 15, 1953-May 31, 1955
Maj. Gen. Dean C. Strother	June 1, 1955-June 30, 1958
Lt. Gen. Walter E. Todd	July 15, 1958-

USAF Academy (USAFA)

Established July 27, 1954. Headquarters	activated Aug. 14, 1954.
Lt. Gen. Hubert R. Harmon	Aug. 14, 1954-July 31, 1956
Maj. Gen. James E. Briggs	
Maj. Gen. William S. Stone	Aug. 1, 1959—

Headquarters Command, USAF (HQC)

Established as Bolling Field Command,	Dec. 15, 1946; and redesignated
as Headquarters Command, USAF, Ma	rch 17, 1948.
Brig. Gen. Morris J. Lee	Oct. 2, 1950-June 1, 1952
Brig. Gen. Stoyte O. Ross	June 14, 1952-July 4, 1956
Maj. Gen. Reuben C. Hood, Jr.	Aug. 1, 1956-June 30, 1959
Maj. Gen. Brooke E. Allen	Aug. 3, 1959-

Alaskan Air Command (AAC)

Activated Alaskan Air Force, Jan. 15, 1942; redesignated as Eleventh Air Force, Feb. 5, 1942; and redesignated as Alaskan Air Command, Dec. 21, 1945.

Maj. Gen. Frank A. Armstrong, Jr.	Feb. 20, 1949-Jan. 9, 1951
Maj. Gen. William D. Old	Jan. 10, 1951-Nov. 30, 1952
Maj. Gen. George A. Acheson	Feb. 26, 1953-Feb. 14, 1955
Lt. Gen. Joseph H. Atkinson	Feb. 24, 1955-July 16, 1956
Lt. Gen. Frank A. Armstrong, Jr.	July 17, 1956-Oct. 24, 1956
Maj. Gen. James H. Davies	Oct. 24, 1956-June 27, 1957
Lt. Gen. Frank A. Armstrong, Jr.	June 27, 1957-Aug. 31, 1957
Brig. Gen. Kenneth H. Gibson	Sept. 1, 1957-Aug. 24, 1958
Maj. Gen. Conrad F. Necrason	Aug. 14, 1958—

Caribbean Air Command (CAIRC)

Activated Panama Canal Air Force, Nov. 20, 1940; redesignated as Caribbean Air Force, Aug. 5, 1941; redesignated as Sixth Air Force, Feb. 5, 1942; redesignated as Caribbean Air Command, July 31, 1946; and assumed powers, missions, functions, and responsibilities of Antilles Air Command, July 31, 1946.

Brig. Gen.	Emil C.	Kiel	Nov.	1950-July	1953
Maj. Gen.	Reuben	C. Hood, Jr.	Aug.	1953-July	1956
Maj. Gen.	Truman	H. Landon	Aug.	1956-July	1959
Maj. Gen.	Leland	S. Stranathan	.Aug. 19	759-	

US Air Forces in Europe (USAFE)

Activated Eighth Air Force Jan. 28, 1942; redesignated as United States Strategic Air Forces in Europe, March 1, 1944; redesignated as US Air Forces in Europe, Aug. 7, 1945.

Lt. Gen. John K. Cannon	Oct. 1948-Jan. 1951
Gen, Lauris Norstad	Jan. 1951-July 1953
Lt. Gen. William H. Tunner	July 1953-June 1957
Gen. Frank F. Everest	July 1, 1957-July 31, 1959
Gen. Frederic H. Smith, Jr.	Aug. 1, 1959—

Pacific Air Forces (PACAF)

Activated Far East Air Forces (FEAF), Aug. 3, 1944; redesignated as Pacific Air Command, US Army, Dec. 6, 1945; redesignated as Far East Air Forces, Jan. 1, 1947; and redesignated Pacific Air Forces effective July 1, 1957.

FEAF

Lt. Gen. George E. Stratemeyer	April 26, 1949-May 20, 1951
Lt. Gen. Earle E. Partridge	May 20, 1951-June 9, 1951
Gen. O. P. Weyland	June 10, 1951-March 25, 1954
Gen. Earle E. Partridge	March 26, 1954-May 31, 1955
Gen. Laurence S. Kuter	June 1, 1955-June 30, 1957

PACAF

	TOTAL CONTRACTOR	
Gen.	Laurence S. Kuter	July 1, 1957-July 31, 1959
Gen.	Emmett O'Donnell	

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AIR FORCE WINNERS of the CONGRESSIONAL MEDAL OF HONOR

Here is a roll call of the forty-seven men of the Air Force and predecessor services who have been awarded the Congressional Medal of Honor, the nation's highest decoration. The Congressional Medal of Honor is awarded for gallantry and intrepidity beyond the call of duty and at conspicuous risk of death in conflict with an enemy of the United States. It should not be confused with specially enacted congressional medals, which are not, properly speaking, Congressional Medals of Honor.

WORLD WAR I

ERWIN R. BLECKLEY, 2d lieutenant, field Artillery, and HAROLD ERNEST GOETTLER, 1st lieutenant, Air Service. In action with the enemy near Binarville, France, October 6, 1918, Lieutenant Goettler, pilot, and Lieutenant Bleckley, observer, took part in a hazardous aerial supply drop to an encircled Army division in the Argonne Forest. They made two trips, both under violent and direct enemy fire. The second time, coming in at treetop level to drop the supplies accurately, the plane was brought down by enemy rifle and machine-gun fire, Lieutenant Bleckley was killed instantly.

FRANK LUKE, JR., 2d lieutenant, Air Service. Near Murvaux, France, on October 6, 1918, having scored several kills on enemy aircraft in the preceding weeks, he voluntarily went on an aerial patrol against enemy observation balloons. In attacking the balloons, three of which he shot down, he came under attack himself from eight enemy planes and ground batteries. Severely wounded, he descended to minimum altitude and opened fire on enemy ground troops, killing six and wounding others. Finally forced down and surrounded by the enemy, he refused to surrender, but drew his pistol and defended himself until he fell dead from a chest wound.

EDWARD VERNON RICKENBACKER, 1st lieutenant, Commanding Officer, 94th Aero Squadron, Air Service, Near Billy, France, September 25, 1918, on a voluntary air patrol over the front lines, he attacked seven enemy planes, five Fokker fighter types and two Halberstadt bomber types. Disregarding the fact that he was impossibly outnumbered, he dived on them, shooting down one Fokker and one Halberstadt and dispersing the remaining aircraft.

WORLD WAR II

ADDISON EARL BAKER, lieutenant colonel, Air Corps, led the 93d Bombardment Group (H) in the low-level attack on the Plaesti, Romania, oil fields on August 1, 1943. During approach to target, his plane was hit by antiaircraft fire, badly damaged, and set afire. Rather than jeopardize the attack, he held formation although the terrain was suitable to an emergency landing. After the attack, he attempted to gain altitude to allow his crew to bail out, but the plane crashed in flames.

RICHARD IRA BONG, major, Air Corps, although assigned to duty as a gunnery instructor and neither required nor expected to engage in combat, at his own request took part in repeated combat missions in the South Pacific from October 10 to November 15, 1944, shooting down eight enemy aircraft in that period. The missions included sorties over Balikpapan, Borneo, and the Leyte area of the Philippines.

HORACE SEAVER CARSWELL, JR., major, Air Corps, piloting a 8-24, launched a one-plane attack on a Japanese convoy in the South China Sea, numbering twelve merchant ships and two warships on the night of October 26, 1944. Against heavy antiaircraft fire, he scored two hits on a tanker and a near miss on a warship before being driven off badly damaged. Major Carswell took the plane, with two engines gone, back over China and ordered the crew to bail aut. One crewman's parachute, however, was ripped by enemy fire, preventing him from jumping. Major Carswell stayed with the plane to attempt a crash landing and save the crewman. Both died when the aircraft, a third engine out of action, crashed.

FREDERICK WALKER CASTLE, brigadier general, Commander, 4th Bombardment Wing, Eighth Air Force, headed a 2,000-plane strike against Germany on December 24, 1944. When one engine failed, he all out of formation and come under heavy fire. With two engines aflame as a result, he remained at the controls alone to enable all crewmen to bail out. Under renewed attack, the plane went down, and General Castle was killed.

RALPH CHELI, major, Air Carps, Near Wewak, New Guinea, Major Cheli lead his B-25 squadron to the attack on a heavily fortified airdrome on August 18, 1943. Under heavy attack from enemy interceptors, his aircraft burst into flames. He chose, however, to continue at the head of the attack rather than ball out. The attack was highly successful. Then Major Cheli crashed into the sea. A prisoner of the Japanese, he died later in an attack by US planes.

DEMAS THURLOW CRAW, colonel, Air Corps, and PIERPONT MORGAN HAMILTON, major, Air Corps. These two officers volunteered to go ashore in an assault landing craft in the Allied landings in French Morocco, North Africa, on November 8, 1942 for the purpose of contacting the French commander with a view to ending hostilities. Once ashore, they headed for French headquarters in a small truck through enemy-held territory. As they neared their destination, a heavy burst of machine-gun fire was delivered from a concealed position, killing Colonel Craw instantly. Major Hamilton, captured, was credited with completing the mission and bringing about a cessation of hostilities in French Morocco.

JAMES H. DOOLITTLE, lieutenant colonel, Air Corps, led World War II's first aerial raid on the Japanese home islands, a daring long-distance strike by Air Corps 8-25 bombors launched from the deck of the Navy aircraft carrier Hornet on April 18, 1942. Five days later he was promoted to brigadier general.

HENRY EUGENE ERWIN, staff sergeant, Air Corps, was radio operator of a 8-29 raiding Japan on April 12, 1945. One of his duties was dropping phasphorous smoke bombs to aid in assembling the planes over target. One exploded in the launch chute and shot back into the plane, exploding in Sergeant Erwin's face and blinding him. Realizing the plane was in danger from the smoking white-hot bomb, though blinded and in extruciating pain, he picked the bomb up and crawled through the plane to a window. After throwing the bomb out, he fell on the floor in flames.

ROBERT EDWARD FEMOYER, 2d lieutenant, Air Corps, navigator. Severely wounded on a raid over Germany on November 2, 1944, Lieutenant Femoyer asked to be propped up so that he could see his charts and instruments and navigate his aircraft home to England. Refusing sedation, he worked in very severe pain for two and one-half hours until the lone aircraft was approaching its base. He died shortly after being removed from the plane.

DONALD JOSEPH GOTT, 1st lieutenant, Air Corps, and WILLIAM EDWARD METZGER, JR., 2d lieutenant, Air Corps. A B-17 of which Lieutenant Gott was pilot and Lieutenant Metzger copilot was badly damaged on a raid over Germany November 9, 1944. Three engines were damaged beyond repair. Pilot Gott decided to try to reach Allied territory, however, rather than bail out, because one crewman was too badly wounded to jump. Back over friendly territory, he ordered the crew to parachute; shortly after they did, with copilot Metzger refusing and remaining at his side, the plane exploded and burned, killing pilot, copilot, and wounded crewman.

JAMES HOWELL HOWARD, major, Air Corps. As leader of a P-51 fighter group supporting a bomber attack on Germany on January 11, 1944, Major Howard was separated from his formation amid action against numerous enemy fighters. Alone, he singlehandedly pressed home attacks against thirty enemy planes for more than half an hour, destroying four enemy planes and damaging others through the day.

LLOYD HERBERT HUGHES, 2d lieutenant, Air Corps, was pilot of a heavy bomber in the Plaesti, Romania, ail-field roid of August 1, 1943. His plane was heavily damaged by antiaircraft fire on the way to target and was streaming gasoline from bomb bay and left wing. With full knowlege that flames from the burning oil field below would probably set this gasoline afire, he proceeded to the attack. After bomb release, the craft crashed in flames.

JOHN LOUIS JERSTAD, major, Air Corps, although he had completed his required share of combat missions, volunteered to lead his heavy-bomber group in the raid on the Ploesti, Romania, oil fields on August 1, 1943. Although his plane was badly damaged, he skillfully led his formation over target before going down in flomes.

LEON WILLIAM JOHNSON, colonel, Air Corps, and JOHN RILEY KANE, colonel, Air Corps, headed elements of heavy bombers in the Ploesti, Romania, oil-field raid of August 1, 1943. They led extremely successful attacks that, despite effective enemy defenses, heavy damage to their aircraft, and smoke obscuring much of the target, totally destroyed important targets vital to the enemy war effort.

NEEL EARNEST KEARBY, colonel, Air Corps, headed a flight of four fighters that reconnoitered the strongly defended Japanese base at Wewak, New (Continued on following page)

Guineo, on October 11, 1943. Their recon mission completed, they came upon some twelve enemy bombers and thirty-six fighters. Diving in among them, Colonel Kearby shot down six enemy planes before leading his flight home.

DAVID RICHARD KINGSLEY, 2d lieutenant, Air Corps. Bombardier of a heavy bomber engaged in a raid on the Plaesti oil fields on June 23. 1944, Lieutenant Kingsley placed his parachute harness on a wounded man whose own parachute had been damaged by enemy fire. He remained with the plane when the rest of the crew bailed out, dying when

RAYMOND LARRY KNIGHT, 1st lieutenant, Air Corps, took a leading role in a series of highly successful fighter-bomber strikes on German air bases in Northern Italy on April 24 and 25, 1945, destroying scores of enemy planes on the ground despite strong defenses and materially aiding an Allied ground advance in the area. Lieutenant Knight, who valorously and aggressively led several of these attacks, was killed when his damaged aircraft crashed in the Appennine Mountains.

WILLIAM ROBERT LAWLEY, JR., 1st lieutenant, Air Corps, brought his severely damaged B-17 back to a British base from a raid over Europe on February 20, 1944 despite the fact that he and most members of his crew were painfully wounded, his capilot was dead, and the plane was under continuing enemy attack most of the way.

DARRELL ROBINS LINDSEY, captain, Air Corps, led a force of thirty B-26 bombers in an attack on a heavily fortified, strategic bridge in Occupied France on August 9, 1944. With his plane damaged and likely to explade at any moment, Captain Lindsey continued to target with his formation, then had his crew members bail out. Before he could do so himself, the plane exploded and plunged to the ground.

WALTER EDWARD TRUEMPER, 2d lieutenant, Air Corps, and ARCHIBALD MATHIES, staff sergeant, Air Corps, were navigator and engineer-gunner, respectively, on a bomber that took part in a raid over Europe February 20, 1944. An enemy fighter attack rendered the pilot unconscious and killed the copilot. Lieutenant Truemper, Sergeant Mathies, and other members of the crew flew it back to base. Then the two of them stood by to attempt to land while the others parachuted. The unit's commanding officer ordered them to jump as well, but they replied that the pilot was still alive and they wouldn't leave him. They were allowed to attempt the landing. On its third pass, the plane crashed into an open field and the three men aboard were killed.

JACK WARREN MATHIS, 1st lieutenant, Air Corps, was leading bombar-dier of a squadron bombing Vegesack, Germany, through intense anti-aircraft fire on March 18, 1943. As he started the bomb run, enemy fire shottered his right arm, tore wounds in his side and abdomen, and knocked him across the compartment. By sheer will, though mortally wounded, he struggled back to his bombsight, released bombs, and died. They fell on target, as did those of bombardiers in his wake.

THOMAS BUCHANAN McGUIRE, JR., major, Air Corps, led a P-38 squadron in fighting over Luzon, the Philippines, on December 25 and 26, 1944. Heavily outnumbered repeatedly, he shot down at least seven enemy planes to bring his total of aerial victories to thirty-eight. He was killed in a hazardous maneuver at low altitude while attempting to save a fellow flyer from attack a few days later.

EDWARD STANLEY MICHAEL, 1st lieutenant, Air Corps, was pilot of a B-17 riddled by enemy fire and very severely damaged in a raid over Germany April 11, 1944. He and the capilot were wounded and the plane virtually wrecked and in danger of burning or exploding at any moment. Seven crew members bailed out as ordered, but the bombardier found his parachute badly damaged, so Lieutenant Michael and the copilor remained at the controls though weak from loss of blood and still under attack. They returned to base in Britain safely.

JOHN CARY MORGAN, flight officer, Air Corps, was capilot of a 8-17 pounced on by enemy fighters en route to target over Europe on July 23, 1943. The pilot was seriously wounded and turret, waist, tail, and radio gunners were also out of action. Under these circumstances, Flight Officer Morgan took the plane on to target and safely back to base.

HARL PEASE, JR., captain, Air Corps. Unknown to his superior officers, Captain Pease and his crew on August 6 and 7, 1942 took a bomber judged unserviceable into action against the Japanese at Rabaul, New Britain, after one engine of their own serviceable plane had failed. Before being shot down by the enemy, Captain Pease and his crew performed most effectively despite the condition of their plane. Their actions had an inspiring effect on other airmen at a crucial point in the war.

DONALD DALE PUCKET, 1st lieutenant, Air Corps, piloted a 8-24 in a raid on Ploesti, Romania, on July 9, 1944. One crew member was killed, six others severely wounded, and the plane bodly damaged by enemy fire. He ordered crewmen who were able to jump, then attempted to crash land the aircraft with the worst wounded abourd, but the plane crashed in flames.

JOSEPH RAYMOND SARNOSKI, 2d lieutenant, Air Corps, volunteered on June 16, 1943, for a vital photographic mission over the Solomon Islands in the South Pacific. Enemy attack wounded five crewmen, including Lieutenant Sarnoski, but he remained at his post manning the nose guns, even after a 20-mm shell had burst right on him. He died at his guns, having shot down two enemy planes and made possible the completion of the mission.

WILLIAM ARTHUR SHOMO, captain, Air Corps, led a flight of two fighters on an armed reconnaissance mission over the Philippines on January 11, 1945. The two planes sighted twelve enemy fighters and one bomber. Captain Shomo, despite the odds, ordered an attack, and the US flyers shot down ten of the aircraft-Captain Shomo bagging seven himself.

MAYNARD HARRISON SMITH, sergeant, Air Carps, The bomber of which Sergeant Smith was a gunner came under heavy fire while returning from a raid over Europe on May 1, 1943, two crewmen suffering wounds and the plane catching fire. After three crewmen bailed out, Sergeant Smith, on his first mission, alternately fought the fire and enemy attackers and ministered first aid to the wounded, ultimately putting the fire out and saving the plane.

LEON ROBERT VANCE, JR., lieutenant colonel, Air Carps, led a heavybombardment group against an enemy position on the coast of Occupied France on June 5, 1944. The plane in which he was flying was hit repeatedly, the pilot killed, Colonel Vance and several crew members badly wounded, and three engines lost. He led the formation to a successful roid, taking the controls of the plane himself in spite of his condition. Nearing the British coast, he ordered the crew to bail out, then skillfully ditched the plane in the English Channel, although it meant almost certain death for him, so that another wounded man in the crew, unable to jump, might have a chance to survive.

FORREST LEE VOSLER, staff sergeant, Air Corps. The heavy bomber in which Sergeant Vosler was serving was badly hit, forced out of formation, and subjected to continual attacks by enemy fighters after bombing its target in Germany on December 20, 1943. Twice hit by 20-mm shell fragments and badly in pain, he managed first to man the guns, then to repair the damaged radio and report the plane was ditching, and finally to aid other crew members following ditching.

KENNETH NEWTON WALKER, brigadier general, Air Corps, commanded the V Bomber Command in the South Pacific from September 5, 1942 to January 5, 1943, when his plane was shot down and he was killed in a daylight raid on Rabaul, New Britain. He repeatedly led bombing missions deep into enemy territory, helping develop techniques of air warfare.

RAYMOND HARRELL WILKINS, major, Air Corps, led a B-25 squadron in an attack on Simpson Harbor, Rabaul, New Britain on November 2, 1943. Flying into a wall of antiaircraft fire, he sank an enemy destroyer and transport singlehanded, then, bambs expended, strafed a heavy cruiser. The cruiser's guns shot him down.

JAY ZEAMER, JR., captain, Air Corps, while successfully executing a photo mission over the Solomons on June 16, 1943, come under attack from some twenty enemy fighter planes. He completed his mapping run, suffering gunshot wounds in orms and legs and a broken leg. He maneuvered the plane so that his gunners could shoot down at least five attacking planes and drive the others off.

KOREA

GEORGE ANDREWS DAVIS, JR., major, United States Air Force. Leading a flight of two F-86 Sabrejets on February 10, 1952, Major Davis sighted a formation of twelve enemy MIG-15 fighters heading to attack a group of US fighter-bombers. Attacking the MIGs, he shot down two of them before sustaining a direct hit himself and plunging to his death.

CHARLES JOSEPH LORING, JR., major, USAF, was leader of four F-80 fighter-bomber aircraft on a close-support mission November 22, 1952. Directed to dive bomb enemy gun emplacements along a ridge, he altered course during the attack and, socrificing himself, dived his plane in among a group of Communist guns that were harassing US ground troops, thus completely destroying the guns and giving up his own life.

LOUIS JOSEPH SEBILLE, major, USAF, on a close-support mission over Korea August 5, 1950, chose to overlook his own safety and the fact that he was running low on fuel so that he could press home continuing attacks on Communist troops, ultimately diving on target to his death.

JOHN SPRINGER WALMSLEY, JR., captain, USAF, on a nighttime B-26 mission on September 14, 1951, disabled an enemy supply train, then, his ammunition expended, guided another B-26 to the target area, illuminating the train and exposing himself to enemy fire with his searchlight. He was shot down and killed while diverting attention to himself from the second attacking B-26.

CHARLES AUGUSTUS LINDBERGH, captain, Air Corps Reserve. A rare peacetime Congressional Medal of Honor was awarded to Captain Lindbergh for "heroic courage and skill as a navigator, at the risk of his life, for his nonstop flight in his airplane from New York City to Parls, France, 20-21 May 1927."

In 1948 Congress posthumously voted Maj. Gen. William C. Mitchell a Special Medal of Honor for his "outstanding planeer service and fore-sight in the field of American military aviation." This award is sometimes mistakenly referred to as the Congressional Medal of Honor.

In addition, many still believe Capt. Colin Kelly won the Congressional Medal of Honor for "sinking a Japanese battleship off Luzon in the early days of World War II." Captain Kelly and his 8-17 crew did, in fact, score near misses on a heavy cruiser, Returning to base, Clark field, the 8-17 was attacked by two enemy fighters. Kelly ordered his crew to bail out, but before he himself was able to escape, the bomber exploded and he was killed. For his heroism, Kelly received the DSC.—End



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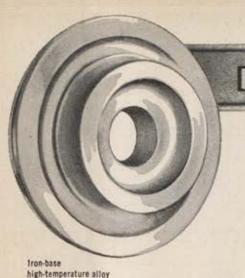


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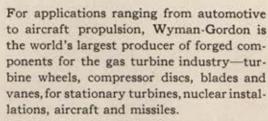
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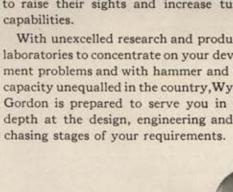
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AIR FORCE Magazine Guide to Air Force Bases

WHAT THEIR JOBS ARE • HOW THEY WERE NAMED
WHERE THEY ARE LOCATED

ALTUS AFB, Okla., 2 mi. E of Altus. Heavy bomber base, 2d AF, SAC; projected Atlas ICBM site. Named for city. AMARILLO AFB, Tex., 14 mi. SE of Amarillo. 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. Hq. ARDC; 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. Hq. AEDC, ARDC. Named for Gen. H. H. "Hap" Arnold, WW II AF CG.

BAINBRIDGE AB, Ga., 7 mi. NW of Bainbridge. Contract primary pilot training, ATC. Named for city.

BAKALAR AFB, Ind., 3 mi. N of Columbus. 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. Hq. 2d AF, SAC; strategic bomber base. Named for Lt. Eugene H. Barksdale, WW I pilot, killed near Wright Field, Ohio, August 1926, while testing observation-type plane.

BARTOW AB, Fla., 5 mi. NE of Bartow. Contract primary pilot training, ATC. Named for city.

BEALE AFB, Calif., 11 mi. SE of Marysville. 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. 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. 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. 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. Air base squadron, 2d AF, SAC. Named for nearby city. BOLLING AFB, 3 mi. S of Washington, D. C. Hq. Command, USAF. Named for Col. Raynal C. Bolling, Ass't 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. Air Materiel Area, AMC; foreign clearing station, MATS. 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. USAF (Continued on page 226)

Glossary of Terms Used in Guide to AFBs

AAB	Army Air Base	

AACS Airways and Air Communications Service

AB Air Base

ADC Air Defense Command

AEDC Arnold Engineering Development Center

AF Air Force Base

AFROTC Air Force Reserve Officers Training Corps

AMC Air Materiel Command ANG Air National Guard

AP Airport

ARDC Air Research and Development Command

ATC Air Training Command
AU Air University
AWS Air Weather Service
CBI Chino-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

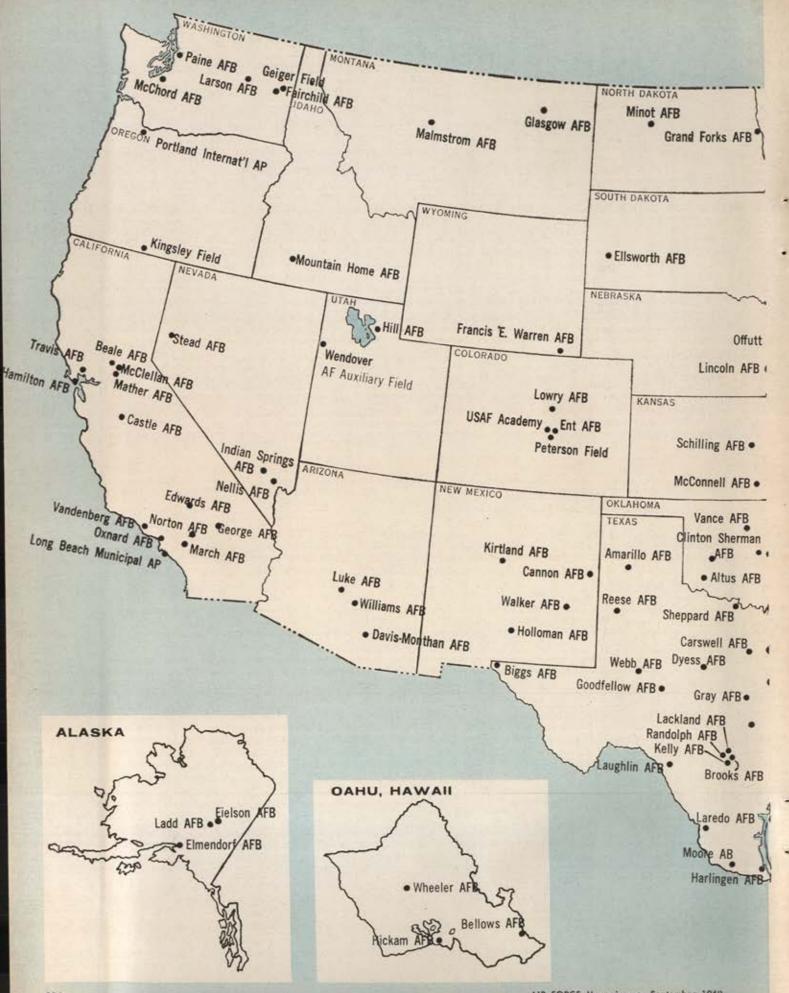
NORAD North American Air Defense Command

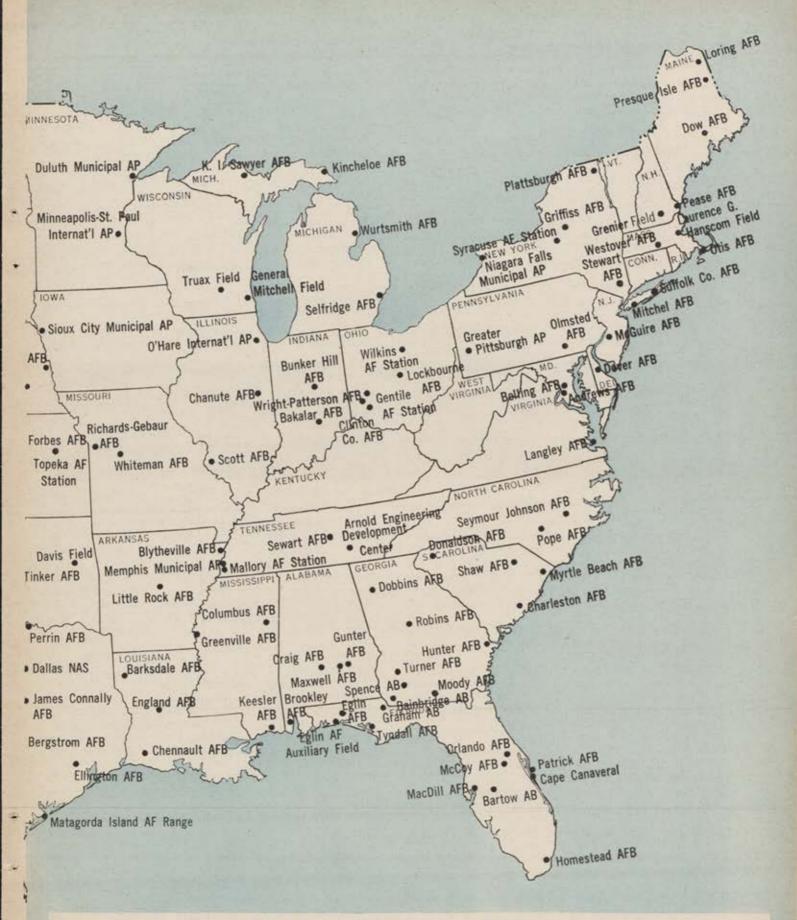
OCS Officer Candidate School SAC Strategic Air Command

SAGE Semi-Automatic Ground Environment

TAC Tactical Air Command
USAF United States Air Force
WADC Wright Air Development Center
WAF Women in the Air Force
WESTAF Western Transport Air Force

WW I World War I WW II World War II





Major Active Air Force Bases in the United States

An AIR FORCE Magazine Map (As of August 15, 1960)

Aerospace Medical Center, ATC; Reserve training, CONAC; Hq. Air Evacuation, MATS. Formerly Gosport Field, renamed for Lt. Sidney J. Brooks, Jr., of San Antonio, killed in air crash near Hondo, Tex., November 1917, on final day of cadet training and commissioned posthumously.

BUNKER HILL AFB, Ind., 9 mi. S of Peru. Air refueling base, 2d AF, SAC; fighter-interceptor base, ADC. Former naval air station. Named for city.

CANNON AFB, N. M., 7 mi. W of Clovis. 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. Heavy 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.

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. Reserve training, troop carrier, CONAC; ADC, joint use; SAGE interim control center. Formerly Marietta AFB, renamed for Capt. Charles M. Dobbins, killed transporting para-

troops over Sicily, July 1943.

DONALDSON AFB, S. C., 7 mi. SSE of Greenville.

Troop carrier base, WESTAF, MATS. 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.

DOVER AFB, Del., 3 mi. SE of Dover. 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. Heavy bomber base, 8th AF, SAC. Formerly Bangor AB, renamed for 2d Lt.















Cannon

Castle

Chennault

Dyess

Ellsworth

CASTLE AFB, Calif., 7 mi. NW of Merced. 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. 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. Air transport base, EASTAF, MATS; fighter-interceptor base, ADC. Named for city.

CHENNAULT AFB, La., 3 mi. E of Lake Charles. Medium bomber base, 2d AF, SAC. 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 in July 1958.

CLINTON CO. AFB, Ohio, 2 mi. SE of Wilmington. Reserve training, CONAC. Named geographically.

CLINTON SHERMAN AFB, Okla., 1 mi. W of Burns Flat. Heavy bomber base, 2d AF, SAC. Formerly Clinton NAS.

COLUMBUS AFB, Miss., 9 mi. N of Columbus. Heavy bomber base, 2d AF, SAC. Named for city. CONNALLY AFB. (See James Connally AFB.)

CRAIG AFB, Ala., 5 mi. SE of Selma. Basic 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. 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. Reserve training, troop carrier, CONAC. Field is named locally. DAVIS-MONTHAN AFB, Ariz., 4 mi. SE of Tucson. Medium bomber base, 15th AF, SAC; fighter-interceptor

James F. Dow of Oakfield, Me., killed in crash near Mitchel Field, June 1940.

DULUTH MUNICIPAL AP, Minn., 7 mi. NNW of Duluth. Fighter-interceptor base, ADC. Formerly Williamson-Johnson AP, renamed for city.

DYESS AFB, Tex., 6 mi. SW of Abilene. Medium bomber base, 15th AF, SAC; projected Atlas ICBM site. 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. Hq. AF Flight Test Center, ARDC. 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. Hq. Air Proving Ground Center, ARDC; 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. Missile training, ADC. On Eglin AFB reservation.

EIELSON AFB, Alaska, 26 mi. SE of Fairbanks. Support base for SAC mission; weather reconnaissance base, WESTAF, MATS; Alaskan Air Command. Named for Capt. Carl E. Eielson, Alaskan air pioneer 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. 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. Heavy bomber wing, 15th AF, SAC; fighter-interceptor base, ADC; projected Titan 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. 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. Tactical fighter base, 12th AF, TAC. Formerly 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. 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. Heavy bomber base, 15th AF, SAC; projected 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.

primary pilot training, ATC. Formerly was Marianna AB. GRAND FORKS AFB, N. D., 14 mi. W of Grand Forks. Fighter-interceptor base, ADC; air refueling base, 15th AF, SAC mission. Named for city.

GRAY AFB, Tex., 6 mi. SW of Killeen. Special activities base, AMC. Formerly Camp Hood AAB, renamed for Capt. Robert M. Gray, pilot on first Tokyo bombing mission of

WW II, killed in India, 1942.

GREATER PITTSBURGH AP, Pa., 5 mi. SW of Coroapolis. Air Reserve, CONAC. Named for nearby city.

GREENVILLE AFB, Miss., 6 mi. NE of Greenville. Basic

pilot training, ATC. Named for city.

GRENIER FIELD, Manchester Municipal AP, N. H., 4 mi. S of Manchester. 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. Hq. Rome Air Development Center, ARDC; Rome AF Depot, AMC; fighter-interceptor base, ADC; heavy bomber base, 8th AF, SAC. Formerly Rome AB, renamed for Lt. Col. Town-















Fairehild

Mitchell

Gentile

George

Holloman

Hunter

FORBES AFB, Kan., 7 mi. S of Topeka. 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. First Missile Division, SAC; Atlas ICBM site. Named for Wyoming's first US Senator and first elected governor, Civil War recipient of CMH, died in US, 1929.

GEIGER FIELD, Wash., 6 mi. WSW of Spokane. Fighter-interceptor base, ADC. Formerly Sunset Field, renamed for Maj. Harold Geiger, WW I dirigible expert, killed in crash landing at Olmsted Field, Pa., May 1927.

GENERAL MITCHELL FIELD, Wis., 6 mi. S of Milwaukee. 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. Specialized depot, AMC. Named for Maj. Don S. Gentile, WW II fighter ace, credited with shooting down twentythree German aircraft. Killed in an aircraft accident near Andrews AFB, Md., on January 28, 1951.

GEORGE AFB, Calif., 6 mi. NW of Victorville. 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. Fighterinterceptor base; under construction for 15th AF, SAC mission. Named for city.

GOODFELLOW AFB, Tex., 2 mi. SE of San Angelo. USAF Security Service base. Named for Lt. John J. Goodfellow, Jr., of San Angelo, killed in fighter combat, in France, 1918.

GRAHAM AB, Fla., 5 mi. NE of Marianna. Contract

send E. Griffiss of Buffalo, recipient of DSC, killed in flight from Russia to England, February 1942.

GUNTER AFB, Ala., 5 mi. NE of Montgomery. Extension Course Institute USAF (AU); School of Aviation Medicine, USAF (ATC). 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. Fighter-interceptor base, ADC; Hq. 6th Reserve Region, CONAC; SAGE interim control 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. Navigator training, ATC. Named for city.

HENSLEY FIELD. (See Dallas NAS.)

HICKAM AFB, Oahu, Hawaii, 6 mi. SW of Honolulu. 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. Hq. Air Materiel Area, AMC. Named for Maj. Ployer P. Hill, killed near Wright Field while testing one of the first B-17s, October

HOLLOMAN AFB, N. M., 8 mi. SW of Alamogordo. Hq. AF Missile Development Center, ARDC. 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. Medium bomber base, 8th AF, SAC; Reserve training, CONAC. Named for city.

HUNTER AFB, Ga., 3 mi. SW of Savannah. Medium (Continued on following page)

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. Special weapons testing base, ARDC. Named

JAMES CONNALLY AFB, Tex., 7 mi. NNE of Waco. Navigator training, Instrument Pilot Instructor School, ATC. Formerly Waco AFB, renamed for Col. James T. Connally of Waco, killed on B-29 mission over Yokohama, Japan, May 1945.

KEESLER AFB, Miss., 2 mi. WNW of Biloxi. 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. Hq. Air Materiel Area, AMC. Named for Lt. George E. M. Kelly,

pioneer Army pilot, killed in US, 1911.

KINCHELOE AFB, Mich., 3 mi. SE of Kinross. Fighterinterceptor base, ADC; being expanded for 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. 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.

KINROSS AFB. (See Kincheloe AFB.)

KIRTLAND AFB, N. M., 4 mi. SSE of Albuquerque. Hq. AF Special Weapons Center, ARDC. 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. Fighter-interceptor base, ADC; air refueling base, 2d AF, SAC. Origin of name unknown.

LACKLAND AFB, Tex., 7 mi. WSW of San Antonio. Military Training Center, OCS, WAF training, pilot-observer preflight, USAF Recruiting School, USAF Chap-lain School, USAF Markmanship 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. LADD AFB, Alaska, 3 mi. E of Fairbanks. Support base, AAC. Named for Maj. Arthur K. Ladd, who was assistant G-4 of the GHQ Air Force, Langley Field, Va., where he died in 1935.

LAKE CHARLES AFB. (See Chennault AFB.)

LANGLEY AFB, Va., 3 mi. N of Hampton. Hq. TAC; refueling base, TAC; fighter-interceptor base, ADC. Named for Samuel P. Langley, pioneer aeronautical scientist, died in 1906.

LAREDO AFB, Tex., 3 mi. NE of Laredo. Basic pilot

training, ATC. Named for city.

LARSON AFB, Wash., 6 mi. NNW of Moses Lake. 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. Strategic recon base, 2d AF, SAC. 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. Hq. AF Cambridge Research Center, ARDC. 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. Medium bomber base, 2d AF, SAC; projected Atlas ICBM site.

Named for city.

LITTLE ROCK AFB, Ark., 15 mi. NE of Little Rock. Medium bomber, strategic recon base, 2d AF, SAC; projected Titan ICBM site. Named for city.

LOCKBOURNE AFB, Ohio, 11 mi. SSE of Columbus. Medium bomber base, 8th AF, SAC; fighter-interceptor

base, ADC. Named for nearby city.

LONG BEACH MUNICIPAL AP, Calif., 3 mi. NE of Long Beach. Reserve training base, troop carrier, CONAC.

Named for city.

LORING AFB, Me., 2 mi. NW of Limestone. Heavy bomber base, 8th AF SAC. 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, destroy-

LOWRY AFB, Colo., 5 mi. ESE of Denver. Technical Training Center, ATC; projected Titan ICBM site. 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. 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. Medium bomber base, 8th AF, SAC. Named for Col. Leslie Mac-Dill, fighter pilot, killed in air crash at Anacostia, Md.

MALLORY AF STATION, Memphis, Tenn. Specialized depot, AMC. Named for Maj. William N. Mallory, WW II intelligence officer with the 1st Tactical AF, killed return-

ing to the US in 1945.

MALMSTROM AFB, Mont., 4 mi. E of Great Falls. Air refueling base, 15th AF, SAC; fighter-interceptor base, ADC; in January will house SAGE interim control center; 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. Hq. 15th AF, SAC; medium bomber base, SAC. Named for Lt. Peyton C. March, Jr., son of WW I Army Chief of Staff, killed

in air crash in US, 1918.

MATAGORDA ISLAND AF RANGE, Tex., 9 mi. SSW of Port O'Connor. Training installation, 2d AF, SAC. Named for island in Gulf of Mexico.

MATHER AFB, Calif., 10 mi. E of Sacramento. 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. 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. Fighterinterceptor base, ADC; SAGE combat center; troop carrier base, WESTAF, MATS; being expanded for 15th AF, SAC. Named for Col. William C. McChord, killed in US, 1937.

McCLELLAN AFB, Calif., 10 mi. NE of Sacramento. Hq. Air Materiel Area, AMC; aircraft early warning and control, ADC. Named for Maj. Hezekiah McClellan, pioneer in Arctic aeronautical experiments, killed in test

flight of new plane, US, 1936.

McCONNELL AFB, Kan., 5 mi. SE of Wichita. 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. 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. Hq. EASTAF, MATS; fighter-interceptor base, ADC; SAGE direction center; air refueling base, 8th AF, SAC. For-

NORTON AFB, Calif., 5 mi. ENE of San Bernardino. Hq. Air Materiel Area, AMC; air division 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. Hq. SAC; air refueling base, SAC; projected 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. Reserve training, troop carrier base, CONAC. Formerly Douglas Airport, renamed for Lt. Cmdr. Edward H. O'Hare of Chicago, Navy pilot in WW II, recipient of CMH, killed in action near Tarawa in the Pacific, 1943. OLMSTED AFB, Pa., 1 mi. NW of Middletown. Hq. Air Materiel Area, AMC. Formerly Middletown Air Depot, renamed for Lt. Robert S. Olmsted, balloon pilot, killed when his balloon was struck by lightning over Belgium, September 1923.















Kincheloe

Kingsley

Larson

Loring

Luke

McGuire

Mitchel

merly Fort Dix AAB, renamed for Maj. Thomas B. Mc-Guire, 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. Reserve training, CONAC. Named for city.

MINNEAPOLIS-ST. PAUL INTERN'L AP, Minn., 7 mi. SSE of Minneapolis. Reserve training, CONAC. Formerly Wold Chamberlain Field.

MINOT AFB, N. D., 11 mi. N of Minot. Fighter-interceptor base, ADC and air refueling base, 15th AF, SAC mission. Named for city.

MITCHEL AFB, N. Y., 2 mi. NE of Hempstead, L. I. Hq. CONAC; Hq. 1st Reserve Region, CONAC. Named for Maj. John P. Mitchel, first Fusion mayor of New York City, fighter pilot, killed in an air crash in Louisiana, July 1918.

MITCHELL FIELD. (See General Mitchell Field.)

MOODY AFB, Ga., 12 mi. NNE of Valdosta. Pilot interceptor training (Adv.), ATC. Named for Maj. George P. Moody, fighter pilot, killed in US, 1941.

MOORE AB, Tex., 14 mi. NW of Mission. Contract primary pilot training, ATC. Named for 2d Lt. Frank Murchison Moore, WW I pilot, killed in September 1918. MOUNTAIN HOME AFB, Idaho, 11 mi. WSW of Mountain Home. Medium bomber base, 15th AF, SAC; projected Titan ICBM site. Named for city.

MYRTLE BEACH AFB, S. C., 3 mi. SW of Myrtle Beach. Tactical fighter base, 9th AF, TAC. Named for city.

NELLIS AFB, Nev., 8 mi. NE of Las Vegas. 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. Reserve training, CONAC. Named for city. ORLANDO AFB, Fla., 2 mi. E of Orlando. Hq. Air Photographic and Charting Service; Hq. Air Reserve Service, MATS. Named for city.

OTIS AFB, Mass., 9 mi. NNE of Falmouth. Fighter-interceptor 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. Fighter-interceptor base, ADC. Named for city.

PAINE AFB, Wash., 6 mi. S of Everett. Fighter-interceptor base, ADC. Named for 2d Lt. Topliff O. Paine, airmail pilot, who was killed while mapping airmail routes,

PATRICK AFB, Fla., 12 mi. SE of Cocoa. Hq. AF Missile Test Center, ARDC. 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. 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. 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. Administrative flying, ADC. Named for 1st Lt. Edward J. Peterson, killed in US, in airplane crash, 1942.

PITTSBURGH AP. (See Greater Pittsburgh AP.)

PLATTSBURGH AFB, N. Y., 1 mi. SW of Plattsburgh. Medium bomber base, 8th AF. SAC; projected Atlas ICBM site. Named for city.

POPE AFB, N. C, 12 mi. NW of Fayetteville. Troop carrier base, 9th AF, TAC. Named for 1st Lt. Harley H. (Continued on following page)

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. Fighter-interceptor base, ADC. Named for city.

PRESQUE ISLE AFB, Me., 1 mi. NW of Presque Isle. Snark launch site, 1st Missile Division, SAC. Named for city.

RANDOLPH AFB, Tex., 15 mi. ENE of San Antonio. 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. Basic 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. Fighter-interceptor base, ADC; will house SAGE interim control center in January. Formerly Grandview

SHAW AFB, S. C., 7 mi. WNW of Sumter. 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. 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. Fighter-interceptor base, ADC. Named for city.

SPENCE AB, Ga., 5 mi. SE of Moultrie. Contract primary pilot training, ATC. Named for Lt. Thomas L. Spence of Thomasville, Ga., WW I pilot, killed in aircraft accident at end of war.

STEAD AFB, Nev. 10 mi. NW of Reno. Survival training, ATC. Formerly Reno AAB, renamed for Lt. Craston Stead, Nevada ANG pilot killed in a crash at the base.















Olmsted

Pease

Tinker

Travis

Vance

Vandenberg

Westover

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. Hq. Air Materiel Area, AMC; Hq. 3d Reserve Region, 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.)

SCHILLING AFB, Kan., 4 mi. SW of Salina. 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. Hq. MATS; Hq. AWS; Hq. AACS. 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. 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. Troop carrier base, 9th AF, TAC. Formerly Smyrna AAB, renamed for Maj. Allan J. Sewart, Jr., bomber pilot, recipient of DSC, killed in action over the Solomons, November 1942.

SEYMOUR JOHNSON AFB, N. C., 2 mi. SSE of Goldsboro. 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.

STEWART AFB, N. Y., 4 mi. NW of Newburgh. SAGE direction center, ADC. Named for Lachlan Stewart, sea captain whose son provided the original land for the base. SUFFOLK CO. AFB, N. Y., 3 mi. N of Westhampton Beach, L. I. Fighter-interceptor base, ADC. Named for geographical area.

SYRACUSE AF STATION, N. Y., 5 mi. NNE of Syracuse. Hq. ADC Air Division; SAGE combat center, ADC. Named for city.

TINKER AFB, Okla., 8 mi. ESE of Oklahoma City. Hq. Air Materiel Area, AMC. 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. TOPEKA AF STATION, Kan., 7 mi. S of Topeka. Spe-

cialized depot, AMC. Named for city.

TRAVIS AFB, Calif., 6 mi. ENE of Fairfield and Suisun. 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. 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. Heavy bomber base, 8th AF, SAC. Named for Lt. Sullins Preston Turner of Oxford, Ga., killed in aircraft accident at Langley AFB,

TYNDALL AFB, Fla., 8 mi. SE of Panama City. 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. Basic pilot training, ATC. Formerly Enid AFB, renamed for Lt. Col. Leon

R. Vance, Ir., WW II recipient of CMH, lost in hospital aircraft forced down at sea off Iceland, 1944.

VANDENBERG AFB, Calif., 10 mi. NW of Lompoc. Hq. 1st Missile Division, SAC; Atlas ICBM site. 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. 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. Basic 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.

WENDOVER AF AUXILIARY FIELD, Utah, 1 mi. S of

Wendover. Gunnery range, AMC. Named for city.
WESTOVER AFB, Mass., 3 mi. NNE of Chicopee Falls.
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. Hq. Pacific Airways and Air Communications, WESTAF, MATS, Named for Mai, Sheldon H. Wheeler, killed in an aircraft accident in 1921 at Luke Field, Hawaii.

WHITEMAN AFB, Mo., 3 mi. S of Knob Noster. Medium bomber base, 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.

WILKINS AF STATION, Ohio, 1 mi. N of Shelby. AF specialized depot, AMC. Named for Maj. Raymond H. Wilkins, CMH recipient, killed November 2, 1943, over Rabaul, New Britain, after he had destroyed two enemy

WILLIAMS AFB, Ariz., 10 mi. E of Chandler. Training for tactical fighter pilots, TAC. 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. Hq. AMC; WADC, ARDC; 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, 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. Fighterinterceptor base, ADC; air refueling base, 2d AF, SAC. Formerly Camp Skeel, later Oscoda AFB, renamed for Maj. Gen. Paul B. Wurtsmith, CG, 13th AF, killed in B-25

crash in North Carolina, 1946.-END

UNITED STATES AIR FORCE INSTALLATIONS OVERSEAS

Greenham Common RAF Station,

Albrook AFB, Canal Zone Alconbury RAF, England Andersen AFB, Guam Ankara AS, Turkey Ashiya AB, Japan Athenai AB, Greece Aviano AB, Italy Benquerir AB, Morocco Bentwaters RAF Station, England Bitburg AB, Germany Bordeaux Merignac Airport, France Boulhaut AB, Morocco Brize Norton RAF Station, England Bruntingthorpe RAF Station, England Chambley AB, France Chateauroux AS, France Chaumont AB, France Chelveston RAF Station, England Clark AFB, Philippines Chiaya AB, Taiwan Camp New Amsterdam AB, Netherlands Dhahran AB, Saudi Arabia Dreux AB, France East Kirkby RAF Station, England 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

England Hahn AB, Germany Haneda Service Annex, Japan Harmon AFB, Guam High Wycombe AS, England Incirlik AB, Turkey Iraklion AS, Crete Itazuke AB, Japan Iwo Jima AB John Hay AB, Philippines Johnson AB, Japan Johnston Island AFB Kadena AB, Okinawa Keflavik Airport, Iceland 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 Narsarssuak AB, Greenland Nouasseur AB, Morocco Orly Airport, France Osan AB, Korea Pepperrell AFB, Newfoundland Phalsbourg AB, France

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 Shepherds Grove RAF Station, England Sidi Slimane AB, Morocco Sondrestrom AB, Greenland South Ruislip AS, England Spangdahlem AB, Germany Suwon Auxiliary Airfield, Korea Tachikawa AB, Japan Taegu Auxiliary Airfield, Korea Tainan AS, Taiwan Taipei AS, Taiwan Taoyuan Airfield, Taiwan Templehof Central AP, Germany Thule AB, Greenland Torrejon AB, Spain Toul-Rosiere AB, France Upper Heyford RAF Station, England West Drayton RAF Station, England Wethersfield RAF Station, England Wheelus AB, Libya Wiesbaden AB, Germany Woodbridge RAF Station, England Yokota AB, Japan Zaragoza AB, Spain

Encase the inferno that makes

We've a good mind to do it at



Capable of withstanding many tons of tensile stress per square inch yet with a wall thickness measured in a minor fraction of an inch...

Longer than the average living room-yet machined to tolerances measured to three decimal places . . .

These are some of the standards resulting from the imaginative approaches our scientists and engineers have taken to design, develop and build first- and second-stage rocket cases for Minuteman under subcontract to Thiokol Chemical Corporation.

We start with a fundamental knowledge of metals acquired from our advanced metallurgical research programs . . . add our design and processing skills . . . maintain close, positive control from ingot to completed case ready for firing.

Result? Repeated successful firings of Allison designed and produced flight-weight Minuteman cases—firing-stand proof of the validity of Allison's design philosophy, the soundness of Allison's processing.

And this is but one of the many space-age projects we're putting our minds to at Allison - minds backed by every General Motors resource.

Whether your problem is concerned with the heavens, the earth, or the oceans, Allison has the will and—if it can be solved—the way to solve it. We're doing it for others—we could do it for you.

Illustrated is a section of a miniature test case showing a special thread developed by Allison for the aft closure of the full-scale Minuteman rocket motor case.

Minuteman go?

DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA

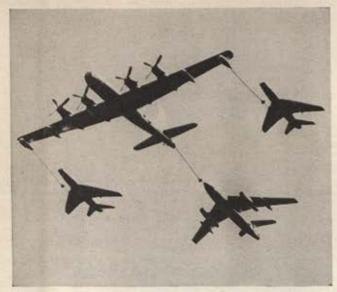




B-26



B-36



KB-50J WITH F-100s AND RB-66



B-29



B-47



B-52

Gallery of USAF Weapons

B-26 INVADER—tactical bomber, World War II vintage; completely phased out of USAF as a bomber; still in use by some tow-target units, used by Air National Guard in limited numbers as a administrative aircraft. Plane, which incorporated many features of the much earlier A-20 Hovoc, was flown first in July 1942, was used with much success in European and Pacific fighting in World War II and again during Korean War. Extremely versatile, fast, maneuverable, rugged, was last propeller-driven toelical bomber phased out of USAF active inventory. Centractor: Douglos Aircraft Co. Power plant and manufacturer: 2 Pratt & Whitney R2800-PW79 piston engines. Power plant and manufacturer: 2 Pratt & Whitney R2800-PW79 piston engines. Power plant hp/thrust: 2,000 hp. Dimensions: span 70 ft., length 51 ft. 3 in., height 18 ft. 5 in. Speed: about 350 mph Ceiling: about 30,000 ft. Range: 2,000 ml. Bomb load: 6,000 bb. Armanment: 5-inch rockets, 12 .50-caliber machine guns. Crew: 3-pilot, navigator/bomb-ardier, gunner. Maximum gross takeoff weight: 40,000 lb. Primary using command: Air National Guard, Tactical Air Command.

B-29 SUPERFORTRESS—4-engine bomber, World War II vintage. Saw valuable service against Japonese in Pacific, was modified for duty as cerial tanker early in 1948. Now used mainly by Air Rescue Service and as a hurricane hunter with the Air Weather Service. Contractor: Boeing Airplane Co. Power plant and manufacturer: 4 Pratt & Whitney R3350-W57 or 57A. Power plant hp/thrusts

2,200 hp. Dimensions: span 141 ft. 2 in., length 99 ft., height 27 ft. 8 in. Speed: about 400 mph. Cellings above 35,000 ft. Range: beyond 4,000 mi. with 10,000 lb. of bembs. Bomb load: 20,000 lb. Armament: 12,50-coliber machine guns. Crew: 11. Maximum gross takeoff weight: 140,000 lb. Primary using command: Air Resuce Service, Air Weather Service.

8-36 PEACEMAKER—strategic heavy bomber, never fired a shot in anger but kept the peace as the first of the great free-world deterrent delivery systems in early days of cold war. Between time of first delivery on August 29, 1947, and last delivery August 14, 1954, 385 8-36s were produced; only USAF aircraft ever copable of attacking a target on another continent and returning to friendly base without aerial refueling. In addition to bomber and reconaissance versions, model designated GRB-36 was equipped as a "mother plane" carrier for RF-84F reconnaissance fighters; it was able to launch and retrieve the smaller aircraft in flight. NB-36H was the world's first aircraft to fly with an operating atomic reactor aboard. Experimental version, Convair-built XC-99 troop and cargo carrier, was capable of carrying 400 fully equipped troops or more than 100,000 lb. of cargo. On February 12, 1959 last 8-36 was retired from the Air Force. Contractor: Convair Div., General Dynamics Corp. Power plant and manufacturers of Fower plant

hp/thrust: reciprocating engines, 3,800 hp each; turbojets, 5,200 lb. each. Dimensions: span 230 ft., length 162 ft. 1 in., height 46 ft. 9 in. Speed: more than 435 mph. Ceillings above 50,000 ft. Range: 10,000 ml. Bomb load/cargo capacity: 100,000 lb. Armament/cameras: 16 20-mm cannon under General Electric fire-control system. The RB-36 also carried 14 different cameras. Crew: 16, including 5-mon relief crew. Maximum gross takeoff weight: over 400,000 lb. Primary using command: was Strategic Air Command; no longer in service. B-47 STRATOJET—medium-jet bomber; one of major components of SAC through the 1930s. Mode 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, tost production model—B-47E—flown first January 30, 1953 and photo-reconnaissance version, the RB-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 racords 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 3 ATO (assisted takeoff) rocket units of 1,000 lb. each; unique landing geor consists of dual main wheels in tandem with single outrigger attached to inboard engine pods. The B-47 program was completed late in 1956. Currently being phased out of inventory, replaced by B-52, B-53 wings. Contractor: Boeing Airplance 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: chove 40,000 ft. Range: beyond 3,000 mi. Bomb load: more than 20,000 lb. Armament: 2 20-mm cannon in fall turret. Crew: 3-pilot, copilot, navigetor/bombardier. Maximum gross takeoff weight: 230,000 lb. Primary using command: Strategic Air Command.

cannon in fail turret. Crew: 3-pilot, copilot, navigator/bombardier. Maximum gross takeoff weight: 230,000 lb. Primary using command: Strategic Air Command.

KB-50J SUPERFORTRESS--tactical cerial tanker, as B-50, originally a strategic bomber replacement for the B-29; was supplied to 3 SAC groups prior to Korea. Them 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. Contractor: Boeing Airplane Co., Hayes Air-craft Co. Power plant and manufacturer: 4 Prott & Whitney R4360-PW35 piston engines, two General Electric 147-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. Celling: about 35,000 ft. Ranger beyond 2,000 ml. Cargo capacity: over 20,000 lb. Crew: 6. Maximum gross takeoff weight: 173,000 lb. Primary using command: Tactical Air Command.

B-52 STRATOFORTRESS--strategic heavy bomber; primary element in SAC taday. First production model flown on August 5, 1954; SAC took delivery of first B-52, June 29, 1954; an November 25, 1956 8 B-52: completed nonstop 17,000-mile flight over the North Pole; 3 B-52: landed at March AF8, Calif., January 18, 1957, after flying around the world in 45 hours 19 minutes. They covered the 24,325 ml. from Castle AFB, Calif., of 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. H has turbofan engines. Contractor: Boeing Airglane Co. Power plant and manufacturer: 8 Pratt & Whitney 157 turbojets. Power plant hp/thrust: 10,000 lb. each engine. Dimensions: (Model A—F) beyond 9,000 ml. Bomb load: (Model A—F) more than 40,000 lb., (Model G and H) span 185 ft., length 40 ft. 8 in. Speed: over 600 mph. Celling: above 50,000 ft. Range: (Model A—F)

Air Command.

B-37 CANBERRA—light bomber; adaptation of English Electric Canberra bomber, now phosed off the USAF active inventory after several years of service with TAC; in use by Air National Guard, Other versions of plane include R8-57 reconnaisance model, T8-57 dual-control trainer, B-57E tow-target aircraft. Contractor: Martin Co. Power plant and manufacturer: 2 Wright 165-5 turbolets. Dimensions: span 64 ft., length 65.5 ft., height 14.8 ft. Speed: aver 600 mph. Ceiling: over 45,000 ft., over 55,000 in stripped-down reconnaissonce version. Ranges 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 comeras. Craw: 2 seated in tandem; 1 in reconnaissance version. Maximum gross takeoff weight: 50,000 lb. Primary using command: Tactical Air Command previously, now Air National Guard.

seated in tandem; I in reconnoissonce version. Maximum gross takeoff weight: 50,000 lb. Primary using command: Tactical Air Command previously, now Air National Guard.

B-58 HUSTLER—strategic medium bomber—reconnaissance plane; world's first supersanic bomber. First flight November 1956. Uses a disposable pod carried beneath its fuselage which makes it unnecessary to haul empty space after weapons or fuel have been expended, poylood, cameras, ECM equipment, fuel can be carried in pod, struts of main landing seer, each with 8 wheels, unusually long to give ground clearance to pod. 8-58 has optimum lift-drog ratio deltawing which imparts stability through relatively slow takeoff and landing speeds to Mach 2 at allitude. Plane in production; SAC crews training at Carswell AFB, Tex; early planes turned over to SAC. Contractors Convair Div., General Dynamics Corp. Power plant and manufacturers 4 General Electric JP? turbojets with other-burner. Power plant hp/thrusts over 10,000 lb. each plus afterburner. 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 midair refueling. Bomb loads nuclear weapons in disposable pod. Armament: 1-1715 20-mm cannon. Crew: 3-poliot, bombardier/navigator, defensive systems operator. Maximum gross takeoff weight: more than 160,000 lb. Primary using commands Strategic Air Command.

B-66 DESTROYER—tactical light bomber; versatile plane; fills Important roles in Composite Air Strike Force. The RB-668, photo-reconnaissance version, first flown June 28, 1954. TAC accepted lists one on february 1, 1956. B-668, flown first January 4, 1955, delivered on March 16, 1956. Latest in the series, the WB-66D weather-reconnaissance aircroft, 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-668s overaged 700 mph ground speed from Tuscon, Ariz, to Crestiview, Fia

B-70 VALKYRIE—strategic heavy bomber; in prototype-development stage of present after current Congress voled funds that in effect overruled Administration decision to cut program sharply. In December 1957, then Secretary of the Air Force James H. Dauglas announced program for Mach 3 B-70, radical superplane for superior to aircraft now is existence. In size 8-70 would be comparable to B-52; cansequently, it would be able to operate from most existing heavy bomber bases, although in most features of design it should represent great advances. Contractor: North American Aviation. Power plant and manufacturer: 6 General Electric J93 turbojets. Power plant hp/thrusts classified. Dimensions: span 115 ft., length 170 ft. Speed: over 2,000 mph (Mach 3) cruine. Cellingt about 70,000 ft. Range: Intercontinental. Bomb load: classified. Armament: nuclear weapens. Crew: 4. Maximum gross takeoff weight: 250 tens. Primary using command: Strategic Air Command.



B-57



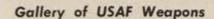
B-58



B-66

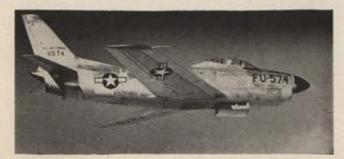


B-70 (ARTIST'S CONCEPTION)





RF-84F



F-86D



F-89H

F-84F THUNDERSTREAK—sectical fighter, Volume production began in 1953; first TAC units were equipped in 1954, in March 1955, it. 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, Bargstrom AFB, Tex., set nonstop jet fighter distance record of 5,118 mi. using in-flight refuelling. Plane had its first flight at Edwards AFB, Calif., in spring of 1951; it has tricycle landling gear, jettisonoble canopy, pilot ejection seat. Production has been completed. Contractor: Republic Aviation Corp. Power plant and manufacturer: Wright Sapphire JdS single jet. Power plant py thrust: 7,200 lb. Dimensions: span 33 ft. 6 in., length 43 ft. 4 in., height 14 ft. 4 in. Speed: over 650 mph. Ceilings above 45,000 ft. Range: beyond 2,000 ml. Bomb load: 4,000 lb. ot 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.

RF-84F THUNDERFLASH—reconnaissance modification of F-84F; made maiden flight in February 1952 at Edwards AFB. Has virtually same characteristic 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 flores in float ejecter cartridges under the wings for night photography. Was the first reconnaissance fighter to have camera control system and a view finder for the piloty also equipped with wire recorder which records piloty's observations during visual reconnaissance. Contractors Republic Aviation Corp. Power plant and manufacturer: Wright Sapphire JdS 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. Ceilings above 45,000 ft. Range: beyond 2,000 ml. Armament/cameras: 4.50-caliber machine guns, standard aerial





F-100C



F-101B

tion of Thunderjets, Contractors Republic Aviation Corp. Power plant and manufacturers General Electric 173 single jet. Power plant hp/thrusts 10,000 lb. Dimensionss spon 33 ft. 6 in., length 43 ft. 4 in., height 12 ft. 4 in. Speeds about 700 mph. Ceilings above 45,000 ft. Ranges beyond 2,000 mi. Bomb loads more than 6,000 lb. conventional, nuclear bombs. Armaments 6.30-caliber machine guns, rackets. Crew: 1. Maximum gross takeoff weights 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 sweptiving 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 fiyers. Was free world's answer to Red MilG jet over Korea. Contractor: North American Aviation. Power plant and manufacturer: F-86F, General Electric 147-27; F-86D, K, I, General Electric 147-33 or 178; F-86H, General Electric 147-27; F-86D, K, I, General Electric 147-33 or 178; F-86H, General Electric 147-32 peomer plant hp/thrust F-86F, 5,970 lb.; F-86D, K, I, 7,650 lb. with offerburner; F-86H, 8,500 lb. Dimensions: F-86F, span 37 ft., length 38 ft., height 15 ft.; F-86D, K, I, span 37 ft., length 40 ft., height 15 ft. Speed: more than 650 mph. Ceilings above 45,000 ft. Range: F-86F, beyond 1,000 mi.maximum. Bomb load: F-86F, 2,000 lb. Armament/cameras: F-86F, 6 50-coliber machine guns: F-86D, I, 24 2.75-in. Mighty Mouse air-to-air cockets; F-86K, 4 20-mm cannon. Crew: 1. Maximum gross takeoff weight: F-86F, 17,000 lb., F-89 CoRPION—cell-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 fovor of F-101s, F-102s, and F-106s. The F-89 is a midwing, twin-engined, all-weather interceptor, monned by a crew of 2, pilot and radar observer, seated tandem in pressurized cockpits, heavy rocket arma



F-102

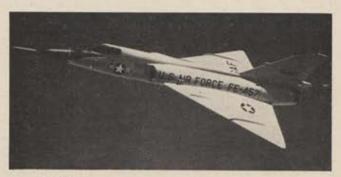


F-105D

Power plant and manufacturer: Prait & Whitney J57-P-21 with afterburner. Power plant hp/thrust: over 10,000 lb. Dimensions: spon 38 ft., length 47 ft., height 16 ft. Speed: over 800 mph. Celling: clover 50,000 ft. Ronges beyond height 16 ft. Speed: over 800 mph. Celling: clover 50,000 ft. Ronges beyond Armament: 4 M-39 20-mm canning. Semb load: conventional or nuclear bombs. Armament: 4 M-39 20-mm canning. Semb load: conventional or nuclear bombs. Armament: 4 M-39 20-mm canning. Semb load: conventional or nuclear bombs. Armament: 4 M-39 20-mm canning. The forces in Europe, Pacific Air Forces, Air Notional Quard.
F-101 VOODOO—all-weather fighter-interceptor; F-101C to been in squadron service with TAC since May 1957. Flone was developed from the XF-88, went supersonic on first flight September 29, 1954. Models include F-101A, F-101B, two-sected long-roage interceptor; F-101C, all-weather, heavily romored toclical fighter; and RF-101. Until the F-104, the F-101 was USAF's fastest, most powerful record of 1,207.5 mph at E-104, the F-101 was USAF's fastest, most powerful record of 1,207.5 mph at E-104, the F-101 was USAF's fastest, most powerful record of 1,207.5 mph at E-104, the F-101 was USAF's fastest, most powerful record of 1,207.5 mph at E-104. The F-104 was USAF's fastest, most powerful record of 1,207.5 mph at E-104. The F-104 was USAF's fastest, most powerful record of 1,207.5 mph at E-104. The F-104 was USAF's fastest, most powerful record of 1,207.5 mph at E-104. The E-104 was USAF's fastest, most powerful record of 1,207. The E-104 was USAF's fastest and the E-104 was USAF's fastest, most powerful record of 1,207. The E-104 was USAF's fastest and the E-104 was USAF's fastest and



F-104



F-106



F-107A

21 ft. 11 in., length 54 ft. 9 in., height 13 ft. 6 in. Speed: over 1,400 mph. Ceiling: above 90,000 ft. Ranget beyond 1,000 mi. Bemb load: conventional and nuclear weapons. Armament: Sidewinders, Vulcan connon. Crew: F-104A and C, 1; F-1048 and D, 2. Maximum gross sakes weight: 20,000 lb. Primary using command: Air Defense Caronal, Tarchi weight: 20,000 lb. Primary using command: Air Defense Caronal, Tarchi weight: 20,000 lb. Primary using command: Air Defense Caronal, Tarchi weight: 20,000 lb. Primary using command: Air Defense Caronal, Tarchi weight: 20,000 lb. Primary using command: Air Defense Caronal, Tarchi weight: 20,000 lb. Primary using command: Esting at Estina APR. Fla. High-peed, Long-range, weight armed F-105 has bemb bay lenger than B-17, fire-control system control of missiles and rockets. Brig. Gen. J. H. Moore, 4th Tactical Fighter Wing Commander, set a new 100-kilemeter closed-course speed record of 1,216.48 mph in early December 1959 in an F-105. Contractor: Republic Aviation Corp. Power plant and manufacturer Frost & Whitney 175 with offerburner. Power plant had manufacturer Frost & Whitney 175 with offerburner. Power plant had manufacturer frost & Whitney 175 with offerburner. Power plant had manufacturer frost & Whitney 175 with offerburner. Power plant had printed to the printed printed to the printed printed to the printed prin

Gallery of USAF Weapons WISSILES

SM-62 SNARK—air-breathing intercontinental-cruise missile; first long-range SAC bembardment missile. High-altitude, sweptwing, single-engine, jet-propelled strategic bombing missile with self-contained, nonjammable, stellar-monitored guidance, nuclear warhead. High-aspect ratio wings mounted near top and forward of center of fuselage; toil consists of vertical stabilizer only. Wings have sow tooth leading edge, elevons, combination alterna and elevators on trailling edge eliminate need for horizontal tail, Extensively tested at numerous ranges; operational of Presque Isle AFB, Me., since end of 1957; missile and zero-launcher highly mobile, can be positioned anywhere in world in few hours. Contractort Northrap Corp. Power plant and manufacturer: Prott & 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 0.00 mh. Ceiling: above 50,000 ft. Range: beyond 6,000 mi. Bomb load: nuclear. Maximum gross takeoff weight: 59,000 lb. Primary using command: Strategic Air Command. SM-62 SNARK-air-breathing Intercontinental-cruise missile; first long-range SAC

Strategic Air Command.

SM-65 ATLAS—Intercontinental ballistic missile, free world's first operational ICBM. Plight testing began at Cape Canaveral June 1957 using A-version missiles with booster engines, dummy nose cones, flights up to 600 miles. Eight such flights preceded tests of complete missile, including sustainer engine and separable nose cone, beginning summer 1958. Full-range 6,000-mile flight mode November 28, 1958; missile fired into orbit December 12, 1958 (talking satellite). In September 1959, following further extensive testing, Atlas declared operational at Vandenberg AFB, Catif., home of USAFs 1st Ballistic Missile Division. Thirteen Atlas squadrons of 10 missiles each programed for 11 USAF bases; missile also slated for space missions including manned space copsule program; basic guidance radio-inertial, advanced versions all-inertial. Contractor: Convair Div., General Dynamics Corp. Power plant and manufacturer: North American Rocketdyne, one-and-a-half stage, liquid fuel. Power plant hy/thrust: about 360,000 lb. takeoff thrust. Dimensions: length 75 to 82 ft. depending on nose cone, diameter 10 ft. Speed: approximately 18,000 mph. Ceiling: about 600 mi. Ranger methon 6,000 mi. 8,050 in later version, achieved 9,000-mile flight in early 1960. Bomb load: nuclear. Maximum grass takeoff weight: about 260,000 lb. of launch. Primary using command: Strategic Air Command.

SM-68 TITAN—intercontinental ballistic missile in latter test stage; expected to

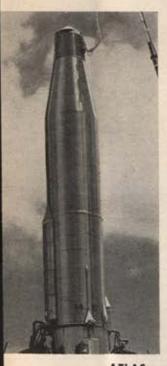
SM-68 TITAN—intercontinental ballistic missile in latter test stage; expected to be operational in 1961. Will be fired from deep, concrete-lined siles from Vandenberg AFB and other sites in Midwest and Far West. Pits 155 feet deep, 40 feet in diameter; later version Titan II will be fired directly from storage position siles gearlier 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 siles. Plans call for Titan squaddrans of 10 missiles each, 5 sites have been announced. Titan, as in case of early Atlas, has radio-inertial guidance, later models all-inertial. Pentractor: Martin Co. Power plant and manufacturer: Aerojet-General RP-1, two-stage liquid propellant. Power plant hp/thrust: 1st stage 300,000 lb., 2d stage 60,000 lb. Dimensions: length 90 ft., diameter 10 ft. Speed: about 15,000 mph. Ceiling: 920 mi. Range: more than 6,000 mi., 9,775 in later version.

Bomb load: nuclear. Maximum gross takeoff weight: 220,000 lb, at lounch. Primary using command: Strategic Air Command.

SM-75 THOR—intermediate-range ballistic missile; full production missile deployed with Royal Air Force in Britain, also to go to Turkish forces. First operational free-world IRBM, initially tested at Cape Canaveral, October 1956, has been post 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; fransportable by air. Contractor: Douglas Aircraft Co. Power plant and manufacturer: North American Rocketdyne single-stage liquid rocket engine. Power plant hy/thrust: 150,000 lb. takeoff thrust. Dimensions: length 62 ft., diameter 8 ft. Speed: Mach 15. Ceiling: 350 mi. Range: beyond 1,500 mi. Bomb load: nuclear. Maximum gross takeoff weight: over 90,000 lb. at lounch.

SM-78 JUPITER—intermediate-range ballistic missile; in production; was developed by Army in conjunction with Chryster Cap. For USAF employment; to be deployed in Italy and Turkey, 15 missiles per squadron. All-inertial guidance system. Contractor: Chryster Cap. Power plant and manufacturer: North American Rocketdyne single-stage liquid rocket. Power plant hp/thrust: 150,000 lb. Dimensions: length 60 ft., diameter 8 ft. 9 in. Speed: 10,000 mph. Ceiling: about 350 mi. Ranges beyond 1,500 mi. Bomb load: nuclear. Maximum gross takeoff weight: 110,000 lb.

SM-30 MINUTEMAN—second-generation, solid-propeilant ICBM; designed around concept of instantaneous, massive response to enemy altack. Small of size and easy to handle, will be mobile on railway lounchers and dispersed in hardened underground sites; currently in intermediate test stage, should be operational in 1962. Contractor: Beeing Aliplane Co. Power plant and manufacturer: Assign solid propeilant, first stage by Thiokol, second and third by Aeroj



ATLAS MACE







THOR



MATADOR





TM-61 MATADOR—air-breathing, factical, surface-te-surface guided missile; was first operational USAF missile, with initial flight December 1950. Basic version had radar-commond 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, Aildeast. Contractor: Martin Co. Power plant and manufacturer: Allison 133.A-37 turbojet plus solid-propellant booster. Power plant hp/thrust: 10,000 lb. and 100,000 lb. from booster. Dimensionas: span 27 ft. 10 in., length 39 ft. 7 in., height 9 ft. 8 in. Speed: more than 650 mph. Celling: above 35,000 ft. Ranger about 600 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.

IM-76 MACE—air-breathing, surface-to-surface guided missile; improved, muchanged version of Matador. IM-76A has improved map-matching guidance system known as AT&N: B model is inertially guided; missile has wide versatility to penetrate enemy electronic detection screens at extreme low level or in upper allitudes. 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 133.A-41 turbojet and solid-propellant booster. Power plant hp/thrust: 10,000 lb. plus 100,000 lb. booster. Dimensions: spen 22 ft. 10 in., length 44 ft. 2 in., height 10 ft. Speed: more than 650 mph. Cellings: above 40,000 ft. Range: about 750 mi. Bomb load: nuclear. Maximum gross takeoff weight: approximately 10,000 lb. Primary using command: Tactical Air Command.

Power plant hp/thrust: 10,000 lb. plus 100,000-lb. booster. Dimensions: span 22 ft. 10 in., length 14 ft. 2 in., height 10 ft. Speed: more than 650 mph. Geiling: above 40,000 ft. Range: about 750 mi. Bomb load: nucleor: Maximum gross takeoff weight: approximately 10,000 lb. Primary using command: Tactical Air Command.

MB-1 GRINE—air-to-air rocket with alomic warbead; unguided, uses tolid-propellont engine. Preliminary studies in October 1953; contract resortiated with Douglas Aircraft, July-August 1954, first tests from F-890 and YF-102, March and May 1955; ADC operational capability, January 1957. Genle has 4 first situatoped leading edges, horizontal tips, vertical trailing edges for free-filight stabilization; carried under the wing of F-89, in missile bay of F-101, F-102, F-104. Contractor: Douglas Aircraft Co. Power plant and manufacturer: MD-1, Aerojet-General Carp. Power plant hp/thrust: about 36,000 lb. Dimensions: length 114.86 in., diameter 17.35 in. Speed: about Mach 3. Ceilling: above 50,000 ft. Ranger about 6 mi. Bomb load: nuclear. Maximum gross takeoff weight: about 360 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 Folton plus a number of improved models including the 1D, 2A, 3A, 4A, the 3, 4, and 11 versions are sometimes termed Super Foltons. The 1 and 3 are rador-homing; 2 and 4 infrared homing; 11 has a nuclear warhead, as such is the notion's first guided nuclear-tipped dir-to-air wapapa. A nuclear GAR-9, no details of which are known, is also under-stood under development, GAR-1D and 2A have been aperational since 1955 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 pythrust about 6,000 lb. Dimensions: length 6 ft. 6 in. diameter 6.5 in., span 1 ft. 8 in. Speed: Mach 2. Ceilling: above 50,000 ft. Ranger beyond 5 mi. Bomb load: conventional workend; 11, nuclear. Maximum gross

mum gross takeoff weight: 9,600 lb. Primary using command: Strategic Air Command.

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. Contractors Martin Co. Power plant and manufacturer: Thiokol Reaction Motors Div. 18.44-RM2 liquid racket. 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: 570 lb. Primary using command: Tactical Air Command.

GAM-87A SKY BOIT—air-lounched ballistic missile (ALBM); now in early development stage, 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 Sky Bolt will extend range and useful life of

FALCONS, FROM LEFT: GAR-11, GAR-1D, GAR-2A, GAR-3



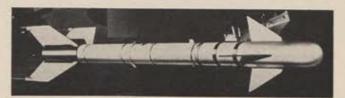
bombers in the inventory. Two or more missiles could be carried on SAC attack aircraft, usually in addition to normal load of nuclear bombs; ALBM's ballistic trajectory and nonjammable guidance would serve well in getting through enemy defenses. Numerous feasibility tests have been conducted. Contractor: Douglas Aircraft Co. Speed: hypersonic. Range: about 1,000 mi. after launch from bombers, at present probably B-521 or B-38s. Power plant and manufacturer: Aerojet-General two-stage solid propellant.

WAGTAIL—air-to-straface toctical-support missile; highly sophisticated weapon on which few details are known; guidance understood built around gyro-reference system enabling missile to evade obstacles on way to target after law-level launch. Cancept calls for use of forward-firing rockets after launch and before ignition of primary power plant, permitting very low velocities while guidance system dispulsate to target. Minneapolis Honeywell is prime contractor.

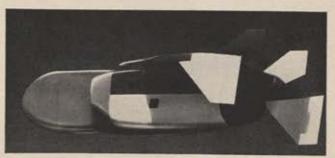
Two further developmental projects on which few details are known at present are the WS-121-B LONGBOW and SLAM. LONGBOW is an air-launched missile project, with the missile believed designed to home on enemy radar as defense measure for attacking US bombers. LONGBOW has supplanted GAM-OROSOW as a developmental missile, with Northrop Corp. prime contractor in both instances. SLAM (Supersonic Low-Altitude Missile) is a project for a nuclear-powered, low-altitude intercontinental missile, a close relative of which is believed to be CLAM, a chemical ramjet missile with roughly the same design concept.



GENIE



SIDEWINDER



QUAIL



BULLPUPS ON FJ FURY

HOUND DOGS ON B-52





Gallery of USAF Weapons

TRANSPORTS

C-45 EXPEDITOR—utility plane; now used primarily for administrative and combatreodiness flying; during and since World War II served as bombardier/navigator trainer, cerial gunnery trainer, multiengine pilot trainer. Contractor: Beech Aircraft Corp. Power plant and manufacturer: 2 Pratt & Whitney R985-AN-14-B piston engines. Power plant hp/thrust: 450 hp each. Dimensions: span 47 ft. 7 in., length 34 ft. 2 in., height 10 ft. 8 in. Speed: 219 mph top speed. Ceilling: 25,000 ft. Ranger 700 mi. Cargo capacity: 5 passengers plus hand baggage or about 2,500 lb. Crew: 2. Maximum gross takeoff weight: 9,000 lb. Primary using command: All USAF commands.

C-46 COMMANDO—corgo-troop carrier; best known for its duty "flying the Hump" with the Air Transport Command during World War II; now is in limited use by Reserve units. Contractor: Curtiss-Wright Corp. Power plant and manufacturer: 2 Pratt & Whitney R2800-75 piston engines. Power plant hp/thrust: 2,000 hp. Dimensions: span 108 ft., length 76 ft. 3 in., height 21 ft. 8 in. Speed: 265 mph. Ceiling: above 25,000 ft. Range: beyond 1,400 mi. Cargo capacity: 12,000 lb. or 50 troops. Crew: 4. Maximum gross takeoff weight: 55,000 lb. Primary using command: USAF reserve forces. NATO, SEATO.

C-47 SKYTRAIN—cargo-troop carrier; popularly known as "Gooney Bird," a historic worldwide workhorse 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 strill 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 seneral-purpose use today. Contractor: Douglas Aircraft Co. Power plant and manufacturer: 2 Pratt & Whitney R1830-90-D. Power plant hp/thrust: 1,200 heach. Dimensions: span 95 ft., length 64 ft. 4 in., height 16 ft. 10 in. Speed: 230 mph. Ceiling: 24,000 ft. Ranger 2,125 mi. Cargo capacity: 7,500 lb., 21 passengers. Crew: 5. Maximum gross takeoff weight: 33,000 lb. Primary using command: All USAF

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 alcraft. Contractor: Douglas Aircraft Co. Power plant and manufacturer: 4 Pratt & Whitney R2000-9 piston engines. Power plant hp/thrust: 1,450 hp each. Dimensions: spon 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 lb., 50 troops. Crew: 3 to 5.

Maximum gross takeoff weight: 82,500 lb. Primary using command: All

C-74 GLOBEMASTER 1—cargo transport; first flight May 1945, at which time be C-74 GLOBEMASTER I—cargo transport; first hight May 1945, of which time become the world's largest land transport alteraft; still in wide use. Civilian version is DC-7, flown by American and foreign airlines. Contractor: Douglas Aircraft Co. Power plant and manufacturer: 4 Pratt & Whitney R4360-49. Power plant hp/
thrust: 3,500 hp. Dimensions: span 173 ft. 4 in., length 124 ft. 2 in., height
43 ft. 9 in. Speed: over 300 mph. Ceilling: above 30,000 ft. Range: 7,000 mit.
Cargo capacity: mere than 50,000 lb., 125 troops. Crews: 5. Maximum gross
takeoff weight: 165,000 lb. Primary using command: Military Air Transport

cargo capacity: more than 50,000 lb., 125 troops, Crew: 5. Maximum gross takeoff weight: 165,000 lb. Primary using command: Military Air Transport Service, other major air commands.

KC-97 STRATOFREIGHTER—strategic aerial tanker; production of 11th and final model in C-97 series, KC-976, completed July 18, 1956. Total of 888 C-97s delivered; C-97 was transport version of 8-29, then modified as version of later 8-50. Until odvent of KC-135, KC-97 was standard SAC aerial tanker; still widely used today, especially to fuel 8-47s and MATS planes. C-97A and C also are in service as MATS and SAC freighters; others converted for SAC command transports. 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: 375 mph. Ceiling: above 35,000 ft. Range: beyond 4,000 mi. Cargo capacity: 96 troops, or 59 litter patients without refueling equipment, or 64,000 lb. Crew: 5. Maximum gross takeoff weight: 175,000 lb. maximum. Primary using command: Strategic Air Command, Milliary Air Transport Service.

C-118 LIFTMASTER—cargo-troop carriers; 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 and manufacturer: 4 Pratt & Whitney R2800-CB-17 piston engines. Power plant and manufacturer: 4 Pratt & Whitney R2800-CB-17 piston engines. Power plant and manufacturer: 4 Pratt & Whitney R2800-CB-17 piston engines. Power plant tand manufacturer: 4 Pratt & Minght 28 ft. 8 in. Speed: 372 mph maximum. Ceilings above 25,000 ft. Range: about 5,000 mi. Cargo capacity: 29,500 lb., or 76 equipped troops. Crew: 5. Maximum gross takeoff weight: 107,000 lb. Primary using command: Milltory A

air command headquarters.

port 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 pythrusts: 3,250 hp takeoff. Dimensions: span 109 ft. 4 in., length 86 ft. 6 in., height 26 ft. 2 in. Speed: 250 mph. Celling: 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

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.

6-121 SUPER CONSTELLATION—cargo-troop carrier-picket aircraft; famous for unique design in which fuselage serves as airfail 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 rodar early-warning picket aircraft fitted with wingtip tonks 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; VC-121 powered by 4 T34 turboorops with over 5,000 lb. thrust he each. Contractor: Lockheed Aircraft Carp. Power plant and manufacturer: 4 R3350 turbo-compound piston engines. Power plant hp/thrust: 3,250 hp takeoff. Dimensions: span 123 ft., length 116 ft., height 23 ft. Speed: 370 mph. Celling: above 25,000 ft. Ranger nearly, 5,000 lb. primary using command: Military Air Transport Service, Air Defense Command. C-123 PROVIDER—assoult transport; made first flight October 1749; designed to spectate from short, unprepared landing strips to land troops and supplies, evocuate 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 & Airglane Corp. Power plant and manufacturer: 2 Praft & Whitney R2800-99W piston engines. Power plant and manufacturer: 2 Praft & Whitney R2800-99W piston engines. Power plant and manufacturer: 4 Praft & Airglane Corp. Power plant and manufacturer and production conservated in middle of fuselage also can qu part of personnel, materies for derivery by parachive or saketil closing; key support circraft in TAC's Composite Air Strike Force, figured prominently in Mideast and For 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 presently experimenting 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 Colifornia, eclipsing on earlier RAF record. Contractor: Lockheed Aircraft Corp. Power plant and manufacturer: 4 Allison 156-A-1A turboprop engines. Power plant hp/thrust: 3,750 equivalent shaft hp at tokeoff; 3,375 equivalent shaft hp normal. 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, 74 litters and 2 attendants, or 36,700 lb. Crew: 4 (5 with load master). Maximum gross takeoff weight: 135,000 lb. Primary using command: Tactical Air Command, United States Air Forces in Europe, Pocific Air Forces.

C-131 SAMARITAN—cargo-troop carrier-trainer; C-131 and T-29 are military

Forces in Europe, Pacific Air Forces.
C-131 SAMARITAN—corpo-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. C-131/T-29 had its first flight in September 1949. Contractor: Convair Div., General Dynamics Corp. Power plant and manufacturer: 2 Pratt & Whitney R2800-99W piston engines. Power plant hp/thrust: 2,500 hp takeoff each.

Dimensions: span 91 ft. 3 in., length 74 ft. 8 in., height 27 ft. 4 in. Speed: more than 300 mph. Ceiling: abave 25,000 ft. Range: beyond 1,000 mi. Carge capacity: 40 passengers, 27 litters, about 12,000 fb. Crew: 2. Maximum gross takeoff weight: 47,000 fb. 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 April 23, 1956, first delivery August 28, 1957. Besically a freighter, C-133A fine floor fle-down facilities which permit installation of 200 airline-type passenger seats; can transport wide variety of carge. Has two loading entrances, fore and aft; simultaneous loading through both doors possible. 2 C-133s can transport the equivalent carge of 5 C-124s; in December 1959 a production model airlifted a record 117,900 fb. of carge to nelltitude of 10,000 ft. Contractor: Douglas Aircraft Co. Power plant and manufacturer: 4 Pratt & Whitney T34-9W turboprops. Power plant and manufacturer: 4 Pratt & Whitney T34-9W turboprops. Power plant and manufacturer: 4 Pratt & Whitney T34-9W turboprops. Power plant 48 ft. Speed ever 350 mph. Celling: above 25,000 ft. Range: 1,000 mi. with 100,000-tb. cargo. Carge capacity: over 100,000 lb. maximum. Crew: 4, plus 1 loadmaster or doctors and nurses. Maximum gross tokeoff weight: 275,000 lb. Primary using command: Military Air Transport Service.

KC-1335 STRATOTANKER—jet aerial tanker; multipurpose, sweptwing tanker-transport in quantity production since October 1954; refuels 8-52, 8-58. 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 refuelling; 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 3 minutes, averaging 469.5 mph; on April 8, 1938, 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 Voadoo to set 3 transcontinental records. Centractor: Boeing Airplane Co. Power plant and manufacturer: 4 Prott & Whitney J57 turbojets. Power plant hp/thrust: 10,000 lb. each engine. Dimensionsts upon 130 ft. 10 in., length 136 ft. 3 in., height 38 ft. 5 in. Speed: over 600 mph. Celling: above 50,000 ft. Ranges beyond 4,500 mi. Cargo capacity: 50,000 lb. er 80 passengers. Crew: 4. Maximum gross takeoff weight: 297,000 lb. Primary using command: Strategic Air Command.

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 deplicate flight paths, approaches, etc., of various modern jets. First production models came into use in July. Contractor: Lock-heed Aircraft Corp. Power plant and manufacturer: 4 Pratt & Whitney JTI-delies. 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: 3,000 ml. Cargo capacity: 10 passengers, or equivalent weight in equipment as appropriate. Crew: 2. Maximum gross takeoff weight: 38,930 lb. Primary using command: Military Air Transport Service, Airways and Air Communications Service.







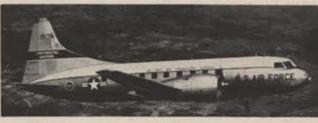
C-118

C-119

C-121



C-123





C-124



C-133



C-130



KC-135 WITH B-52G

C-140





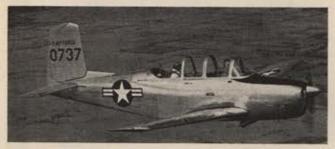
T-28



T-29



T-33



T-34



T-38

T-37





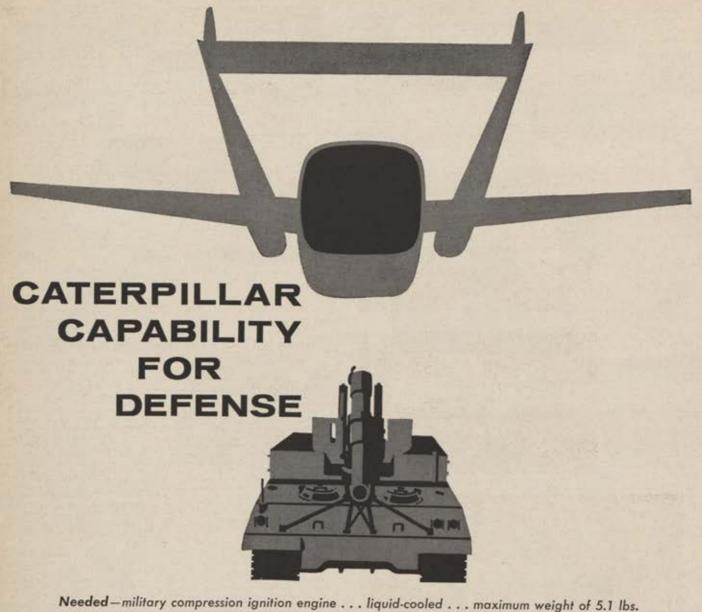
T-39

Gallery of USAF Weapons

TRAINERS

T-28 TROJAN—Primary and basic pilot trainer; in use since September 1949; production completed. Contractors North American Aviation. Power plant and manufacturers ringle Wright 18130-14 pitton engine. Pewer plant hyfbrust 800 mb. 18130-14 pitton engine. Pewer plant hyfbrust 800 mb. Ceiling: above 25,000 ft. Ranges be 26,100 ml. 1816 in deed 218. Dombt. Armament: opinond. 2. 59-ceiliber machine quin. 6. 22.5%. co. 200 common. Maximum grass takeoff weight: 7,000 lb. Primary using command: k1 Training Command.

1-29 FLYING CLASSROOM—bombordier/navigator/rodar operator trainer; T-29 and C-131 are militory versions of the Convoir 240/30/400; are used variously, mainly os troop carriers, for transportation of litter patients, as trainer for bombar-dier/navigator/rodar operators. In T-29 most up-to-det Alf Force navigation, bombar-dier/navigator/rodar operators. In T-29 most up-to-det Alf Force navigation, bombar-dier/navigator/rodar operators. In T-29 most up-to-det Alf Force navigation, bombar-dier/navigator/rodar operators. In T-29 most up-to-det Alf Force navigation, bombar-dier/navigator/rodar operators. In T-29 most up-to-det Alf Force navigation, and rodar plus periscopic sextant facility. T-2901 have the complex "K" bombing system installed, space for only 6 students. T-29 mode first flight September 1949. Contractors Convoir Div., General Dynamics Corp. Power plant and manufacturer. 2 Fort & Whitney R2800-999 histon engines. Power plant hyfbrust; 2,500 hp each. Dimensions; spon 91 ft. 8 in, length 74 ft. 8 in., height 27 ft. 4 in. 500 hp. 2015 hp. Ceiling; observed to the product of the product of



per horsepower . . . minimum output of 500 net horsepower.

Researched - new materials . . . high strength aluminum alloys . . . ways to get high horsepower within critical space and weight limitations.

Produced - compression ignition engine . . . liquid-cooled . . . weight of 5.0 lbs. per horsepower ... output of 500 net horsepower.

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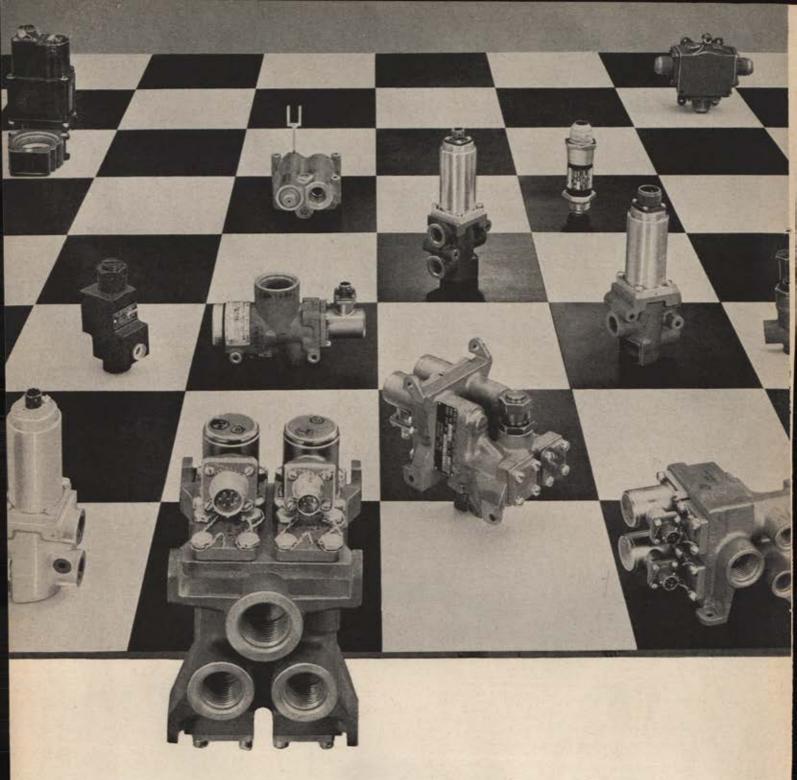
This aluminum compression ignition engine weighs only 2485 lbs. It develops 580 HP at 2200 RPM without fan or generator. No delicate field adjustments are required. It burns a variety of fuels. Liquid cooling maintains engine temperatures within optimum limits under extended high output conditions.

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DIVISION OF CRANE CO.





H-5



H-13



H-12



YH-16

Gallery of USAF Weapons

HELICOPTERS

H-5—crash-rescue helicopter, made first flight October 1943, led to many developments found in later H-19. Contractor: Sikonsky Aircroft Div., United Aircroft Corp. Power plant and manufacturer: Prott & Whitney 8983-ANS. Power plant hy/thrust: 450 hp. Dimensions: blode 49 ft., length 41 ft. 2 in., height 13 ft. Speed: 105 mph maximum. Celling: above 15,000 ft. Ranger about 450 ml. Carge capacity: 3 passengers. 1 attendant. Craw: 2. Maximum grass takeoff weights approximately 6,500 lb.
H-12—troop carrier helicopter, never put into quantity production. Cantractor: Sell Aircroft Corp. Power plant and manufacturer: Prott & Whitney R1340-35.
Power plant hp/thrust: 600 hp. Dimensions: blode 47 ft. 6 in., length 41 ft. 7 in., height 14 ft. 4 in. Speed: above 110 mph. Ceiling: above 13,000 ft. Ranger about 400 mi. maximum. Cargo capacity: 10 passengers or 6 littless and attendant. Craw: 2. Maximum grass takeoff weight: about 7,000 lb.
H-13 RANGER—trainer-administrative helicopter; available with wide assortment of auxiliary equipment; prototype mode first flight March 1946. Limited number put into operational use. Contractor: Bell Helicopter Corp. Power plant and manufacturer; Lycoming V-435 piston engine. Power plant hp/thrust: more than 200 hp. Dimensions: blade 35 ft. 2 in., length 31 ft., height 9 ft. 6 in. Speed: ever 100 mph. Ceiling: above 13,000 ft. Ranger 218 mi. with maximum fuel load. Carge capacity: 2 passengers or 500 lb. Craw: 1. Takeoff weight: 2,500 lb. YH-16A TURBO-TRANSPORTER—troop carrier helicopter; first flight October 1953; substitution of turbine engines for piston lightened weight of helicopter, permitted greater poyloads. Contract terminated. Contractor: Vetto Div., Beeling Airplane Co. Power plant and manufacturer: 2 Allison 138 turboprops (earlier model has 2 Pratt & Whitney R1880-11). Power plant hp/thrust: 3,600 hp total (earlier model greater poyloads. Contract terminated. Contractor: Vetto Div., Beeling Airplane Co. Power plant and manufacturer: Skorsky Aircroft Div., United Aircroft Corp



H-19



H-21



H-43

H-43 HUSKIE—crash-rescue, fire-fighting helicopter; operational only in A model. H-43B, redesigned, improved version, rolled out at Bloomfield, Conn., December 1958. Improvements include lighter engine, "cirplane handling" characteristics through use of rudders in the design. First delivery of B mode in June 1959. On December 9, 1959, Copt. 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. Previous record of 21,982 ft. was set by a Russian MI-1. Contractor: Kaman Aircraft Corp. Power plant and manufacturer: Prott & Whitney R1340-48 piston engine, H-42A; Lycoming T53-1-1A turbine, H-43B. Power plant hp/thrust: 860 hp maximum. Dimensions: span 51.5 ft., length 25 ft. 2 in., height 12.7 ft. Speed: 120 mph maximum, 114 mph cruise. Celling: above 25,000 ft. Range: 232 ml. at cruise speed. Cargo capacity: over 2,500 lb. or 7 passengers plus pilot. Crew: 2. Maximum gross takeoff weight: 6,948 lb. Primarry using command: Strategic Air, Tactical Air, Air Research and Development, Air Defense, Air Materiel, and Air Training Commands; Military Air Transport Service.



SA-16



SB-29

Gallery of USAF Weapons

RESCUE

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 aircroft. Contractor: Grumman Aircraft Engineering Corp. Power plant and manufacturer: 2 Wright R1820-764 or 8 piston engines. Power plant hy/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 possengers plus rescue and aid equipment. Crew: 6. Maximum gross takeoff weight: 30,000 lb. Primary using command: MATS Air Rescue Service.

SB-29—leng-range search modification of 8-29 Superfortress in use by ARS. Contractor: Beeing Airplane Co. Power plant and manufacturer: 4 Pratt & Whitney R3350 W-57 or 57A piston engines. Power plant hy/thrust: 2,200 hp each. Dimensions: span 141 ft. 3 in., length 99 ft., height 17 ft. 9 in. Speed: 400 mph. Ceiling: 35,000 ft. Range: 4,000 mi. Cargo capacity: 20,000 lb. Crew: 11. Maximum gross takeoff weight: 140,000 lb. Primary using command: MATS Air Rescue Service.

MATS Air Rescue Service.

Gallery of USAF Weapons

LIAISON







L-5

L-13

L-20

L-5G SENTINEL—Hoisson-ambulance; high-wing, single-engine, light aircraft in utility use since 1942. Contractor: Consolidated United Aircraft Corp. Power plant and manufacturer: Lycoming 0435-11 piston engine. Power plant hp/Speed: 130 mph. Celling: 15,000 ft. Range: 400 mi. Cargo capacity: about 200 lb. Cameras: optional K-20 camera. Crew: 1. Maximum gross takeoff weight: 2,185 lb. Primary using command: various commands, Air National Guard.

Guard.
L13—Ilaison-ambulance; high-wing, single-engine, lightplane; all-metal, features folding wings and tail permitting easy transport by air or surface; first flight May defo. Contractor: Convolr Div., General Dynamics Corp. Power plant and manufacturer: Franklin 0425-9 piston engine. Power plant hy/thrust; 245 hp.

Dimensions: span 40 ft. 6 in., length 31 ft. 9 in., height 8 ft. 5 in. Speed: 115 mph. Ceiling: 15,000 ft. Range: 400 ml. Carge capacity: 200 lb. and 5 pessengers or 1,000 lb. Crew: 1. Maximum gross takeoff weight: 3,500 lb. Primary using command: various commands, Air National Guard.

L-20 BEAVER—liaison-administration; high-wing, lightplane produced in limited qualities for Air Force and Army since 1947. Contractor: de Havilland Aircroft 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.

Gallery of USAF Weapons

DRONES

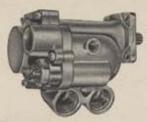
Q-2 FIREBEE—drone, first flight April 1951; can be air- or ground-launched, has parachute-recovery system. ARDC and ADC have two operational squadrons each. Contractor: Ryan Aeronaulical Co. Power plant and manufacturer: Continental 169 or Fairchild 144. Power plant hp/thrust: 1,000 lb. Dimensions: span 11 fix 3 in., length 17 ft. 7 in., height 6 ft. 3 in. Speed: 575 mph. Ceilings 40,000 ft. Range: about 1 hour flying time maximum. Maximum gross takeoff weight: 1,850 lb. Primary using command: Air Defense Command, Air Research and Development Command.
Q-4B—drone; improved version of the Q-4A; expected to be operational in 1961; Q-4A and B are air launched from carrier aircraft. Contractor: Northrop Corp. Power plant and manufacturer: General Electric 185-5 turbojet. Power plant hp/thrust: 2,450 lb. Dimensions: span 13 ft., length 36 ft. Speed: Mach 2. Ceilings: 70,000 ft. Range: about 1 hour. Maximum gross takeoff weight: 3,350 lb. Primary using command: Air Research and Development Command, Tactical Air Command, Air Defense Command.



Q-2

Q-4B





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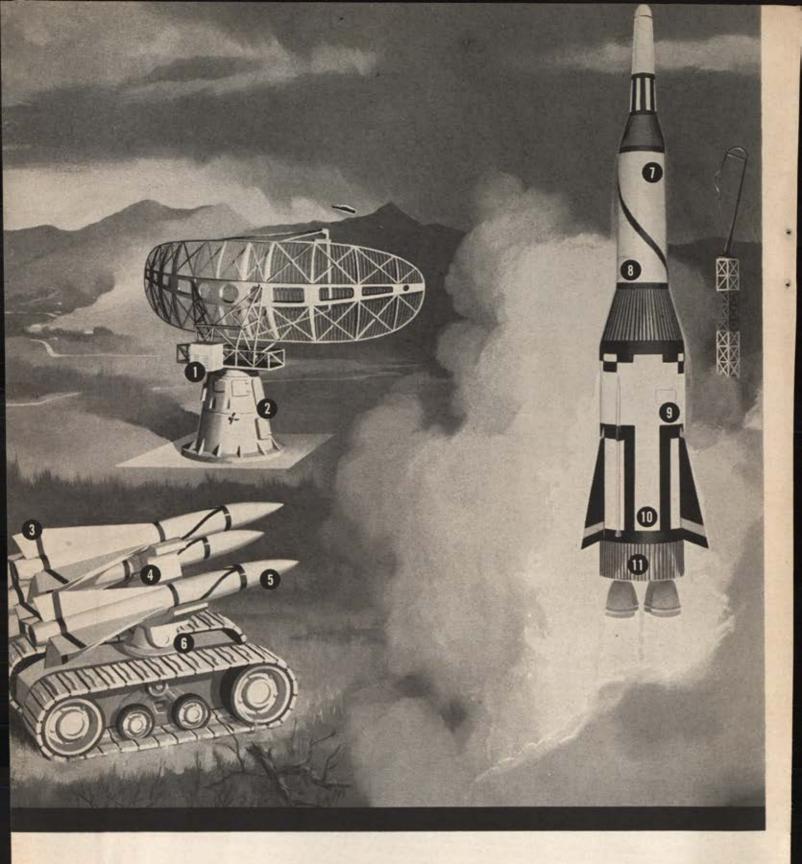
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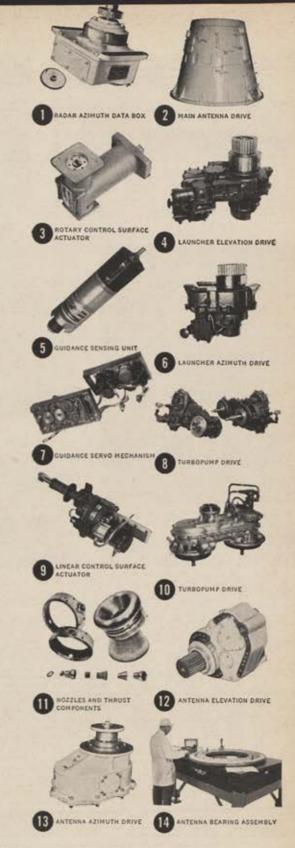
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XV-1



X-14



X-13

X-15



X-17



X-18



XF-103

Gallery of USAF Weapons EXPERIMENTAL

XV-1 CONVERTIPLANE—vertical takeoff/landing experimental craft; designed to study principle of unloaded retor for possible use in larger aircraft; holds unofficial speed record of 200 mph for rotary-wing aircraft; utilizes new-type helicopter rotar, conventional aircraft piston engine, pusher-type propeller, short airplane wings. Pressure iet engines located at tip of each of three rotor blades provide power for helicopter flight; when forward speed exceeds 100 mph, power may be shifted from rotor to conventional aircraft type and overhead rotor allowed to windmill. First flight made April 14, 1955; no further development expected. Contractors McDonnell Aircraft Corp. Dimensions: span 26 ft., length 30 ft., height 10 ft. 8 in. Speed: 200 mph. Cargo capacity; 3 passengers, 2 litters. Crew: 2.

X-13 VERTIJET—vertical takeoff/landing experimental craft; relatively low-speed research jet aircraft designed to explore vertical takeoff and landing concepts as related to moneover in horizontal flight. Has conventional stick and rudder control system for horizontal flight and jet reaction controls for vertical hovering, climbing, descending; in hovering designers have obtained stable, maneuverable flight supported on column of hot gas with no air flowing over surfaces, no landing goar per se, no flaps, doors, dive brakes, catapult, and arresting gear. Takes off from flathed trailer, exects from horizontal to vertical, rises vertically from a cable on the bed of the trailer; several hundred feet in the air pushes over to horizontal flight; landing process is reversed. Experimental program completed. Contractor: Ryan Aeronautical Co. Power plant and manufacturer: Rolls-Royce Avan turbojet, Power plant hp/thrust: 10,000 tb. Dimensions: span 21 ft., length 24 ft., height 15 ft. Speed: about 350 mph. Celling: above 20,000 ft. Range: limited. Crew: 1. Maximum gross takeoff weight: 7,200 tb.

Speed: about 350 mph. Ceiling: above 20,000 ft. Range: limited. Crew: 1. Maximum gross takeoff weight: 7,200 lb.

X-14—vertical takeoff/landing experimental craft; turbojet powered, open cockpit, rises vertically in horizontal position through means of thrust diverter. Fitted with conventional tricycle landing gear, can make ralling takeoff to achieve greater payload and range; air-jet reaction controls normally are used during takeoff and landing. Contractor: Bell Aircraft Co. Power plant and manufacturer: Armstrong Siddeley Viper. Power plant hp/thrust: 1,750 lb. each. Dimensions: span 34 ft., length 25 ft., height 8 ft. Speed: 180 mph. Ceiling: 20,000 ft. Range: limited. Crew: 1. Maximum gross takeoff weight: 3,000 lb.

X-15—manned edge-of-space rocket research craft; undergoing series of captive, glide, and powered flight tests at Edwards AFB, Colif. Product of project conducted jointly by USAF, the prime financial contributor, NASA, Novy, first X-15 rolled out October 1958; total of 3 have been built. There are 4 aims of X-15 program: to obtain knowledge of actual flight conditions beyond the earth's atmosphere; to study such matters as weightlessness, acceleration, and deceleration, X-15 made first successful

powered flight September 17, 1959 after series of glide tests. In flights, plane is carried aloft, launched by B-52 "mother plane." Pilots in X-15 tests thus for have been Scott Crossfield of North American, USAF's Maj. Robert F. White, NASA's Joe Wolker. Contractor: North American Aviation, Power plant and manufacturer: Reaction Motors Div., thickol Corp. liquid-propellant rocket motor (XLR099). Power plant hp/thrust: 50,000 lb. Dimensions: span 22 ft., length 50 ft., height 13 ft. Speed: more than 3,600 mph. Ceilling: approaching 100 mi. Range: flight path distance over 100 mi. Crew: 1. Maximum gross takeoff weight: 31,275 lb. at lounch.

Speed: more than 3,600 mph. Ceiling: approaching 100 mi. Range: flight path distance over 100 mi. Crew: 1. Maximum gross takeoff weight: 31,275 lb. at lounch.

X-17—reantry test vehicle; vertically launched, high-speed, fully instrumented test vehicle designed to provide data for solution of ICBM reentry problem. USAF launched 26 vehicles; 19 successfully fulfilled test requirements. Navy has used X-17 in Polaris program; USAF program complete. Contractor: Lockeed Aircraft Corp. Power plant and manufacturer: 3-stege solid-propellant rockeet. Dimensions: length 75 ft. Speed: 9,000 mph. Cargo capacity: 75-lb. instrument package. Maximum gross takeoff weight: 12,000 lb.

X-18—tilt-wing research craft; mission to investigate VTOL operations for cargo-type aircraft, particular emphasis on transition between vertical takeoff hovering flight and forward flight as normal cirplane; STOL operation as conventional cirplane also possible. Uses basic fuselage of a Chase YC-122C with a new wing; first flight in 1959. Centractor: Hiller Aircraft Corp. Power plant and manufacturer: 2 Allison YT40 turboprop and 1 Westinghouse J34 turboprop engines. Power plant hp/thrust: 5,850 equivalent shoft hp at takeoff for each YT40 and 3,400 lb. thrust for the J34. Dimensions: spon 48 ft., length 63 ft., leight 24.7 ft. Speed: 250 mph. Crew: 2. Maximum gross takeoff weight: 33,000 lb.

X-8-4H-turboprop engine test bed, modification of F-84 iet fighter; originally designed to test supersonic propellers; built to "split" just forward of the canopy to take several different forward sections. First flight was made on July 22, 1955; never entered production. Contractor: Republic Aviation Corp. Power plant and manufacturer: Allison Xf40-A-1 turboprop. Power plant hp/thrust: 5,850 equivalent shoft hp at takeoff. Dimensions: span 33 ft. 5 in., length 51 ft. 5 in., bength 15 ft. 4 in. Speed: transonic. Ceiling: above 40,000 ft. Range: steel; no normal protruding cockpit, periscope providing pilot visibility. No production beyond prototype. Contrac

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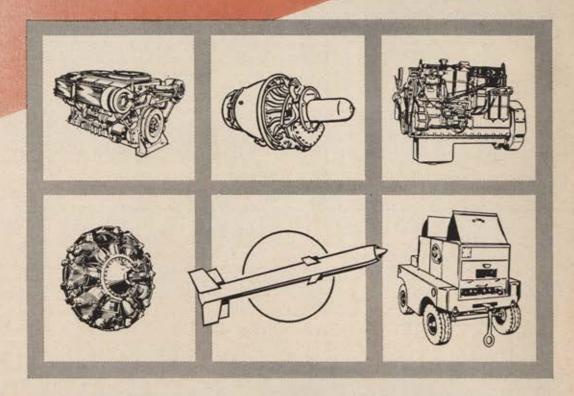
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110A . . . Chemical-Powered Strategic Bomber, B-70

117L . . . Advanced Recon Satellite System

117M ... Samos

119L . . . Jet Tanker/Cargo System, KC-135

125A . . . Nuclear-Powered Strategic Bomber System

131B . . . ASM for B-52, GAM-77 Hound Dog

133A . . . Minuteman

199A . . . SAC System Studies 199Y . . . High-Energy Fuel Studies

Air Defense

WS-200A . . . Missile Interceptor System, IM-99 Bomarc 201B . . . All-Weather Interceptor System, F-106

202A . . . ASG-18 Fire Control and GAR-9 208A . . . GAR System, GAR-11 Falcon

217A... Long-Range Interceptor System, F-101B

221A . . . Sidewinder, GAR-8 System

239A . . . Missile Defense Alarm System (Midas)

299A . . . Air Defense System Studies

Tactical War

WS-300 ... Tactical Air Warfare System 303G . . . Mutual Security/Case, F-104G

306A . . . Tactical Fighter-Bomber System, F-105A

309A . . . Low-Altitude Tactical Missile System, TM-76 A. B. Mace

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323A . . . Tactical Strike-Recon System 398B . . . Theater Ballistic Missile TMX

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400N . . . Transport Carrier/Assault Fixed-Wing Air-

402L . . . Logistic Carrier System, C-133 412L . . . Air Weapons Control System

414M...GB Electronic Countermeasure System 416L . . . Continental AC&W Support System

420A . . . MAP Fighter Weapons System, N-156F

420L . . . Jet Basic Trainer, T-38

424L . . . Intermediate Jet Trainer System 425L . . . NORAD Combat Operations Center

426L . . . Low Supersonic Drone, Q-4

429L . . . Target Drone System, Q-2 Firebee 431L . . . Traffic Control and Landing System

433L . . . Weather Observation and Forecast System

438L . . . Intelligence Data-Handling System 443L . . . Army Helicopter System, XH-40

452L . . . Utility/Trainer Aircraft, T-39

460L . . . Weather Recon Support System

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466L . . . Electronic Intelligence Communication Opera-

467L . . . Advanced Navigational Training Support Sys-

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472L . . . Test Bed Aircraft for Support Systems

473L . . . Hq. USAF Operations Control

474L ... BMEWS

480L... AF Communication System

495L . . . MARK XII IFF

496L . . . Space Track System

497A . . . Miscellaneous NASA System Work

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605A . . . Research Vehicle, X-15 606A . . . AVRO VTOL Aircraft

607A . . . Hiller Tilt Wing VTOL, X-18

609A . . . Hypersonic Environment Test

614A . . . Advanced AICBM 618A... Dispersed Site VTOL

620A . . . Dyna-Soar

625A... Aircraft Nuclear Propulsion Manned 638A... GAM-87 Sky Bolt

649A . . . SAC Experimental Vehicle Studies

649B ... SLAM/CLAM

649C . . . STOL Fighter System

649D . . . Advanced AICBM

649E . . . Space Counterweapons System

649F ... SAINT

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1950

1951

Sgt. Paul P. Ramoneda (posthumous), for extreme courage in the crash of a B-29 aircraft Capt. Daniel J. Miller, USAF, for valorous rescue of six wounded soldiers by helicopter in Korea Capt. Kendrick V. Reeves, USAF, for the rescue of thirty-two men, women, and children from the Mediterranean after their aircraft had gone down at sea.

1st Lt. Edward G. Sperry, USAF, for bravery in testing a B-47 ejection seat. He was severely injured 1953

as a result of this test

Lt. Col. John Paul Stapp, USAF, for exposing himself to wind blasts up to 632 mph and decelerative forces of twenty-five times gravity in tests T/Sgt. William G. Sutherland, USAF, for high cour-

1955 age in an air crash

M/Sgt. Leonard J. Bachetti, USAF, for valor in rescuing survivors from a flaming C-124 Lt. Robert M. Kerr, USAF, for taking the controls

of a T-33 and bringing it to a safe landing, although not himself a pilot, after the pilot was stricken 1st Lt. James E. Obenauf, USAF, for saving the life of a fellow crew member by remaining with his

1958

crippled B-47 and bringing it to safe landing
Capt. Herbert L. Mattox, Jr., USAF, for successfully rescuing all twenty-nine crew members of a
wrecked Japanese trawler by helicopter off Okinawa 1959

THE COLLIER TROPHY

Donated in 1911 by Robert J. Collier, to be awarded each year for the greatest achievement in aviation in America. Administered by National Aeronautic Association.

1950 The helicopter industry, the military services, the Coast Guard for development and use of rotarywing aircraft for rescue operations

1951 John Stack and Associates at the Langley Aeronautical Lab., NACA, for wind-tunnel development

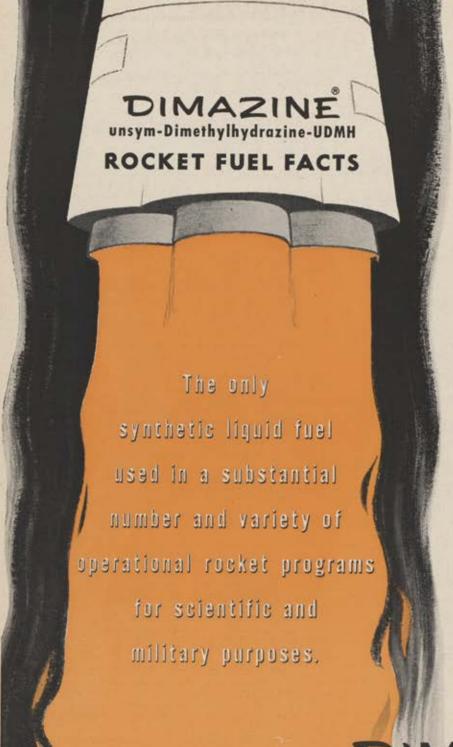
Leonard F. Hobbs, United Aircraft, for the J57 jet 1952 engine

1953

1954

engine
James H. Kindelberger, North American, for the
F-100 Supersabre jet. Edward H. Heinemann, Douglas Aircraft, for the Navy's carrier-based F4D
Richard Travis Whitcomb, NACA, for discovery of
the area rule of airplane design
William M. Allen and Associates, Boeing, for the
Boeing B-52. Gen. Nathan F. Twining and USAF
for sponsoring it and making it operational
Charles J. McCarthy and Associates of Chance
Vought, Vice Adm. James S. Russell and Associates
of the US Navy Bureau of Aeronautics for the F8U
Crusader carrier-based fighter
Edward P. Curtis for his report, "Aviation Facilities
(Continued on page 256) 1956

(Continued on page 256)



and here are some of the many reasons why:

OUTSTANDING ALL-ROUND PERFORMANCE

- Fast, reliable hypergolic ignition with most storable and highenergy oxidants
- Smooth, safe starting and shutdown transients
- · Excellent combustion stability
- High resistance to liquid-phase decomposition and vapor detonation in injectors, coolant tubes
- · High specific impulse:
 - 355 80/20 Fluorine/LOX
 - 344 Fluorine
 - 310 LOX
 - 290 Perchloryl Fluoride
 - 286 Nitrogen Tetroxide
 - 282 98% Hydrogen Peroxide
 - 280 Chlorine Trifluoride
 - 276 IRFNA

(Theoretical Isp. sec-1,000/14.7 psia, optimum expansion, shifting equil.)

- · Excellent efficiency, high actual I,
- Low viscosity, good pumping and fluid-flow properties
- High heat capacity, good coolant characteristics
- Density comparable to hydrocarbon fuels

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- · Ease of handling
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Planning," as Special Assistant to the President USAF and the industry team responsible for the F-104 interceptor; Lt. Col. Howard C. Johnson, USAF, for establishing a world land-plane altitude record; and Maj. Walter W. Irwin, USAF, for estab-lishing a world straightaway speed record in the 1958

DAEDALIAN TROPHY

Established by the Order of the Daedalians, an organization of WW I pilots, to be presented to the major air command with the lowest adjusted aircraft accident rate during the preceding calendar year. Administered by the United States Air Force.

Military Air Transport Service Strategic Air Command 1951 1952 Strategic Air Command Headquarters Command Military Air Transport Service Air Defense Command 1953 1954

1955 Air Research and Development Command 1956

Continental Air Command Tactical Air Command Strategic Air Command 1957 1958

1959

FEDERATION AERONAUTIQUE INTERNATIONALE GOLD MEDAL

For those who have contributed highly to the development of aeronautics; first awarded in 1925. Administered by the Fédération Aéronautique Internationale, US representative the National Aeronautic Association.

1950 Frank Whittle for jet-engine development
1951 Dr. Edward P. Warner, President of the International Civil Aristics Operations.

tional Civil Aviation Organization

1953

1954

No award made
Jacqueline Cochran
Lt. Gen. James H. Doolittle, USAF
Maurice Hurel of France, test pilot, designer, manu-1955 facturer of aircraft

L. Peter Twiss of Great Britain for establishing a world straightaway speed record of 1,132 mph Maj. David G. Simons, USAF, for ballooning to a world altitude record of 101,516 feet Andrey Micholaevich Tupolev, Russia 1956

1957

1958

DANIEL GUGGENHEIM MEDAL

Provision for this medal was made in 1928 to promote aeronautics. Administered by Institute of the Aeronautical Sciences.

1950 Hugh L. Dryden 1951

Igor I. Sikorsky Sir Goeffrey de Havilland, England 1952 Charles Augustus Lindbergh 1953

Clarence Decatur Howe, Canadian Minister of Trade 1954

1955

and Commerce, for promoting air travel, research Theodore von Kármán Frederick B. Rentschler (posthumous) for major achievements throughout a lifetime devoted to avia-1956 tion, with specific reference to the aircraft engine

Arthur E. Raymond, Douglas Aircraft, for develop-ment of a long line of successful civil and military 1957 aircraft

William Littlewood, American Airlines, for leader-ship over a quarter of a century in developing equip-ment, operating techniques of air transports Grover Loening for a lifetime devoted to the ad-1958

1959 vancement of aeronautics in America

HARMON INTERNATIONAL TROPHY (AVIATOR)

Established in 1926 by Clifford B. Harmon, early balloonist and aviator, for outstanding international achievements in the arts and/or sciences of aeronautics for the preceding year, with the art of flying receiving first consideration. Administered by The

Clifford B. Harmon Trust. 1950 Col. David C. Schilling, USAF, for the first non-

stop jet flight between Great Britain and the US 1951 Capt. Charles F. Blair, USAF, for being the first person to fly a single-engine fighter nonstop across the North Pole from Europe to North America Col. Bernt Balchen, USAF, for Arctic operations

1952

1953

Col. Bernt Balchen, USAF, for Arcuc operations including many flights Maj. Charles E. Yeager, USAF, for piloting the Bell X-1A rocket test plane at a speed of 1,650 mph J. F. Coleman, Convair test pilot, for history's first transitional flight from vertical takeoff to level flight in the Navy's XFY-1 VTO experimental fighter 1954

Group Capt. John Cunningham, RAF, for piloting 1955 the de Havilland Comet III on the first around-the-world commercial jet flight

Lt. Col. Frank Everest, USAF, for flights in the Bell X-2 in which he became the first man to fly 1956

close to Mach 3

1957 Gen. Curtis E. LeMay, USAF, for piloting a KC-135 on a nonrefueling record flight from Westover AFB, Mass., to Buenos Aires, Argentina Maj. André Turcat, France, for the first flight at

1958

twice the speed of sound Capt. Joe B. Jordan, USAF, for taking an F-104 to an altitude record of 103,395.5 ft.; Capt. Joseph W. Kittinger, Jr. USAF, for ballooning to a record 76,400 ft. in an open gondola and then parachuting 1959

FRANK M. HAWKS MEMORIAL AWARD

Established by Air Service Post 501, American Legion, in honor of Past Post Vice Commander Frank M. Hawks for outstanding contributions to development of aviation. Administered by Air Service Post 501, American Legion.

Amon G. Carter, for contributions to aviation Thomas K. Finletter, Secretary of the Air Force Robert B. Anderson, Secretary of the Navy Jacqueline Cochran 1951

1952

1953

1954

DeWitt Wallace, publisher of Reader's Digest, for contributions of his publication to aviation Ogden R. Reid, editor of the New York Herald Tribune, for that newspaper's contributions to avia-1955 tion

Henry R. Luce, publisher, for contributions of Time, 1956

Life, and Fortune to aviation Gen. Randolph McCall Pate, USMC, for the Marine 1957

Corps' contributions to aviation Leroy R. Grumman, Grumman Aircraft Wayne W. Parrish, Publisher, American Aviation 1959 Publications

LEWIS H. HILL SPACE TRANSPORTATION AWARD

For research in any or all of the fundamental sciences relating to space travel or space technology, \$5,000. Administered by

Institute of the Aeronautical Sciences.

1958 Dr. Robert H. Goddard (posthumous) for pioneer activities in development of modern rocketry.

1959 Prof. James A. Van Allen, Iowa State University, for establishing the existence, intensity, and extent of radiation belts above the earth

JOHN JEFFRIES AWARD

Established in 1940 by the Institute of the Aeronautical Sciences to honor the memory of the American researcher-physician who joined Blanchard, the French balloonist, in the first aeral voyage across the English Channel in 1785. In recognition of the importance to aviation of scientific endeavor in the field of medicine. Certificate and \$200. Administered by Institute of the Aeronautical Sciences

1950 Brig. Gen. Otis O. Benson Jr., USAF (MC), Commandant, USAF School of Aviation Medicine
1951 Capt. John R. Poppen (MC), USN (Ret.)
1952 Lt. Col. John Paul Stapp, USAF
1953 Capt. Charles F. Gell (MC), USN Naval Aviation

Medicine Acceleration Lab. James P. Henry (MC), WADC, Aero Medical Lab., 1954

1955 Capt. Wilbur E. Kellum USN, Commander, National Naval Medical Research Institute, Bethesda,

1956 Ross A. McFarland, Harvard University, for human

factors research in connection with air transport Maj. David G. Simons, USAF (MC), for a historic balloon research flight 1957

1958 Dr. Hubertus Strughold, USAF School of Aviation Medicine

1959 Brig. Gen. Don Flickinger, USAF, ARDC

KOREN KOLLIGIAN TROPHY

The Koren Kolligian family of Winchester, Mass., donated the trophy in the name and memory of 1st Lt. Koren Kolligian, Jr., USAF, declared missing in a T-33 aircraft off San Francisco in 1955. Administered by the United States Air Force.

1958 Maj. Samuel W. Tyson, USAF, for piloting to safety a crippled passenger-loaded C-97

1959 1st Lt. James E. Obenauf, USAF for saving the life of a fellow crew member and his crippled B-47

1960 1st Lt. Ronald L. Warner, USAF, for landing a crippled passenger-loaded C-119 on a Pacific flight

ROBERT M. LOSEY AWARD
Established by the Institute of the Aeronautical Sciences in 1940 in memory of Capt. Robert Moffatt Losey, an Air Corps meteorological officer. Certificate and \$200. Administered by Institute of the Aeronautical Sciences.

1951

Roscoe R. Braham, Jr., New Mexico School of Mines Ivan R. Tannehill, US Weather Bureau Dr. Vincent J. Schaefer, General Electric researcher Henry T. Harrison, Jr., Chief Meteorologist, United 1952 1953

Hermann B, Wobus, Meteorologist, Project AROWA Lt. Col. Robert C. Bundgaard, Air Weather Service, 1954 1955

USAF

1956 Ross Gunn, US Weather Bureau

1957

Jule G. Charney, MIT Meteorology Professor Patrick D. McTaggart-Cowan, Associate Director, 1958 Canadian Meteorological Service

Herbert Riehl, Professor of Meteorology, University 1959 of Chicago

MACKAY TROPHY

Established by Clarence M. Mackay in 1911. To the Air Force person or persons who made the year's most meritorious flight. Administered by the United States Air Force.

1950 USAF's 27th Fighter Wing for its 1950 mass flight

across the Atlantic.
Col. Fred J. Ascani, USAF, for establishing a new world speed record of 635.686 mph over a 100-km 1951 closed course

Maj. Louis H. Carrington, Jr., Maj. Frederick W. Snook, and Capt. Wallace D. Yaney, USAF, for the first nonstop air-refueled transpacific flight of an 1952 RB-45

40th Air Division (SAC) in recognition of its Opera-1953

tion Longstride

tion Longstride
308th Bombardment Wing (M), 38th Air Division
(SAC), for successfully completing a "leap frog" intercontinental maneuver, proving the combined
operational capabilities of the B-47
Col. Horace A. Hanes, USAF, for establishing a
world's speed record of 822.135 mph in an F-100G
Capt, Iven C. Kincheloe, Jr., USAF, for flying the
Bell X-2 aircraft to an altitude record of 126,200
feet. 1954

1955

1956

1957 93d Bombardment Wing (SAC) for its Operation Powerflight

Tactical Air Command's Composite Air Strike Force 1958 for rapid and effective deployment to the Far East in the Formosa crisis of 1958 USAF's Thunderbirds aerial team for a good-will

1959 tour of the Far East

WILLIAM J. McGOUGH MEMORIAL AWARD

Established by Air Service Post 501. American Legion, in memory of Post Commander William J. McGough. Administered by Air Service Post 501 of the American Legion.

1950 Harry A. Bruno, commemorating forty years of service to American aviation

1952 Arthur Godfrey as "aviation's best friend"

1954 Col. Willard W. Millikan, ANG, for breaking the transcontinental speed record for jet planes

1955 James F. O'Neil, publisher, American Legion Monthly, for his contributions to aviation development

Mrs. James H. Doolittle 1957

SYLVANUS ALBERT REED AWARD
Endowment fund given by the late Dr. Reed to the Institute of
the Aeronautical Sciences, 1933. For a notable contribution to the aeronautical sciences resulting from experimental or theo-retical investigations. Certificate and \$250. Administered by Institute of the Aeronautical Sciences.

1950 Robert R. Gilruth, NACA, for new techniques to obtain transonic and supersonic data

1951

1952

obtain transonic and supersonic data
E. H. Heinemann, Douglas Aircraft, for design and
development of experimental aircraft
John Stack, NACA, for leadership in design, development, and operation of wind tunnels
Ernest G. Stout, Consolidated Vultee, for design
and development of high-speed water-based aircraft
Dr. Clark B. Millikan, Guggenheim Aeronautical
Lab for aeronautical researches 1953

1954 Lab., for aeronautical researches

1955 H. Julian Allen, Ames Aeronautical Laboratory,

NAĆA, for design of supersonic planes and missiles Clarence L. Johnson, Lockheed, for contributions to solving problems in the design of supersonic airplanes and missiles

Prof. Raymond L. Bisplinghoff, Department of Aeronautical Engineering, MIT, for developing ways to calculate aircraft loads and stresses

1958 Victor E. Carbonara, Kollsman Instrument Co., for providing the engineering concepts and leadership in development of navigation systems Karel J. Bossart, Convair, for contributions to de-

sign and development of the Atlas ICBM

RICKS MEMORIAL TROPHY

In honor of late Maj, Gen. Earl T. Ricks, former Chief, ANG. To the winner of the ANG jet race held annually preceding the Air Force Association Convention. Administered by Air Force Association.

1954

1955 1956

1st Lt. Charles J. Young, New Jersey ANG Lt. Col. James A. Poston, Ohio ANG Maj. David F. McCallister, Delaware ANG Maj. Peter R. Phillipy, Pennsylvania ANG Capt. Clarence Christensen, Nebraska ANG Capt. Donald K. Reid, Michigan ANG 1957 1958

1959

DAVID C. SCHILLING AWARD

For distinguished service to airpower in the field of flight, Named for World War II Air Force ace killed in postwar auto accident, Formerly AFA Flight Trophy, Administered by Air Force Association

1950

Capt. James Jabara, world's first jet acc Brig. Gen Albert Boyd, Commanding General, Ed-1951 wards AFB, Calif.

Col. David C. Schilling, USAF 1953

1954

Third Air Rescue Group, MATS Charles Yeager, USAF Maj. Stuart Childs, USAF, and George Welch (post-1955 humous)

1956

Lt. Col. Frank K. Everest, USAF Col. Patrick D. Fleming, USAF (posthumous) Capt. Iven C. Kincheloe, USAF (posthumous) Tactical Air Command, USAF 1957 1958

1959

LAWRENCE SPERRY AWARD Endowment by Elmer A. Sperry, Jr., Edward G. Sperry, and Helen Sperry Lea in 1936 in memory of their brother Lawrence Sperry, pioneer aviator and inventor, who died while attempting

a flight across the English Channel in 1923. \$250. Administered

by Institute of the Aeronautical Sciences.

1950 Frank N. Piasecki, Piasecki Helicopter Corp., for design and development of helicopters

Robert C. Seamans, Jr., MIT, for flight research Dr. Dean R. Chapman, NACA, for flight research 1952

Dr. Donald Coles, California Institute of Technol-1953 ogy, for research contributions

Scott Crossfield, test pilot for NACA at Edwards AFB, for research flights 1954

1955

1956 1957

Al B, for research flights
Giles J. Strickroth, Martin Co., for contributions to
Matador missile guidance
George F. Jude, Sperry Gyroscope Co., for contributions to flight control and all-weather flight
Clarence A. Syvertson, Stanford Univ., for solving
problems of flight for speeds of Mach 30
Robert G. Loewy, Vertol Aircraft, for work in rotarywing aircraft design 1958

wing aircraft design

1959 James E. McCune, Aeronautical Research Assoc. of Princeton, for research contributions

HOYT S. VANDENBERG AWARD

For distinguished service in contributing to public understand-ing of the air age. Named for late former USAF Chief of Staff. Originally called AFA's Air Age Trophy. Administered by Air Force Association.

1950

D. W. Rentzel, Administrator, CAA
Gen. Carl A. Spaatz, first Chief of Staff, USAF
Gen. Hoyt S. Vandenberg, Chief of Staff, USAF
James H. Doolittle, pilot, soldier-scientist 1951 1952

1953 1954

1955 1956

Gill Robb Wilson, Air Force Association
Maj. Gen. Lucas V. Beau, Civil Air Patrol
Arthur Godfrey, Columbia Broadcasting System
Gen. George C. Kenney, USAF (Ret.)
Ralph J. Cordiner, Chairman, Military Pay Study 1957 1958

Committee Dr. Frank E. Sorenson, University of Nebraska 1959

WRIGHT BROTHERS MEMORIAL TROPHY

For significant public service, as a civilian, of enduring value to aviation in the United States. Administered by National Aeronautic Association. 1950 Grover

Grover Loening

Dr. Jerome Clark Hunsacker Lt. Gen. James Harold Doolittle Rep. Carl Hinshaw Dr. Theodore von Kármán 1951 1952

1953

1954 Dr. Hugh L. Dryden Dr. Edward P. Warner 1955 1956

1957 Sen. Stuart Symington 1958 Dr. John Francis Victory

USAF'S TOP ALL-TIME ACES

An aviator who shoots down five enemy aircraft qualifies as an ace. The entire list of USAF aces of three wars numbers in the hundreds. Aces of all US armed services have been invited to attend the Air Force Association National Convention in San Francisco later this month for the purpose of forming a Fighter Ace Association, first organization of US aces ever set up. Here is a composite list of USAF's top aces in the two World Wars and Korea:

I. BONG, Maj. Richard I., 40 victories, Pacific, WW II; Congressional Medal winner; killed in F-80 crash, 1945.

2. McGUIRE, Maj. Thomas B., Jr., 38

victories, Pacific, WW II; Congressional Medal winner; killed over Philippines, 1945; gave name to McGuire AFB, N. J.

3. CABRESKI, Col. Francis S., 37% victories, 8th AF, WW II, and Korea; top ace of 8th AF; on active duty.

4. JOHNSON, Capt. Robert S., 28 victories, 8th AF, WW II; Republic Aviation executive.

5. MacDONALD, Col. Charles H., 27 victories, Pacific, WW II; on active duty.

6. RICKENBACKER, Capt. Edward V., 26 victories, WW I; Congressional Medal winner; Board Chairman, Eastern

7. MEYER, Col. John C., 26 victories,

8th AF, WW II, and Korea; on active duty.

8. PREDDY, Maj. George E., 25.83 victories, 8th AF, WW II; killed over Brussels, Belgium, Christmas Day, 1944.

9. MAHURIN, Col. Walker M., 25% victories, ETO, Pacific, WW II, and Korea; Northrop Aviation executive.

10. GENTILE, Capt. Don S., 23 victories; 8th AF, WW II; killed in T-33 crash in vicinity Andrews AFB, 1950. Gave name to Gentile AF Station, Ohio.

11. WETMORE, Capt. Ray S., 22.59 victories, 8th AF, WW II; killed in aircraft accident near Otis AFB, Mass., 1951.

12. SCHILLING, Col. David C., 22% victories, 8th AF, WW II; killed in auto accident Mildenhall, England, 1956; gave name to Schilling AFB, Kan.

 JOHNSON, Lt. Col. Gerald R., 22 victories, Pacific, WW II; killed in accident, 1945; gave name to Johnson Air Base, Japan.

14. KEARBY, Col. Neel E., 22 victories, Pacific, WW II, Congressional Medal winner; killed over New Guinea,

15. ROBBINS, Col. Jay T., 22 victories, Pacific, WW II; on active duty.

16. CHRISTENSEN, Lt. Col. Fred J., 21% victories; 8th AF, WW II; currently a member of Massachusetts ANG.

17. DAVIS, Lt. Col. George A., Jr., 21 victories, Pacific, WW II, and Korea; Congressional Medal winner; killed over Korea, 1952.

18. GARRISON, Lt. Col. Vermont, 21 victories, 8th AF, WW II, and Korea; on active duty.

19. HERBST, Col. John C., 21 victories, CBI, WW II; top theater ace; killed in F-80 crash, 1946.

20. VOLL, Maj. John J., 21 victories, ETO, WW II; top 15th AF ace; on active duty.

21. WHISNER, Maj. William T., Jr., 21 victories, 8th AF, WW II, and Korea; on active duty.

22. EAGLESTON, Col. Glenn T., 20% victories, ETO, WW II, and Korea; top 9th AF ace, WW II; on active duty.

23. LYNCH, Lt. Col. Thomas J., 20 victories, Pacific, WW II; killed in action,

24. WESTBROOK, Lt. Col. Robert B., 20 victories, Pacific, WW II; top 13th AF ace; killed over Philippines, 1944.

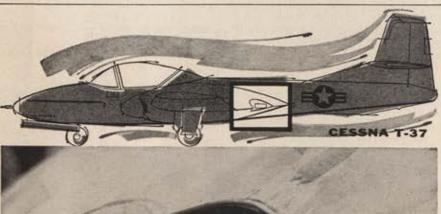
25. ZEMKE, Col. Hubert; 19½ victories, 8th AF, WW II; on active duty.

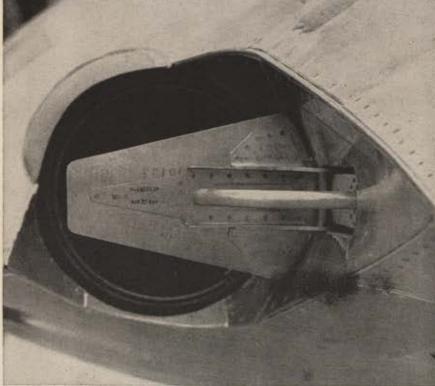
26. BEESON, Maj. Duane W., 19.33 victories, 8th AF, WW II; deceased, 1949, Wright-Patterson AFB, Ohio.

27. DUNCAN, Col. Glenn E., 19 victories, 8th AF, WW II; on active duty.

28. FLEMING, Col. Patrick D., 19 victories, US Navy, WW II (transferred to the USAF after war); killed in B-52 accident in 1956.

29. CARSON, Maj. Leonard K., 18½ victories, 8th AF, WW II; on active duty. 30. JABARA, Lt. Col. James, 18½ victories, 9th AF, ETO, WW II, and Korea. On active duty-END.





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Problem: How to provide, in a jet trainer, instant reserve thrust.

Solution: Cessna T-37's thrust attenuators. Extended, the attenuators deflect exhaust blast, cut effective thrust over 40%; increase landing glide-path control while engines continue at higher power. Should the occasion demand, student retracts attenuators, unleashes full reserve power instantly.

Thrust attenuators are one of many reasons why the low-cost T-37 is the Air Force's standard intermediate jet trainer-and one more of the ways Cessna "Problem-Solving" Research is ever at work to assure America's future in the air.

Military Division, Wichita, Kansas



BENDI

1960 AEROSPACE PANORAMA

SAN FRANCISCO

BROOKS HALL AND CIVIC AUDITORIUM

SEPTEMBER 22-25, 1960

BOOTH NUMBERS 321, 325, 327 424, 428, 430



July 1, 1959 - June 30, 1960

HIGHLIGHTS OF THE YEAR IN THE US AIR FORCE

July 1, 1959—William M. Holaday was assigned to full-time duty as Chairman of the Civilian-Military Space Liaison Committee, following relief from his duties as Director of Guided Missiles, OSD.

July 7, 1959—An RAF crew at Feltwell-in-Suffolk, one of several IRBM sites in Great Britain, gave an impressive demonstration of operational readiness by preparing their Thor missile for firing in sixteen minutes.

July 7, 1959—The Air Force shot a four-stage rocket 750 miles up into space from the Wallops Island, Va., NASA flight station in the first of a series of launchings designed to measure natural radiation.

July 8, 1959—The US announced that 200 USAF fighter-bombers based in France would be moved elsewhere because of President Charles de Gaulle's refusal to permit their nuclear weapons to be stockpiled in his country solely under US control.

July 14, 1959—A Red Air Force singlejet T-431 attained an altitude of 94,658 feet. The Soviet Union submitted documents to the Fédération Aéronautique Internationale for official certification as a record.

July 15, 1959—Air Force Secretary James H. Douglas sent a message via gold telegraph key from the Pentagon to open the communications centers at Hickam AFB, Hawaii, and Fuchu AB, Japan, which were integrated into the Air Force's global communications network.

July 21, 1959—The Air Force successfully launched an Atlas ICBM on a full-range 5,000-mile flight. The launching followed five months of mishaps which had caused a deferment of the Atlas operational date from the planned July 1, 1959.

July 24, 1959—The nose cone of a Thor IRBM fired from Cape Canaveral flew without pitching, yawing, or spinning during its trajectory of 316 miles above earth, achieving the first recorded stabilized, nontumbling flight. July 28, 1959—The second consecutive Atlas missile was successfully launched in a full-range flight from Cape Canaveral. President Eisenhower referred to this series "C" missile as "operational" in his press conference the following day.

July 30, 1959—Gen. O. P. Weyland, Commander, Tactical Air Command, and Gen. Earle E. Partridge, Commander, Continental Air Defense Command, each with more than a third of a century of service, retired from the Air Force.

August 3, 1959—Dudley C. Sharp was sworn into office as Under Secretary of the Air Force replacing Malcolm A. MacIntyre, who resigned as of July 31, 1959.

August 5, 1959—Deputy Defense Secretary Donald A. Quarles was posthumously awarded the Medal of Freedom, the nation's highest civilian award, by President Eisenhower.

August 7, 1959—Explorer VI, a highly instrumented, 142-pound "paddle-wheel" satellite, was launched from Cape Canaveral via a three-stage Thor-Able rocket. The spheroid went into an elliptical orbit with an apogee of 26,400 miles and a perigee of 157 miles, widest so far achieved by a man-made earth satellite.

August 10, 1959—The Air Force canceled a major research program to develop exotic chemical fuels for its proposed Mach 3 B-70 bomber and F-108 interceptor.

August 13, 1959—Discoverer V, a 1,700-pound satellite built around the Thor IRBM as a first stage, was placed in orbit at Vandenberg AFB.

August 14, 1959—The B-58 procurement program was curtained with a reduction of current programs from a planned forty to thirty-two.

August 18, 1959—The President signed Public Law 86-166 providing a compromise \$39.2 billion appropriation to finance the military establishment for FY 1960. The bill provided nearly \$17.5 billion for the Air Force; \$11 billion for the Navy; nearly \$9.4 billion for the Army; and almost \$1.4 billion for the OSD.

August 19, 1959—Discoverer VI was placed in orbit at Vandenberg AFB. August 25, 1959—The first fifty F-100 fighter-bombers left French bases for Western Germany to take up a new, somewhat less favorable stance in the

NATO defense system.

August 30, 1959—The Strategic Air Command announced that SAC pilots had flown more than 4,000,000 hours in jet aircraft since SAC was established on March 21, 1946.

September 1, 1959—A House Committee on Government Operations report recommended a merger of the Army and Air Force on grounds of efficiency, requesting that President Eisenhower should order studies on the possibility of their reunification.

September 2, 1959—The Air Force announced plans to purchase more than sixty turbofan-powered B-52H bombers. This move reflected the attractiveness of this weapon system, equipped to use air-to-surface missiles.

September 3, 1959—A Bomarc-A missile intercepted a Regulus II missile at a height of nearly seven miles. This was the first of a series of tests against supersonic targets by the SAGE-directed interceptor. The Regulus II is capable of speeds in excess of 1,500 mph.

September 9, 1959—Two Atlas ICBMs were fired the same day—one from Cape Canaveral and the other from Vandenberg AFB. The Vandenberg launch was the first successful firing made by the assigned SAC military crew. The Atlas had been formally turned over to SAC by ARDC on September 1, 1959.

September 9, 1959—A Project Mercury capsule containing no living organisms was launched via Atlas ICBM from Cape Canaveral and retrieved successfully downrange 1,500 miles away. Officials said that a man could

(Continued on page 262)



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Kellogg variable volume pumps. From 0.06 to 1.77 c.i.p.r., -65° to +450°F, to 5,000 psi, and to 18,000 rpm.

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- · High volumetric efficiency.
- · Simplified design for maximum life, minimum mainte-
- Highest HP/weight ratio.
 Dependable operation.
- Minimum size.
- · Exceptional contamination tolerance.

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have survived the altitude of nearly 100 miles and speeds of more than 14,000 mph. Interior temperature never exceeded 100°F. although exterior temperature exceeded 3,000°F. September 12, 1959-The Soviet Union launched Lunik II, which made a historic flight of 236,875 miles and succeeded in implanting on the moon a red pennant, the first known object ever sent by man from the earth to another astronomical body. The multistage rocket with an 860-pound spherical instrument package struck the moon on September 14, the day before Premier Khrushchev arrived at Andrews AFB to begin a US tour.

September 15, 1959—The Air Force successfully fired a full-sized model of the Minuteman ICBM in tethered tests from an underground launching pad at Edwards AFB.

September 16, 1959—A four-jet Red Air Force 201-M midwing monoplane piloted by Lt. Col. N. I. Goryainov lifted a ten-metric-ton (22,046-pound) load to a record-breaking altitude of 50,197 feet, then maintained level flight for ten minutes. The record claim was submitted to the Fédération Aéronautique Internationale.

September 17, 1959-The X-15 rocket

plane made its first successful flight under its own power over the Mojave Desert with test pilot Scott Crossfield at the controls. The X-15 exceeded 1,400 mph and rose to an altitude of at least 50,000 feet.

September 18, 1959—Kincheloe AFB (formerly Kinross AFB) in Michigan was dedicated on the twelfth anniversary of the establishment of the Department of the Air Force in honor of Capt. Iven C. Kincheloe, jet ace and test pilot who was killed in a crash on July 26, 1958.

September 20, 1959—The Air Force announced study of a nuclear-powered, supersonic low-altitude missile (SLAM) designed to complement manned bombers and ballistic missiles. SLAM will be powered by a nuclear ramjet engine. Studies of a reactor for such an engine have been under way for several years. Completion of the early developmental phase of the missile, which would be able to travel around the world at supersonic speeds, was said to be several years away.

September 23, 1959—The F-108 longrange Mach 3 jet interceptor project was terminated due to budgetary considerations.

September 23, 1959-DoD announced

that the space and missile program was being reorganized. USAF was given responsibility for all space transportation and, ultimately, was to be put in charge of all space booster rockets. ARPA gave up all space projects to the military services, but was assigned work on solid rocket fuels and on defense against ballistic missiles. The Air Force was made responsible for the final development of Samos, a reconnaissance satellite, and Midas, a ballistic missile early-warning satellite. The Navy was made responsible for Transit, a navigation satellite. The Army was given control of Notus communications satellite.

September 24, 1959—A towering Atlas-Able moon rocket exploded during an engine test, postponing a scheduled US space shot.

September 24, 1959—The Air Force's last B-17 Flying Fortress was "tested to destruction" over Holloman AFB, N. M., in a test of an interceptor missile. With the destruction of USAF aircraft number 0-483717, a giant flock of noble birds, out of place in today's aerospace world, finally became extinct.

September 29, 1959-The new AN/FPS-28 radar system, built around



a fifty-ton boxcar-shaped antenna 104 feet long, began tests for use with the SAGE network to provide warning of an enemy air attack.

September 30, 1959—M/Sgt. Horst W. Tittel, 75, retired from active duty after a fifty-one-year military career which began in 1908, just one year after the Aeronautical Section was established in the Army Signal Corps.

October 2, 1959—The Air Force established the Reserve Forces Study Group under the chairmanship of Maj. Gen. Sory Smith, Commander of the Fourth Air Force. The Study Group was assigned the task of determining long-range requirements and missions of the Air Reserve Forces.

October 4, 1959—On the second anniversary of Sputnik, the Soviet Union launched Lunik III which successfully rounded the moon. The last stage, detached from the rocket after full thrust had been achieved, obtained photographs of the far side of the moon never before seen on earth.

October 13, 1959—The Bold Orion, a two-stage, thirty-seven-foot developmental ballistic missile, was fired from a B-47 in the vicinity of the Explorer VI "paddlewheel" satellite. The missile came within twenty miles of interception of the satellite, which was then 160 miles above the earth and traveling at 22,000 mph.

October 15, 1959—A B-58A production-line plane carrying a standard pod made an eighty-minute high-speed run of 1,680 miles from Seattle, Wash., to Fort Worth, Tex. The plane averaged twenty-one miles per minute, maintaining speeds in excess of Mach 2 for more than one hour. It was refueled en route by a Boeing KC-135 tanker.

October 15, 1959—A B-52 bomber refueling in the air over Hardinsburg, Ky., crashed when its tanker plane exploded. The two nuclear bombs aboard, which did not explode, were recovered.

October 21, 1959—A Russian pilot flying an E-66 cantilevered jet attained an average speed of 1,483 mph. The Soviet Union applied to the Fédération Aéronautique Internationale for official recognition. The previous world speed record of 1,404 mph was set by Maj. Walter W. Irwin, USAF, flying an F-104A Starfighter.

October 30, 1959—The US and Turkey reached agreement for placement of a squadron of Jupiter IRBMs in Turkey. Two Jupiter squadrons were slated for Italy, and four Thor IRBM squadrons on site in England.

November 3, 1959—The first Atlas squadron was integrated into SAC, the first US ICBM unit to reach combat readiness.

November 3, 1959—The Atlas ICBM was successfully airlifted from San Diego to Frances E. Warren AFB, Wyo., by a Douglas C-133 Cargomaster, demonstrating mobility capabilities in connection with the giant missile.

November 4, 1959—SAC announced revision of bombing tactics to include low-level techniques, necessitating establishment of seven low-level training corridors throughout the country. November 6, 1959—A Snark intercontinental-cruise missile testing advanced star-tracking guidance traversed a course of 5,000 miles and landed on a watery target off Ascension Island in the South Atlantic.

November 6, 1959—The National Defense Council of Japan decided to buy F-104Cs and Ds to provide the backbone of Japan's air defense.

November 8, 1959-The Air Force picked Boeing to build the Dyna-Soar space glider and the Martin Company

(Continued on following page)

Imagine a 50-ton Hercules airfreighter lifting off in just 500 feet, from a standing start on an unprepared field. Or picture the big prop-jet stopping after touchdown in 520 feet. This performance of Lockheed's Boundary Layer Control C-130, at mid-point of a 2000-mile round trip mission, is truly remarkable. But its significance goes far beyond the spectacle itself.

The BLC-130 brings true STOL capability to Air Force support missions. Whether it has to rush 92 combat troops to a spreading brush-fire fight, or airlift 18 tons of food to some remote hunger

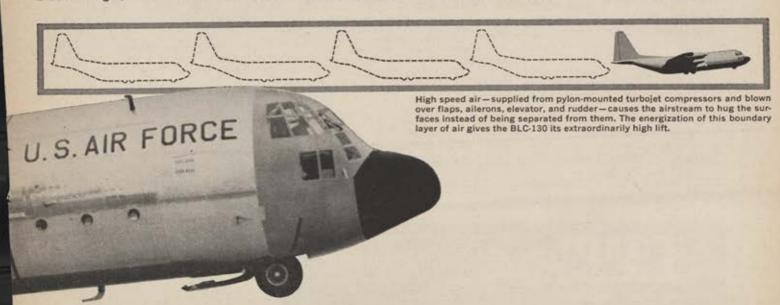
spot, the huge airlifter will be able to deliver its payload closer to the action than ever before possible.

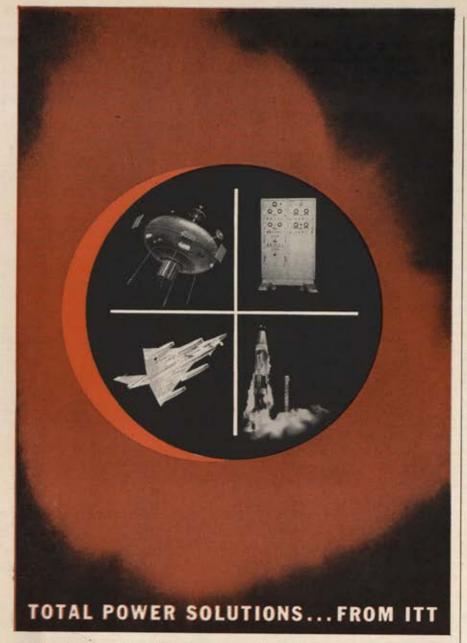
A test bed BLC-130 has completed advanced flight tests, clearly illustrating the feasibility of boundary layer control on big planes.

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HIGHLIGHTS_

to produce rocket boosters to power the vehicle. ARDC was to oversee development and testing of Dyna-Soar.

November 9, 1959—The US and Canada agreed in principle on installation in Canada of American-supplied nuclear weapons for defense of North America.

November 10-12, 1959—A TAC Composite Air Strike Force completed deployment to Europe as part of Exercise Spear Head following a no-notice alert of USAF Hq.

November 11, 1959—USAF announced that the solid-fueled Minuteman ICBM, scheduled to become operational in 1962 or 1963, was to be placed on trains to roam the country along unfixed routes. Thus the missile would provide mobile deterrence; it also was to be emplaced in hardened fixed facilities.

November 14, 1959—A new Aerospace Medical Center was dedicated at Brooks AFB, Tex.

November 16, 1959—ARDC Capt. Joseph Kittinger made a record parachute leap of 76,400 feet from an open balloon gondola hovering at the edge of space over New Mexico. He set a record for open-gondola ascent as well as length of parachute descent and distance of free-fall before chute opening.

November 16, 1959—An agreement reached among the President and his top advisers provided for a FY 1961 defense budget of about \$41 billion, the same as in FY 1960. The conferees agreed to cut 5,000 men each from Air Force and Navy manpower and to deny the Navy a second atomic-powered carrier.

November 20, 1959—The first USAF wing devoted exclusively to operation of satellites, the 6594th Test Wing, was activated in Palo Alto, Calif., and assigned to ARDC's AFBMD. First task: to help develop a working military satellite system.

November 27, 1959—The Air Force announced plans for production facilities for the Minuteman to be set up in the Utah area.

November 30, 1959—A B-47 set an endurance record of eighty hours and thirty-six minutes in a flight covering 39,200 miles, also a record. The flight, equivalent to one and three-fifths times around the world, took off and landed at Wright-Patterson AFB, Ohio.

December 1, 1959—USAF reluctantly announced the reorienting of the B-70 bomber program, drastically cutting back this Mach 3 all-purpose bomber program.

December 1, 1959-First operational

B-58 was turned over to the Air Force by Convair's Fort Worth plant. This was the thirty-first Hustler built. The first thirty went to test programs. Immediate plans call for construction of one more B-58, bringing the total built to thirty-two. Three wings of thirty-six aircraft each were still called for in SAC's programing.

December 2, 1959-Thomas S. Gates, Jr., former Secretary of the Navy, took over as Secretary of Defense from retiring Neil H. McElroy. December 4, 1959-A monkey named

Sam was fired fifty-five miles up into space in a capsule from Wallops Island, Va., and recovered safely in the Atlantic in a successful test of the escape mechanism for a US space capsule. The capsule was identical to that intended for Project Mercury's human passengers. The capsule was eased to earth by two parachutes and picked up by a Navy ship some 200 miles

from launch point.

December 5, 1959-The Air Force dropped 900 aircraft from the inventory to conform to ceilings necessitated by the proposed budget of about \$41 billion. ADC took deep cuts including inactivation of at least eight of seventynine ADC squadrons and dissolution of three regional ADC headquarters. December 8, 1959-NASA announced that it had formed a new unit to develop big rockets, including Saturn, for launching space vehicles. Maj. Gen. Don R. Ostrander, Deputy Director of ARPA, was named to head the program. At the same time, it was announced that ARPA was reduced in status; it would henceforth report to Dr. Herbert F. York, DoD's Director of Research and Engineering, instead of directly to the Secretary of Defense. December 9, 1959-Capt. Walter J. Hodgson and Maj. William J. Davis, USAF, took a Kaman H-43B Huskie helicopter to an altitude of 30,100 feet over Brookfield, Conn., breaking the previous heavy helicopter altitude record of 21,982 feet set by a Russian copter in the spring.

December 10, 1959-Four British rocket bases employing nuclear-tipped Thors were declared to be in a state of readiness preparatory to being de-

clared fully operational.

December 10, 1959-Under Secretary Dudley C. Sharp was named to succeed James H. Douglas as Secretary of the Air Force. Mr. Douglas became Deputy Secretary of Defense.

December 11, 1959-Brig. Gen. Joseph H. Moore of TAC streaked to a new closed-course speed record of 1,216.48 miles an hour in an F-105 at Edwards AFB, breaking the previous mark of 1,100.426 mph set in June by a French pilot in a Mirage III fighter.

December 11, 1959-Capt. Joseph W. Kittinger, Jr., who made the longest parachute jump in history on November 16, jumped again from an open gondola 74,700 feet. The jumps are part of an ARDC high-altitude survival project.

December 14, 1959-USAF Capt. Joe B. Jordan flew his F-104C Starfighter to a new world altitude record of 103,395.5 feet in a flight out of Edwards AFB, Calif. The mark broke the world's record previously set by a Soviet T-431 which ascended to 94,658 feet in July 1959, and an unofficial record set by a carrier-based F4H Phantom II jet, which on December 6, 1959, had attained an altitude of 98,560 feet.

December 15, 1959-USAF's Maj. Joseph W. Rogers flew a Convair F-106 Delta Dart to a new straightaway speed record at Edwards AFB. The ADC's F-106 project officer was clocked at 1,525.95 mph, bettering the old 1,483.83 mph record set by the Soviet Union.

December 21, 1959-USAF accepted the first production GAM-77 Hound Dog air-to-surface missile from North

American Aviation. Two Hound Dogs carried by B-52s can be launched individually to strike over hundreds of miles at targets.

December 22, 1959-The US and Canada agreed on construction of fortyfive new radar stations to fill gaps in the Pinetree air defense line. The new stations were intended to reduce continental vulnerability to low-flying aircraft attack at altitudes below 2,000

December 22, 1959-A joint announcement by President Eisenhower and King Mohammed V revealed that US military forces would be withdrawn from Morocco by the end of 1963. The evacuation would involve four SAC bases at Nouasseur, Ben Slimane, Sidi Slimane, and Benguerir, plus the US naval base at Port Lyautey.

January 2, 1960-Project Mercury's objectives were lowered from a plan to have its Astronauts circle the earth eighteen times in a 150-mile-high orbit on the first two flights to "three-orbit" missiles of four hours each. The reduced objectives were necessitated by budget limitations and rising costs.

January 6, 1960-The US shifted the last of its tactical nuclear bombers (Continued on following page)



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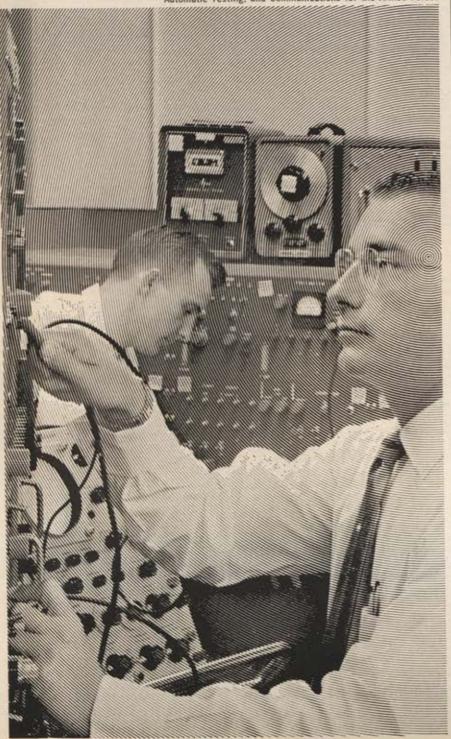
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HIGHLIGHTS_

from France to Britain in a NATO reorganization necessitated by President de Gaulle's position on USAF's nuclear warheads on French soil.

January 7, 1960-President Eisenhower's State of the Union message to Congress reported that fourteen test firings of the Atlas ICBM had averaged hits within two miles of target, well within the circle of total destruction."

January 7, 1960-At a National Security Council meeting, it was revealed, a decision was taken to provide \$1 billion extra to finance an additional seven ICBM squadrons, making a total of twenty-seven Atlas and Titan squadrons constructed or authorized. January 13, 1960-The Thor IRBM

test program ended. The USAF announced plans to use the missile to carry small payloads into orbit and

deep into space.

January 14, 1960-President Eisenhower asked Congress to amend the 1958 space law, calling for the abolition of the National Aeronautics & Space Council, whose job it was to help the President define and coordinate military and civil space programs. He asked authority to assign responsibility for specific space vehicles to either military or civil agencies regardless of their ultimate use.

January 15, 1960-The Air Force Research Division was established within ARDC to coordinate research.

January 18, 1960-Joseph V. Charyk was nominated by the President to be Under Secretary of the Air Force to succeed Dudley C. Sharp. He had served previously as Chief Scientist of the Air Force.

January 20, 1960-The Soviet Union fired a rocket 7,762 miles to a mid-Pacific target area, announcing that the missile fell less than 1.24 miles away from a predetermined point.

January 21, 1960-Miss Sam, a sixpound female monkey, was rocketed up nine and one-half miles above the Atlantic Ocean in a Project Mercury space capsule test of the escape mechanism to be used in US manned spaceflight. The capsule and monkey were retrieved.

January 22, 1960-Another was added to the long string of successful Atlas launches from Cape Canaveral. A 6,300-mile shot fell on target.

January 25, 1960-Air Chief of Staff Gen. Thomas D. White announced that USAF's accident rate fell in 1959 to an all-time record low. There were 675 major aircraft accidents in 1959 compared to 894 the year previous. Total fatalities fell from 705 to 376. Rate of accidents was 8.3 per 100,000 flying hours compared to previous low of 10.4 that was set in 1958.

February 1, 1960-The Air Force's 6549th Test Wing (Satellite), ARDC, first of its kind, took over control of Project Discoverer. The space wing includes a launch squadron at Vandenberg AFB and tracking squadrons in New Hampshire and Hawaii.

February 2, 1960 - A Titan ICBM, fired from Cape Canaveral, achieved separation and ignition of its second stage. It was also the first successful test using a command guidance sys-

February 4, 1960 - Discoverer IX failed. This was the third miss out of nine Air Force Discoverer shots, aimed at developing reconnaissance and warning satellites.

February 5, 1960-The Air Force Reserve program was reorganized to place the training of 100,000 Air Reserve and Air National Guard members directly under major commands that they would supplement in time of emergency. Also included was creation of post-attack recovery units.

February 15, 1960-The US and the UK signed an agreement to cooperate in the establishment of a Ballistic Missile Early Warning Station (BMEWS) at Fylingdales Moor, Yorkshire, in northern Scotland.

February 17, 1960-USAF decided to proceed with development of an 1,000-mile-range air-launched ballistic missile, the GAM-87A Sky Bolt, with Douglas Aircraft as prime contractor. February 24, 1960 - A Titan missile performed a "highly successful flight" of more than 5,000 miles into the South Atlantic. The nose cone recovered from the ocean contained a data cassette and tape recorder expected to give data concerning the blackout period during reentry when telemetry was reduced.

February 29, 1960-The first X-15 of three manufactured by North American Aviation was accepted by the Air Force and turned over to the NASA Research Center at Edwards AFB, for testing beyond that already performed by North American.

March 4, 1960 - Defense Secretary Gates approved the recommendation of the JCS to keep one-eighth of the SAC force airborne instead of the onefourth recommended by Gen. Thomas S. Power, SAC Commander.

March 4, 1960-SAC placed in operation a worldwide radio communications system which could be made operative from any telephone, radioequipped automobile, or command airplane.

March 6, 1960-An automatic nation-

wide bomb alarm system composed of 100 sensor stations was announced. It would flash information instantly to the Pentagon in the event of nuclear attack.

March 8, 1960 - The last of sixty Douglas Thors turned over to Britain's Royal Air Force was flown to Britain in a Douglas C-124 Globemaster. Thors will keep coming off the production line for use in space projects.

March 8, 1960-An Atlas missile using an all-inertial guidance system for the first time flew 5,000 miles downrange from Cape Canaveral scoring the twenty-first straight success for this ICBM, a successful-shot string which was broken two days later.

March 11, 1960-Pioneer V. a beachball-size satellite, was successfully placed into orbit by a Thor-Able booster for the purpose of investigating space between the earth and Venus. The missile carried the most powerful radio transmitter yet put into space; it set a record for long-distance space transmission before ceasing to send some three months and 23,000,-000 miles later.

March 14, 1960 - Operation Big Slam/Puerto Pine began in the Caribbean as a test of US capability in

brush-fire wars - principally, of the adequacy of MATS military airlift.

March 22, 1960-An Air Force plan to let air base commanders shift KP duties from servicemen to hired civilians, if they considered the change more economical than in-service operation, was disclosed. The plan was to begin operation on July 1, 1960.

March 23, 1960-An Air Force F-106 Delta Dart flew 2,500 miles acoss country from Palmdale, Calif., to Jacksonville, Fla., with an automatic navigation/fire-control system doing all but five minutes of the piloting on the cross-country flight.

March 23, 1960 - USAF announced that the first Minuteman site will be at Malmstrom AFB, Mont., with construction slated to begin next January. Three Minuteman squadrons, each with 500 men, are to be at Malmstrom. March 24, 1960 - USAF proposed a drastic cutback in the development of Bomarc-B, asking for \$50 million in-stead of the indicated \$420 million. Budgetary factors and a series of test failures, combined with the Soviet shift in emphasis from manned bombers to ballistic missiles, dictated the

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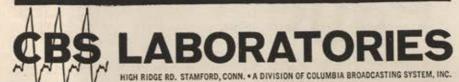
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HIGHLIGHTS_

March 28-29, 1960—President Eisenhower met with Prime Minister Harold Macmillan at Camp David, Md., and reached an agreement in principle that the US would make available to Creat Britain the Sky Bolt and possibly Polaris missiles.

April 1, 1960—Tiros, a photographic, weather-forecasting satellite, was sent into orbit by a Thor-Able booster, scoring a notable first for the US. It began sending back weather photos within bours

April 11-12, 1960—An Air Force B-52 flew from Florida to the North Pole, launched a Hound Dog air-to-surface missile at the climax of its trip, then returned to its home base at Eglin AFB, Fla. The twenty-two-hour, 10,-800-mile nonstop flight demonstrated the long-range capability of SAC bombers and their facility for attacking a target while at the same time staying hundreds of miles away from it.

April 13, 1960—A Boeing Bomarc-B successfully flew at Eglin AFB, Fla. This was the first successful flight in eight tries.

April 15, 1960—USAF placed its Discoverer XI satellite in orbit. Efforts by net-bearing planes to catch its data capsule in the vicinity of Hawaii failed, as they had after previous Discoverer shots. This time the capsule simply stayed in orbit with the satellite.

April 22, 1960—Courtland D. Perkins was confirmed by the Senate as Assistant Secretary of the Air Force. Mr. Perkins had been Chairman of the Aeronautical Engineering Department at Princeton University.

April 22, 1960—An Atlas missile was successfully fired from its new coffin launch complex at Vandenberg AFB. The complex was pronounced "operational," thereby giving the US two operational firing sites at Vandenberg for the ICBM.

April 22, 1960—USAF announced that the annual Mackay Trophy for meritorious flight went this year to the Thunderbirds, USAF jet demonstration team, for their Far East good-will tour last fall. The Cheney Award for valor went to MATS helicopter pilot Capt. Herbert L. Mattox, Jr., for the successful rescue of twenty-nine men from a sinking Japanese trawler. The Daedalian Trophy for flight safety went to SAC.

April 25, 1960—The Air Force ordered the nuclear-tipped Falcon (GAR-11) missile, the first in its class. Intended for use by ADC interceptors, it is designed to be especially effective against enemy ECM systems, and will supplant the Genie, which lacks the selfcontained guidance system.

April 27, 1960—The Air Force announced completion of its technical review of Dyna-Soar and released \$29.7 million which had been held up pending the review. The USAF also requested additional funds to make up a total of nearly \$100 million spent or earmarked for Dyna-Soar.

April 27, 1960—The British House of Commons endorsed the decision of Prime Minister Macmillan to abandon the Blue Streak ballistic missile, which had already cost \$280 million, in favor of the US-developed Sky Bolt.

April 28, 1960—The SEATO powers launched Operation Sealion, a major air-sea exercise involving sixty-four ships, 100 aircraft, and 20,000 men from the US, Australia, France, Britain, New Zealand, the Philippines, and Thailand.

May 1, 1960—A US U-2 high-altitude jet reconnaissance plane was shot down near Sverdlovsk in the central USSR while on a military intelligence mission. The incident set in motion a chain of military and diplomatic repercussions the consequences of which were to continue unfolding for many months and possibly years.

May 12, 1960-USAF claimed a new world record for a heavy-equipment parachute drop when a Lockheed C-130 Hercules dropped 35,000 pounds in one bundle over the desert within the naval air station at El Centro, Calif. A British RAF plane held the old mark of 31,000 pounds. Cargo in the bundles, dropped under 100foot diameter chutes, was scrap metal. May 15, 1960-Soviet Russian rocketeers launched a five-ton (9,988pound) spaceship carrying what was described as a dummy spaceman into orbit around the earth, heaviest successful artificial satellite so far.

May 18, 1960—Bomarc concluded its most successful week of test shots with six successful interception firings out of a total of seven launches. The firings included the second successful Bomarc-B in a flight 270 miles over Eglin AFB.

May 19, 1960-Maj. Bob White took X-15 number one to an altitude of 107,000 feet, highest so far for the test plane, at Edwards AFB.

May 20, 1960—Immediately in the wake of the U-2 incident and the still-born Paris summit meeting, Red fighter planes forced down a USAF C-47 over East Germany when it strayed across the Iron Curtain in a routine run from Copenhagen to Hamburg. Aboard were seven men and one woman passenger. The USAF plane and all aboard were

released unharmed four days later. May 20, 1960-Atlas set a new missile distance record with a 9,000-mile flight from Cape Canaveral to the Indian Ocean. The missile took 521/2 minutes for the trip and carried a 3,000-pound dummy warhead plus 1,000 pounds of instruments. The longest previous shot, 7,762 miles, was by a Russian "super-rocket" fired into the mid-Pacific in January 1960. May 21, 1960-USAF's last World War II B-25 bomber departed from the active inventory in a ceremony during Armed Forces Day observances at Eglin AFB, Fla.

May 24, 1960—A developmental Midas (Missile Defense Alarm System) satellite was placed in orbit.

May 27, 1960-A SAC missileman acted as test conductor for the first time in a successful Titan shot from Cape Canaveral.

May 29, 1960—Ten stained glass windows were dedicated in the chapel at Offutt AFB, SAC Headquarters, to commemorate and symbolize the mission and achievements of SAC flyers in keeping the peace through deterrence.

May 31, 1960-Tiros I, one of the most successful US satellites, scored another technological first two months after it was sent into orbit by firing two spin rockets to increase its stabilizing spin. June 1, 1960—Exercise Mobile Yoke, the cross-Pacific deployment of 120 fighters and other planes of a Composite Air Task Force to Southeast Asia, began,

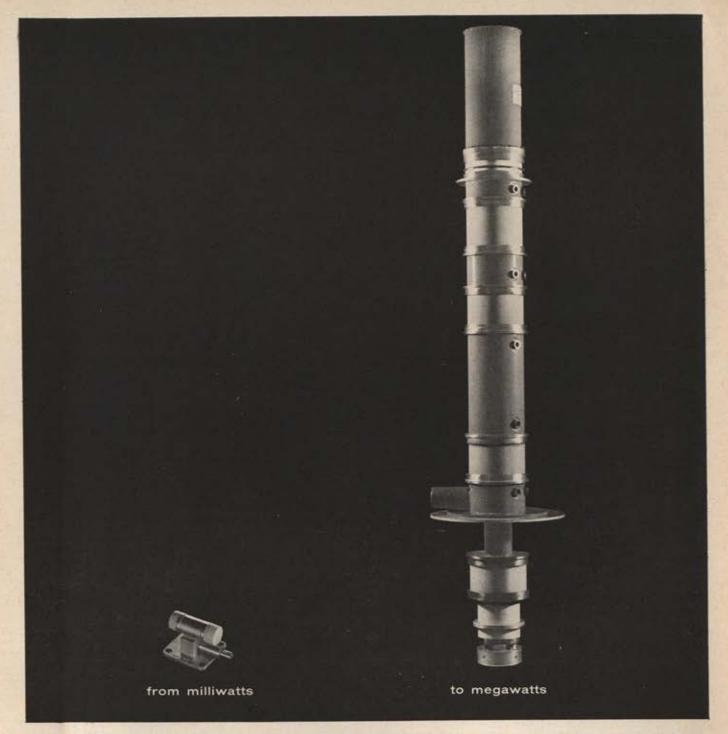
June 1, 1960—The USAF began to buy up sites around Malmstrom AFB, Mont., for the first big complex of Minuteman missiles. The first squadron is to have fifty-five ICBMs in underground launching sites spread out over three counties in Montana.

June 2, 1960—A Bomarc-A interceptor missile, nearing its final dive on a target, was shifted to a second, more deadly target in a test firing. The interception and the switch were both conducted on command by the SAGE system located at Gunter AFB, Ala., although the actual interception occurred 100 miles out over the Gulf of Mexico.

June 7, 1960—A Bomarc missile armed with a nuclear warhead caught fire on its pad near McGuire AFB, N. J., and set off a radiation alarm. The fire was believed to have been caused by a bursting helium bottle.

(Continued on page 271)





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June 8, 1960-A SAC B-52 fired a GAM-72 Quail decoy missile off the Eglin AFB test range for the first

June 8, 1960-The second Air Force Academy graduating class was told by Secretary Dudley C. Sharp that during their careers they might well be faced with the problem of establishing bases on other planets.

June 9, 1960-The Air Force planned to use many civilian airports around the US as "temporary dispersal bases' for B-47 bombers. This measure will give substantial additional dispersal to SAC bombers and thus add to their retaliatory capability.

June 11, 1960-An Atlas ICBM with a new, advanced inertial guidance system flew 5,000 miles downrange and landed in an intended impact area off Ascension Island.

June 13, 1960-The USAF and the Association of American Railroads signed an agreement calling for the use of more than twenty rail lines during communication and control tests to last until November 1960 for the purpose of determining the feasibility of surface movement of Minuteman ICBMs, Hill AFB, Utah, was designated control center for the program. First train run began on June 20 at

June 15, 1960-A USAF KC-135 jet tanker piloted by Capt. Joseph Blaylock set a new Japan-East Coast speed record by flying 7,175 miles from Yokota AB, Japan, to Seymour Johnson AFB, N. C., in twelve hours, thirty-two minutes. Aboard was CASF Commander Maj. Gen. Henry Viccellio, returning home at the end of CASF Far East deployment exercise Mobile Yoke.

June 20, 1960-The Air Force announced that it had contracted for Titan II, a bigger, unjammable, longerrange version of the ICBM that would carry a heavier warhead and be "faster on the draw." The advanced model will have storable liquid fuel, will be fired directly from underground silos, have an all-inertial guidance system. June 22, 1960-The US put two satellites into orbit with a single rocket shot from a Cape pad-first such double shot in space-launch history. Included in Uncle Sam's two-pack were the Navy's Transit II-A, second experimental navigation satellite, and a basketball-like aluminum research sphere. Booster was a USAF-Space Technology Laboratories Thor-Able-Star in its second successful performance as a

June 25, 1960-USAF established the Aerospace Corporation, a multimillion dollar, nonprofit civilian organization to manage engineering, research, and development aspects of missile and space programs. It took over work performed previously by Space Technology Laboratories, a subsidiary of the Thompson Ramo Wooldridge Corporation. STL retained responsibility for a number of advanced Air Force projects. June 25, 1960-The last antiaircraft gun in the North American air defense system phased out of the picture. That day, the 2d Gun Battalion of the Army's 68th Artillery, Camp Lucas, Mich., a unit of NORAD, was deactivated.

June 27, 1960-The Soviet delegate led five Communist delegations in a walkout from the Geneva disarmament sessions shortly after US chief delegate Frederick M. Eaton had presented a new three-stage disarmament proposal. The Conference was suspended.

June 28, 1960-USAF presented an Atlas missile to the National Air Museum of the Smithsonian Institution and the Institution awarded the Langlev Medal posthumously to Dr. Robert H. Goddard, founder of modern rocketry in a dual ceremony in Washington. Mrs. Goddard accepted the Medal. June 29, 1960-USAF fired its Discoverer XII satellite at Vandenberg, but it failed to reach orbit.

June 29, 1960-DoD authorized the use of ICBMs as targets against which a prototype Army Nike-Zeus would be fired in antimissile-missile development tests. Some of the missiles will be fired from Vandenberg AFB by Air Force personnel, with the Nike-Zeus to attempt interceptions in launches from Kwajalein Island, 4,800 miles

out into the Pacific.

June 30, 1960-A joint House-Senate conference approved for submission to the White House a FY '61 military budget of \$39.996 billion including a net of \$750 million added to the President's original request. The conferees increased funds for the B-70 from \$75 million to \$265 million, bringing the program to full developmental status. They provided for continuation of Bomarc-B, doubled the \$85 million asked to prepare for an airborne alert, and added \$145.7 million to speed up Samos, Midas, Discoverer, and the mobility capability of Minuteman.

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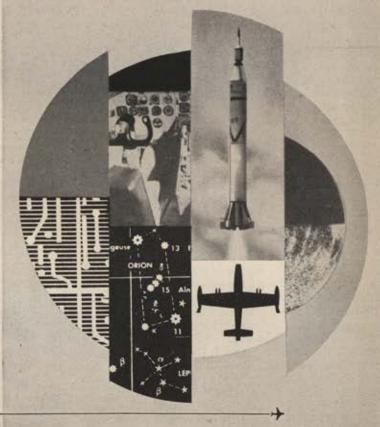
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airman's bookshelf

The Year in Aerospace Power Books

The 1959-60 bumper crop of aviation and aerospace books set an alltime high. More than 250 volumes appeared. Over 126 of these featured the Air Force.

Seventy-seven hard-cover and thirtyfour paperback books dealt exclusively or predominantly with Air Force topics, a nearly fifty percent increase over totals for last year. Emphasis again, as in previous years, fell on history, missiles, rockets, and space. Here are some of the highlights:

History

Memoirs of World War I, by Brig. Gen. William Mitchell (Random House, \$5)—First publication of "Billy" Mitchell's World War I journal, detailing his experiences as observer and participant in aerial combat on the Western Front.

Hellbirds: The Story of the B-29s in Combat, by Wilbur H. Morrison (Duell, Sloan & Pearce, \$3.50)—Personal account of air combat against the Japanese by a B-29 crewman.

The Sky Suspended: The Story of the Battle of Britain, by Drew Middleton (Longmans Green, \$5)—A foreign correspondent's dramatic recreation of the air action that saved Britain.

The Hurricane Story, by Paul Gallico (Doubleday, \$3.95)—The story of this famous British fighter and the men who flew her.

Air Epics of World War II; Stories of the Planes and the Men Who Flew Them, by Arch Whitehouse (Doubleday, \$4.50)—World War II aerial combat dramatically revisited.

Fighter Aircraft of the 1914-1918 War, edited by E. F. Cheesman (Harleyford, England, \$8.50)—An illustrated historical encyclopedia of WW I aircraft of all nations.

The Life and Death of the Luftwaffe, by Gen. Werner Baumbach (Coward-McCann, \$3.95) – Former Luftwaffe general tells the story of Nazi airpower from start to finish.

Kriegie, by Kenneth W. Simmons (Nelson, \$3.95)—Personal story of an American airman captured by the Germans, his imprisonment and participation in a "death march" at the end of the war.

Famous Bombers of the Second World War, by William Green (Hanover, \$3.95)—A reference history of twelve major English, American, German, and Italian bombers.

Great Aircraft, by Norman Macmillan (St. Martin's, \$5.95)—An assessment of ten aircraft which have been milestones in aviation history through war and peace.

Historical Turning Points in the German Air Force War Effort, by Richard Suchenwirth (Research Studies Institute, Air Univ., Historical Study # 189) —A study of the Luftwaffe's defeat.

The German Air Force General Staff, by General-Leutnant Andreas Nielsen (Research Studies Institute, Air Univ., Historical Study #173)—A comprehensive analysis of wartime Luftwaffe.

A History of Air Rescue Service, edited by John L. Vandergrift (Air Rescue Service)—An illustrated narrative of the accomplishments of the ARS past and present.

Grand Old Lady: The Story of the DC-3, by Lt. Col. Carroll V. Glines, USAF, and Lt. Col. Wendell F. Moseley, USAF (Pennington, \$3.95)—The life story of the famous "Gooney Bird."

There Shall Be Wings: A History of the Royal Canadian Air Force, by Leslie Roberts (Clarke, Irwin, Toronto, Canada, \$5)—A highly readable history of the RCAF.

The Story of the US Air Force, by Robert Loomis (Random House, Landmark Book, \$1.95)—A history of the USAF with a foreword by General LeMay. (For the young adult.)

Transport Planes That Made History, by David C. Cooke (Putnam's, \$2.50)—US military and civilian transport planes in photo and narrative from 1921 to present. (For the young adult.)

Racing Planes That Made History, by David C. Cooke (Putnam's, \$2.50) —A photo-text survey of famous racing planes from the early days of flight to the post-WW II era. (For the young adult.)

Biography

Saint-Exupery, by Marcel Migeo (McGraw-Hill, \$5.75)—Biography of the great literary airman Antoine de Saint-Exupery.

Daughter of the Sky: The Story of Amelia Earhart, by Capt. Paul L. Briand, Jr., USAF (Duell, Sloan & Pearce, \$3.95)—Well written biography of the American woman air pioneer.

Sabrejet Ace, by Charles Coombs (Wheeler, \$2.20)—The dramatic personal story of Capt. Joseph McConnell, Jr., USAF triple-jet ace in the Korean air war. (For the young adult.)

General Billy Mitchell, by Helen Woodward (Duell, Sloan & Pearce, \$3.50)—Biography of this famous airpower pioneer based on the classic biography of Mitchell by Isaac Don Levine. (For the young adult.)

The Wright Brothers, by Henry Thomas (Putnam's, \$2.50)—Simplified biography of the Wrights. (For the young adult.)

Fiction

Bombers in the Sky, by Arch Whitehouse (Duell, Sloan & Pearce, \$3)— Eleven fiction-based-on-fact stories about the men and planes who fought in the skies over Europe, the Mediterranean, and the Pacific in the second World War.

The War Lover, by John Hersey (Knopf, \$5)—Novel dealing with the AF bomber offensive of the Eighth Air Force over Europe, WW II, and featuring the combat tour of one B-17 crew.

Shoulder the Sky, by George Leonard (McDowell Obolensky, \$4.50)—Novel about life and duty at an air training base in the South during World War II.

Tour of Duty, by Walter J. Sheldon (Lippincott, \$3.95)—Novel dealing with community relations problems confronting an AF base in Japan.

Flight from Ashiya, by Elliott Arnold (Knopf, \$3.95)—Novel about Air Rescue Service operations out of Japanese bases.

Falcons to the Fight, by Joe Archibald (Macrae Smith, \$2.95)—An interesting sports novel about the USAF Academy football team. (For the young adult.)

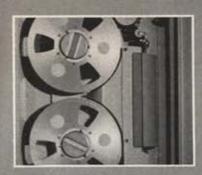
Wings for Peace, by Marian Talmadge and Iris Gilmore (Dodd, Mead, \$3)—Novel dealing with the training, life, and experiences of Cadets at the USAF Academy. (For the young adult.)

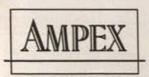
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AIRMAN'S BOOKSHELF_

Service Topics

The Report on Unidentified Flying Objects, by Edward J. Ruppelt (Doubleday, \$3.95)—New, revised edition encompassing USAF official accounts and analyses of continuing flying-saucer reports.

The Story of the US Air Force Academy, by M/Sgt. Lawrence C. Landis, USAF (Rinehart, \$3.95)—Narrative presentation of the history, organization, operations, physical plant, and curriculum of the Air Force Academy.

Twenty Seconds to Live, by Elizabeth Land (Dutton, \$3.25)—The heroic story of AF Lt. Jim Obenauf, who stuck with his burning B-47 to save the life of a fellow crewman in one of the most stirring incidents of the post-Korean years.

Sky Sentry: A SAC Crewman in Service, by Arnold Brophy (Dodd, Mead, \$2.75)—Photo-narrative story of SAC told through the experiences of a B-52 crewman. (For the young adult.)

Jet Pilot Overseas, by Henry Lent (Macmillan, \$3)—Story of a new Air Force lieutenant and his first combat assignment overseas. (For the young adult.)

Aviation in the Modern World, by James V. Bernardo (Dutton, \$5.95)—Comprehensive essay discussion of aircraft, missiles, and spacecraft and their impact on human existence, society, and way of life.

Space Sentry, by Arnold Brophy (Dodd, Mead, \$2.75)—Authentic picture story of the life, training, and duty of an AF combat missileman. (For the young adult.)

R&D: Missiles, Rockets, Space

Nuclear Flight: The United States Air Force Program for Atomic Jets, Missiles, and Rockets, edited by Lt. Col. Kenneth F. Gantz, USAF (Duell, Sloan & Pearce, \$4)—Twenty-two articles by military and civilian experts on USAF's nuclear-powered aircraft R&D program.

Man High, by Lt. Col. David G. Simons, USAF (MC), with Don A. Schanche (Doubleday, \$4.50)—Colonel Simons' personal story of his recordbreaking 102,000-foot ascent in a balloon-borne gondola, the first significant manned probe into outer space over Minnesota in 1957.

Rockets of the Air Force, by Erik Bergaust (Putnam's, \$2.50)—A photocaption presentation of AF rockets and missiles, with connecting narrative.

Rocketship X-15: A Bold New Step in Aviation, by Myron Gubitz (Messner, \$4.95)—The detailed story of the X-15 from conception to present including recent flights, written against the historical background of highspeed, high-altitude testing by USAF from WW II days through the X-2.

The Missilemen, by Mel Hunter (Doubleday, \$4.95)—A picture-text chronicle of the men, missiles, mission, and operations of the AF Missile Test Center, Cape Canaveral.

Physics and Medicine of the Atmosphere and Space, edited by Maj. Gen. Otis O. Benson, Jr., USAF, and Dr. Hubertus Strughold (Wiley, \$12.50)—Reproduction of the AF's Second International Symposium on the Physics and Medicine of the Atmosphere and Space held in San Antonio, Tex., November 1-12, 1959. Consists of forty-five papers read by experts from the US and foreign nations.

First into Outer Space, by Ted Gordon and Julian Scheer (St. Martin's, \$3.95)—The story of man's first space probe—the joint USAF-NASA Pioneer I shot which climbed 71,000 miles before it fell back into the atmosphere.

Atlas: The Story of a Missile, by John L. Chapman (Harper, \$4)-A history of USAF's Atlas ICBM through design, R&D, testing to operational status in terms of the men and the program. (An AeroSpace Book Club selection.)

Space Technology, edited by Howard Seifert (Wiley, \$22.50)—Thirty-eight papers by US space specialists covering the full range of space science.

Space Handbook; Astronautics and Its Applications, by Robert W. Buchein (Random House, \$3.95)—An authoritative RAND study in lay terms of space technology.

Soviet Air and Rocket Forces, edited by Asher Lee (Praeger, \$7.50)—Collection of lengthy monographs by US, British, and Russian experts dealing with Soviet airpower from 1917 to

The Challenge of the Spaceship: Previews of Tomorrow's World, by Arthur C. Clarke (Harper, \$3.50)— Speculation on the impact of space exploration on mankind,

Vistas in Astronautics, Vol. II, edited by Morton Alperin and H. F. Gregory, USAF (Pergamon, \$15)—Papers surveying scientific and technological progress in astronautics read at the Second Annual AFOSR Astronautics Symposium, Denver, Colo., 1958.

Handbook of Geophysics, by the Ge-

ophysics Research Directorate USAF (Macmillan, \$15) - Comprehensive presentation of International Geophysical Year data-from satellite and rocket explorations, to Arctic expeditions, solar observations, balloon flights, and thousands of meteorological observa-

The Exploration of Space, by Arthur C. Clarke (Harper, \$4.50)-New, revised edition of this classic with latest information on US rockets, missiles, and space technology.

Interplanetary Flight, by Arthur C. Clarke (Harper, \$3.50)-This new edition contains applications of the latest space technology and astronautical achievements.

War for the Moon, by Martin Caidin (Dutton, \$4.95)-An up-to-date account of US and Russian lunar probes of 1958 and 1959 and of US space exploration from early plans to Pioneer V.

Satellites and Space Probes, by Erik Bergaust (Putnam's, \$2)-Brief, concise picture survey of Russian and US space probes, satellites, space pro-

The Dawning Space Age, by H. E. Mehrens (Civil Air Patrol, \$2)-The history, development, present status, and future applications of rockets,

missiles, and space travel.

Fundamentals of Guided Missiles: Design, Theory, Operations, Maintenance, by the USAF (Aero, \$12.50)-Commercial reproduction of Air Force Manual 52-31, basic text used by technical service schools.

New Dimensions of Flight, by Lewis Zarem (Dutton, \$3.95)-Comprehensive coverage in picture and narrative of USAF aerospace hardware, experimental aircraft, missiles, and space vehicles; research and development in missilry and man-in-space fields, and discussion of basic principles and disciplines of astronautics.

Man's Reach into Space, by Roy A. Gallant (Doubleday, \$3.50)-A beautifully color-illustrated account of the history, R&D, and progress to date in man's efforts to prepare himself for physical survival in the hostile environment of space. (For the young

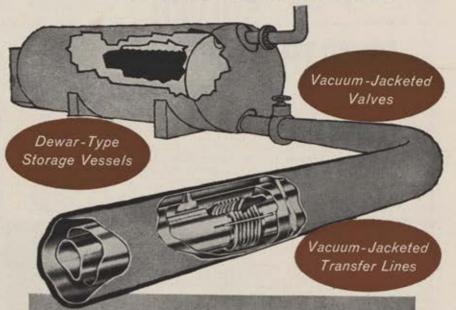
adult.)

Gateway to Space, by Charles Coombs (Morrow, \$3.95)-Highly illusstrated story of the Air Force Missile Test Center, Patrick AFB, Fla., and the men, facilities, and operations at the test launching site and downrange tracking sites. (For the young adult.)

Space Volunteers, by Terence Kay (Harper, \$2.75)-The story of scientists who subject themselves to gruel-(Continued on following page)

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ing tests to advance space programs; features such men as Col. John Stapp and Scott Crossfield. (For the young adult.)

The Rockets Red Glare: The Challenge of Outer Space, by Mortimer W. Lawrence (Coward-McCann, \$2.75)—Illustrated account of work being done in spacecraft design and preparation for space travel. (For the young adult.)

Stations in Space, by Donald Cox (Holt, Rinehart, Winston, \$2.95.)—A summary of known facts about space stations of the future and the equipment needed to launch and maintain them. (For the young adult.)

Countdown: The Story of Cape Canaveral, by William R. Shelton (Little, Brown, \$3.50)—The development of rocketry from scientist Robert Goddard through the German V-2 to present US rocket, missile, and satellite programs at Cape Canaveral. (For the young adult.)

Man and Space, by Clive Davis (Dodd, Mead, \$2.75)—A photo-narrative report on our present knowledge of the universe around us. (For the young adult.)

Airmanship and Reference Texts

The Aerospace Year Book, 1960 edition, edited by James J. Haggerty, Jr. (American Aviation Publications, \$10)—Annual edition of this complete, illustrated photo-text survey of American aviation and space plans and progress in the year 1960.

Warplanes of the World, by J. W. R. Taylor (Simmons-Boardman, \$1.95)

-Presentation of all leading operational military aircraft of the world.

Aircraft Annual, 1960, by J. W. R. Taylor (Simmons-Boardman, \$2.95).

Aircraft and Missiles, by D. M. Desoutter (De Graff, \$7.50)—An illustrated basic text and reference covering aeronautical engineering and related topics.

Aerospace Dictionary, by Frank Gaynor (Philosophical Library, \$6)— An up-to-date dictionary of aerospace words and terms.

USAF Aerospace Craft, Releasable Data, by Office of AF Information (Air Force Pamphlet 190-2-1, June 1, 1960) -Photo and statistics of all USAF weapons and weapon systems.

Interim Aerospace Terminology Reference, by the Terminology Branch of the Air Staff (Air Force Pamphlet 11-1-4, October 30, 1959)—Glossary of aerospace terms and definitions that have appeared in AF publications and official papers.

A Chronology of American Aerospace Events, by the Office of AF Information (Air Force Pamphlet 190-2-2, March 18, 1960)-Lists all significant American aviation and missile events, with emphasis on the AF. chronologically from 1903.

The World's Fighting Planes, by William Green and Gerald Pollinger (Hanover, \$3.50) - New edition of this picture-narrative reference on current military aircraft of all nations.

It's Your Life, Joe: An Expert's Advice on Air Safety, by Col. A. M. "Chick" Henderson, USAF (Ret.) (Vantage, \$2.95)-Former AF parachute expert and Asst. Chief, Aero Medical Laboratory, WADD, writes an informative, entertaining narrative on parachuting and care of personal flying equipment.

The Air Force Blue Book, edited by Tom Compere (Military Publishing Institute, \$1.50)-1960 edition of this yearbook-almanac of the USAF, with articles on major commands and AF operations and statistics covering the AF today and in the past.

Big Eight: The Biography of an Airplane, by Richard Hubler (Duell, Sloan & Pearce, \$5)-The story of the Douglas DC-8 jet transport.

Related Professional Topics

Strategy in the Missile Age, by Bernard Brodie (Princeton Univ. Press, \$6.50) -Outstanding professional analysis of modern military strategy and forces; a RAND Study.

No High Ground, by Fletcher Knebel and Charles W. Bailey, II (Harper, \$4)-The story of the atom bombing of Japan and the history of the AF unit which carried out the operation.

Known but to God, by Quentin Reynolds (John Day, \$3.95)-The story of America's three Unknown Soldiers in Arlington National Cemetery, recreated in fictional form.

The War: A Concise History, 1939-1945, by Louis L. Snyder (Messner, \$7.95)-A comprehensive one-volume history of World War II.

Deterrent or Defense: A Fresh Look at the West's Military Position, by B. H. Liddell Hart (Praeger, \$5)-A searching and critical analysis of Western defense measures in the light of up-to-date strategy.

Neither War nor Peace: The Struggle for Power in the Postwar World. by Hugh Seton-Watson (Praeger, \$6) -A history and analysis of the past fourteen years of cold war.

National Security in the Nuclear Age, edited by Richard D. Challener and Gordon B. Turner (Praeger, \$6)-

A searching analysis of strategy problems facing the US today covering classical and modern theories of warfare, limited war, unbalanced forces, NATO, unification, economic aspects of air, land, and sea forces, the role of US in modern strategy and its utilization of contemporary weapons.

War Through the Ages, by Lynn Montross (Harper, \$10)-New, enlarged edition of this survey of war from 490 B.C. through Korea.

Defense: Policy and Strategy, by E. J. Kingston McCloughry (Praeger, \$6)-Analysis of changing concepts of war and present-day defense strategy of the US and her allies.

Guide for the Military Writer, by John W. Gause (Stackpole, \$4.95)-Reference-text containing advice on military writing of all kinds-official letters, reports, estimates, staff studies, memoranda, speeches, documented monographs, articles for commercial publication, books, news releases.

The Professional Soldier, by Morris Janowitz (Free Press, \$6.75)-A study of the current organization of the military services and their leadership as it has evolved during the past fifty years.

Controls for Outer Space, by Philip C. Jessup and Howard J. Taubenfield (Columbia Univ. Press. \$6)-An examination of the urgent need for space law against a background of international agreements governing control of land and sea areas.

The Ocean of Air, by David I. Blumenstock (Rutgers Univ. Press, \$6.75) -A comprehensive, highly readable examination of the atmosphere and the history of its scientific exploration.

Massive Retaliation: The Policy and Its Critics, by Paul L. Peeters (Regnery, \$5)-An approving study of US foreign policy under late Secretary of State John Foster Dulles.

The Longest Day, June 6, 1944, by Cornelius Ryan (Simon and Schuster, \$4.95)-Dramatic recreation of the first twenty-four hours of the allied invasion of Normandy told through accounts of fighting men in the air, on land, on the sea.

The Joint and Combined Staff Officers Manual, by Col. Jack D. Nicholas, USAF, Col. George B. Pickett, USA, and Capt. William O. Sears, Jr., USN (Stackpole, \$4.50)-A guide book for all who serve on joint staffs.

The Survival Book, by Dr. Paul H. Nesbitt, Alonzo Pond, and William H. Allen (Van Nostrand, \$7.50)-A complete, comprehensive, civilian manual for survival under all possible elimatic and geographical situations.

Education and Military Leadership: (Continued on following page)

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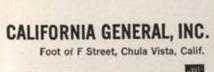
AIR FORCE Magazine . September 1960



Yes...The world has shrunk and now the Universe is shrinking, due to man's restless thirst for knowledge.

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A Study of the ROTC, by Gene M. Lyons and John W. Masland (Princeton Univ. Press, \$5)—A study of the ROTC with emphasis on the postwar period.

Paperbacks

The Night Hamburg Died, by Martin Caidin (Ballantine, 50¢) – The gruesome but gripping story of the great July-August RAF fire raids on Hamburg, Germany.

X-15: Man's First Flight into Space, by Martin Caidin (Ridge, 25¢)-A simplified picture story of the X-15 and the men who are responsible for the program.

Air Force, by Frank Harvey (Ballantine, 50¢)—Collection of eight Harvey stories about the AF previously published in national magazines.

MIG Alley, by Robert Eunson (Ace, 35¢)—Novel of the air war in Korea and the battle of the Sabrejet vs. the MIG-15.

Fighting Generals, edited by Phil Hirsch (Pyramid, 35¢)—Anthology of dramatic stories of generals in combat in WW II.

Space Weapons, by the editors of Air Force/Space Digest (Praeger, \$1.45)—Authentic report on USAF R&D progress in missiles, aerospace medicine, spaceflight.

Bombs in Orbit, by J. Sutton (Ace, 35¢) - Dramatic science fiction of manned satellite destroying three bombs put in orbit by the enemy.

bombs put in orbit by the enemy.

Command Decision, by William W. Haines (Bantam, 35¢)—Reprint of this WW II classic air novel.

Thunderbolt! by Robert S. Johnson with Martin Caidin (Ballantine, 35¢)—Biography of twenty-eight-victory AF ace Bob Johnson and his experiences fighting the Luftwaffe in WW II.

Red Alert, by Peter Bryant (Ace, 35¢)—A novel of the men of SAC during the first two hours of World War III.

Flight, by Edgar Jean Bracco (Berkley, 35¢)—Anthology of true stories about the exploits of American air aces in WW II based on the current TV series, "Flight."

Skip Bomber, by Lloyd E. Olson (Ace, 35¢)—Dramatic story of the men who flew B-17s in the Pacific on wartime skip-bombing missions against Japanese warships.

Alas, Babylon, by Pat Frank (Bantam, 50¢)—A novel of life in America after a nuclear exchange in World War III.

Rockets Through Space, by Lester Del Rey (Premier, 50¢)-The story (Continued on page 280)

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45

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3. ATLAS The Story of a Missile By John L. Chapman

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Bu Bernard Brodie

Here is a balanced, objective analysis of the fundamental military problems presented by modern warfare . . . a book to stimulate thought, conversation, and action. No one who is concerned with airpower and its place in military strategy in the years ahead can afford to miss this important new book. Bookstore price \$6.50.

5. SOVIET STRATEGY IN THE NUCLEAR AGE

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THE GREAT DECISION

By Michael Amrine

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Alfred Goldberg, Editor

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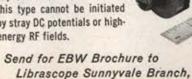


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D-Day: The Sixth of June, 1944, by David Howarth (Pyramid, 50¢)-The story of the men of all branches of the service who stormed Hitler's Atlantic Wall on June 6, 1944.

The Star of Life, by Edmond Hamilton (Crest, 35¢)-Novel about the first Air Force man to orbit the moon in the Mercury capsule.

Flight Nurse, by Adelaide Humphries (Berkley, 35¢)-Novel about the life, work, and love of an Air Force flight nurse.

Man into Space, by Lloyd Mallan (Fawcett, 75¢)-Picture-narrative on astronautics, spaceflight, and the preparations being made for man's survival in space.

Flying Tiger: Chennault of China, by Brig. Gen. Robert L. Scott, USAF (Ret.) (Berkley, 35¢)-The story of the great WW II air leader in action in the CBI as chief of the famed Flying Tigers.

Luftwaffe, by Gerhardt Muller (Associated Booksellers, 35¢)-A novel about a German fighter pilot in World War II.

Hurricane Squadron, by David Richards (Associated Booksellers, 35¢)-Dramatic account of RAF battles over the Mediterranean in WW II.

The Liberators, by Richard T. Bickers (Associated Booksellers, 35¢)-A story of the lives and the combat duty of the American bomber crews flying B-24 Liberators over Germany.

Jungle Pilot, by Richard T. Bickers (Associated Booksellers, 35¢) - Account of English fighter pilots in aerial combat in the Far East in WW II.

They Flew the Atlantic, by Robert de la Croix (Monarch Books, 35¢). Stories of the early Atlantic flyers and their daring feats pioneering the transoceanic air routes.

The Next Fifty Years of Flight, by Col. Bernt Balchen, USAF (Ret.) and Erik Bergaust (Viking, \$1.25)-Reprint of a prophetic look to the future.

The Bomb: The Story of Hiroshima, by Fernand Gigon (Pyramid, 50¢)-A study of the medical documentation on radiation disease resulting among the Japanese who survived the first atomic bomb blast.

Night Intruder, by Richard T. Bickers (Associated Booksellers, 35¢)-A novel about British naval maneuvers and counterfighting in the Middle East during World War II.

(Continued on following page)

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Flight 685 Is Overdue, by Edward Moore (Ace, 35¢)—Novel about attempted suicide and murder aboard a Chicago-Miami commercial airliner.

P.O.W., by Charles Dick (Associated Booksellers, 35¢) – Story of Allied POWs in German prison camp in WW II.

The Rise and Fall of Hermann Goering, by Willi Frischauer (Ballantine, 50¢)—A biography of Hermann Goering, WW I German ace and chief of the Nazi Luftwaffe, WW II.

Space Handbook: Astronautics and Its Applications, by Robert W. Bucheim and the staff of the RAND Corporation (Modern Library, \$1.25)—Guide to spaceflight and exploration of the universe.

The Rest Must Die, by Richard Foster (Gold Medal, 35¢)—Imaginative, terrifying novel of New York City during A-bomb attack by the Russians. Realistic study of mass hysteria, fear, and mob violence in the subways as the city's superstructure above is destroyed.

Berlin, by Theodore Pliever (Ace, 50¢)—A story about the beleaguered, war-torn city.

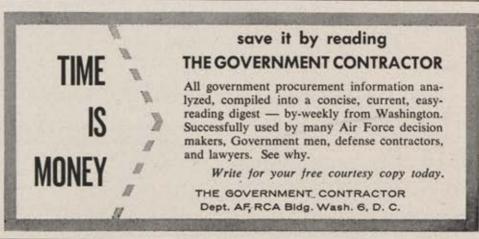
The Big Show, by Pierre Clostermann (Ballantine, 50¢)—Reissue of this fighter pilot's day-by-day story of 400 aerial engagements against the Luftwaffe in World War II.

Boeing 707, by Martin Caidin (Ballantine, 50¢)—A story of America's first all-jet commercial airliner in photo and narrative. Highly descriptive account of 707 operations by US commercial air carriers.

I Flew for the Fuhrer, by Heinz Knoke (Berkley, 35¢)—The story of a German fighter pilot in WW II, giving an account of aerial combat through enemy eyes.

-Maj. James F. Sunderman







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Art Storz presents Omaha Squadron check to sponsor six teachers at Nebraska U. summer session.



Erie, Pa., air show attracted 75,000 persons in two days. Here's part of crowd on the first day.

AFA ON MAIN STREET

Gus Duda

AFA ORGANIZATION DIRECTOR

ATER this month, San Francisco will become the rendezvous for AFA members, educators, military, government, and aerospace industry leaders from throughout the nation. The Air Force Association climaxes its fourteenth year with its National Convention and Aerospace Panorama to be held in the city by the Golden Gate for the second time.

San Francisco will truly become the aerospace center of of the world from September 21 to 25. Some 6,000 persons are expected to attend the best meeting in AFA's history.

Thus AFA will once more show its face to the world as a great national organization, just as its Squadrons and Wings actively represent AFA on the local and area levels throughout the year. The Squadrons and Wings are, of course, the soul of the Association—they are AFA—and so (Continued on following page)

Utah Wing exhibit during Symposium attracted long lines at each of the displays. Thor was big item for Utah educators who attended program.





Carl Long, left, and Ches Richardson are shown here with four of the "Highest and Fastest" participants: Capt. W. J. Hodgson, Capt. Joe Jordan, Maj. William Davis, and Maj. Joseph Rogers. Pittsburgh Squadron sponsored these USAF pilots in a series of appearances throughout area.



Some of the winners in Hanscom Squadron's essay contest are briefed on performance of F-102 while waiting for ride in lightplane as part of award for the top essays.

Below, Chico Squadron guests are shown before receiving command briefing at NORAD. Squadron Commander Tom Mason is second from left. Group also was briefed by ADC and toured Academy. Such projects have earned the Squadron a fine reputation for community relations in Chico area.



it is fitting, as we move toward another annual Convention, to review their contributions to aerospace power in the past twelve months.

From the Omaha Squadron, largest in AFA with more than 2,000 members, to the smaller Squadrons such as Erie, Pa., AFA members wrote a success story in 1960. Omaha, for example, again presented its annual checks to four Nebraska colleges, the money to be used to finance teacher scholarships in the vital area of aerospace education. In Erie, the year-old Squadron sponsored its second air show at the local airport, and further established itself as an influential community group.

In Ogden, Utah, the Squadron again sponsored its highly successful and imaginative Weber Valley Air Fair, attracting more than 75,000 people with flying demonstrations, parachute jumps, and static displays. The three Squadrons of the Utah Wing this spring ran an Aerospace Education Symposium, bringing in over 400 Utah teachers for a two-day discussion on the problems of aerospace education, and highlighting the week end with an outdoor display of aerospace hardware that attracted over 20,000 citizens.

Taking a cue from the February issue of Air Force/ Space Digest, the Pittsburgh Squadron arranged a threeday series of school lectures, television and radio interviews, and public panel discussions by USAF aerial record holders. Arlington, Va., Squadron carried out a campaign to bring issues of AFA's magazine to every school in the country.

Laurence G. Hanscom Squadron in Massachusetts held its fourth annual Youth Aviation Day. The Squadron again held an essay contest, with winners spending a day at Hanscom Field under Squadron sponsorship. Winners this year also had a ride in a civilian plane.

On the other side of the nation, our Chico, Calif., Squadron took a group of civic leaders on a tour of Headquarters NORAD and the Air Force Academy.

Our folks in Anchorage, Alaska, meanwhile, embarked on a campaign to develop membership and wound up with a 200 percent increase in members.

Many Wings and Squadrons have sponsored memberships for Cadets of the Academy's Class of 1960. At the suggestion of the Colorado Wing, which last year arranged memberships for every graduating Cadet, AFA Wings and Squadrons have already sponsored well over half of the Class of '60. Wyoming leads in this program.

There were many outstanding individual performances in the past year. AFA's Aerospace Education Council has led the way for AFA participation in many fine educational efforts, among them a special panel presentation to the National School Boards Association's annual meeting in Chicago. This was arranged by Frank E. Sorenson, Council Chairman, and Secretary of our Lincoln, Neb., Squadron, and William A. Shannon, another member of the Council. The Association's ever-increasing interest in aerospace education has been featured in many Wing and Squadron programs this past year. The work of the Council, composed of some of the top educators in the country, has been exemplary.

Don Olson, Colorado Wing Commander and Chairman of the Colorado Springs Airpower Council, headed a local committee to arrange a testimonial dinner this spring for the members of the Cadet Honor Squadron at the Academy. This is planned as an annual program. It coincided with the presentation of the Air Force Association Trophy to the Squadron.

AFA's views on aerospace power were placed before Congress some months ago by Association President How-(Continued on page 287)

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\$7500	\$7875	\$8250	\$8625	\$9000	\$9375
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\$15,000	\$15,750	\$16,500	\$17,250	\$18,000	\$18,750
\$20,000	\$21,000	\$22,000	\$23,000	\$24,000	\$25,000
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ard T. Markey and Brig. Gen. Donald J. Strait, Vice Chairman of AFA's Air National Guard Council. They appeared before the Rivers Subcommittee on Reserve Affairs.

A special committee composed of Col. Roy E. Cooper, Wyoming, Col. Robert P. Knight, Minnesota, and Lt. Dale Hendry, Idaho, all members of AFA's Air National Guard Council, completed a monumental thirty-day study of the Reserve program, and submitted an extensive report to the President early this year.

The Association also presented its views on defense of the nation to the platform committees of both the Democratic and Republican Parties before their party Conventions. President Markey and AIR FORCE/SPACE DIGEST Editor John F. Loosbrock made the presentations in Chicago and Philadelphia.

So went the year. In essence, it was a year of progress for AFA. There was increased awareness of the responsibility that the Association has assumed in the aerospace education movement. An increasing number of AFA Squadrons appear to be concentrating their efforts on

community service, while decreasing former meetings-forthe-sake-of-meetings policies.

An increasing number of our Squadrons across the nation also are assuming community leadership in matters involving nonmilitary aerospace matters. This is as it should be, and certainly fulfills one of the basic tenets of the Association's founders. When AFA was organized in 1946, one of its cornerstones was Gen. H. H. "Hap" Arnold's description of airpower as "total aviation activity, civilian and military, commercial and private, potential as well as existing."

The Air Force Association, through monthly publication of AIR FORCE/SPACE DIGEST, through its national meetings, and through the myriad of projects undertaken by its Wings and Squadrons, daily underlines its steadfast support of the objectives established by its founders, and reaffirms the faith of Arnold, Vandenberg, Doolittle, Spaatz, and the host of others who believed that the job of getting the airpower message home to the people is in good hands with AFA.—END

LAST CHANCE TO MAKE YOUR RESERVATION FOR AFA'S 1960 CONVENTION AND PANORAMA

See August AIR FORCE, pages 24-25, for program details

SAN FRANCISCO HOTEL AND MOTEL RATES

HOTEL	SINGLE	TWIN &	1-B/R SUITE	2-B/R SUITE	HOTEL	SINGLE	TWIN &	1-B/R SUITE	2-B/R SUITE
Alexander Hamilton	\$9-14	\$12-18	\$20-35	\$60	Manx	\$7-9	\$9-12	\$15-20	
Bellevue	\$11-12	\$11-15	\$25		Richelieu	\$7-8	\$8-12	\$20-25	BERRY
Beverly Plaza	\$7-9	\$9-12	\$20	Salar	Stewart	\$9-12	\$9-18	\$25-30	
Californian	\$9-11	\$11-14	\$22-25		Whitcomb	\$10-12	\$11-16	\$25-60	\$41-76
Canterbury	\$10-19	\$10-20	\$25-40		MOTEL	G-Mari	design.	100199625	1487555
Cartwright	\$7	\$8-9	100,000		Caravan	\$18-22	\$18-22		HE TO BE
Chancellor	\$8-9	\$10-12			Continental	\$14	\$14-16	\$25-37	- 100
Drake Wiltshire	\$10-11	\$12-16	\$25-35	DESCRIPTION OF THE PERSON OF T	Holiday	\$20	\$20	\$30-50	
El Cortez	\$8-9	\$9-14	\$18-24	-9T	Mart	\$7-9	\$8-14	\$16-24	EU
Fielding	\$7-9	\$8-12			Travelodge	\$8	\$10-14		

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Others in Room			
Arrival—Date	Hour	Departure Date	
			9-60

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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.

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Membership

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