DD/S&T-1195-65

DD/S&T FILE COPY

12 MAR 1965

ADM-10.1 (correspondence)

STATOTHR

[redacted]

STATOTHR Dear [redacted]

Mr. McCone has asked that I answer your letter of 26 February on his behalf.

As you know, the United States Air Force is assigned responsibility within the United States Government for the investigation of Unidentified Flying Object (UFO's). Consequently, we do not feel it is appropriate to comment on the conclusions of the National Investigation Committee on Aerial Phenomena either with respect to the character of UFO's or your allegations of United States Air Force secrecy and censorship.

Sincerely,

STATINTL

Signed: [redacted]

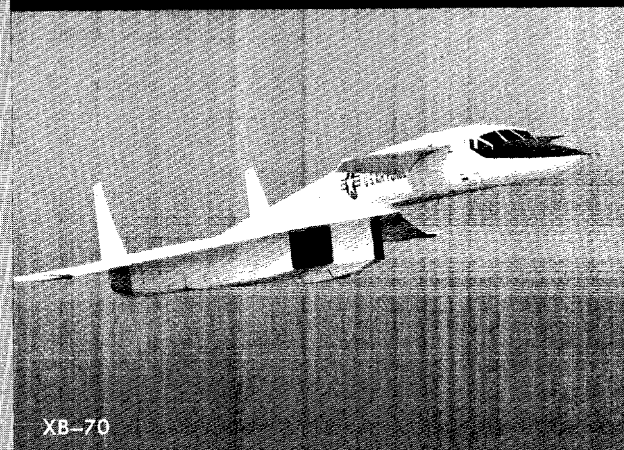
STATINTL

[redacted]

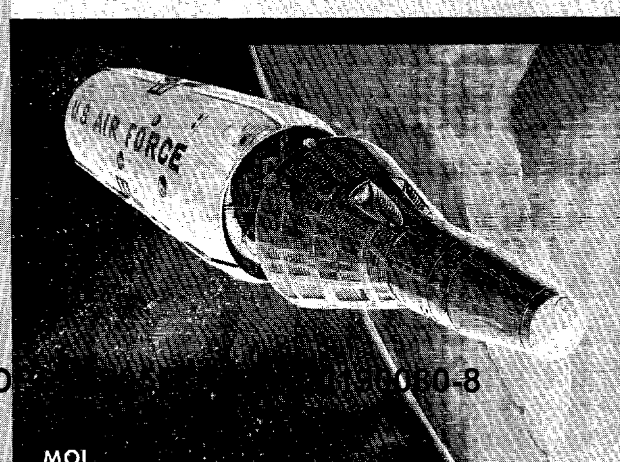
Distribution:
Orig & 1 - Adse
1 - [redacted] Chrono
STATINTL
1 - AS-DD/S&T
2 - DD/S&T Registry

UNITED STATES AIR FORCE SYSTEMS COMMAND

1964


XB-70

F-111A

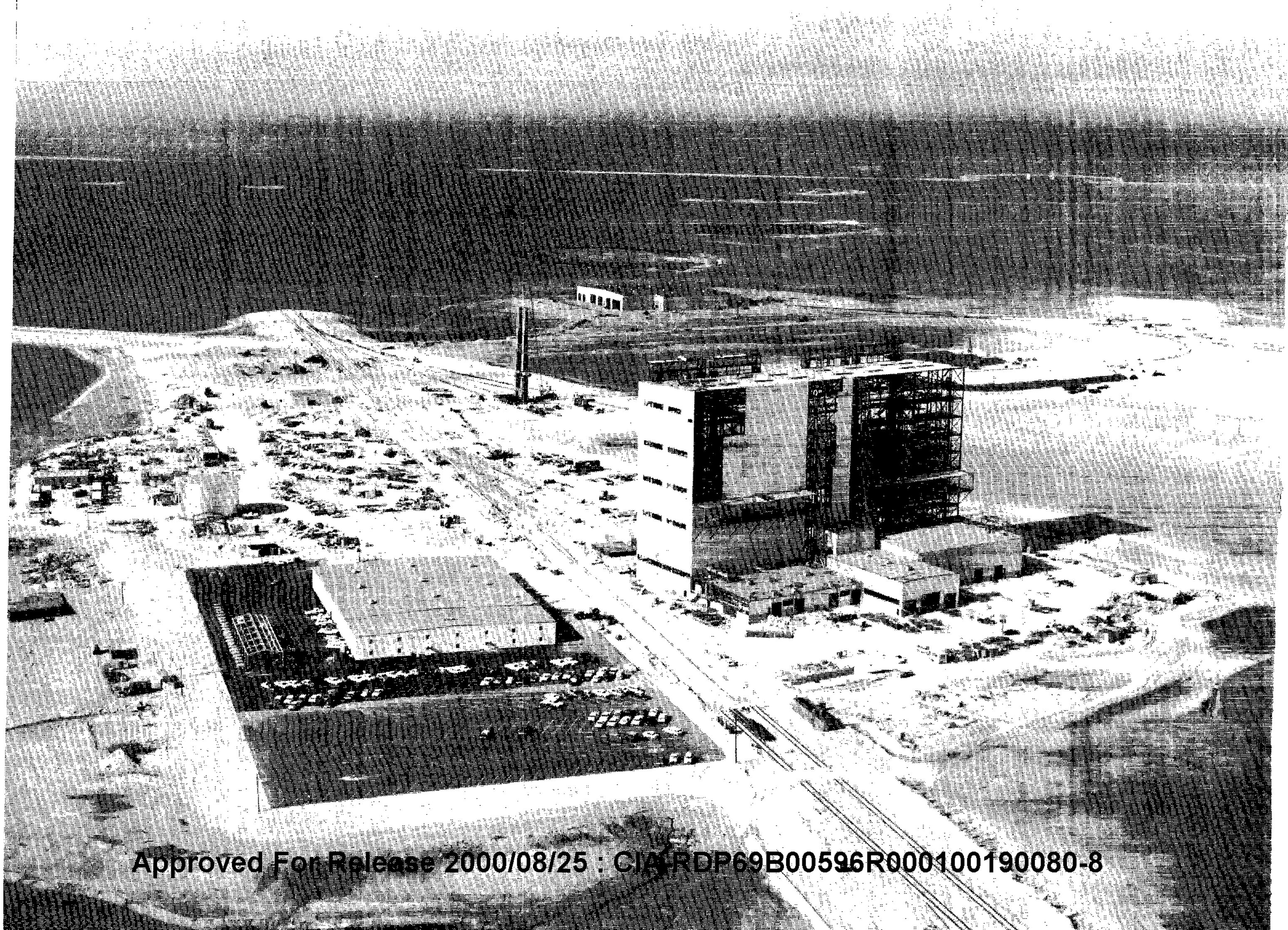


MOL

THE AIR FORCE SYSTEMS COMMAND

is responsible for timely advancement of the technological base and its effective translation into the acquisition of qualitatively superior aerospace systems for the United States Air Force.

National security is the constant objective, from exploratory and advanced development, test and evaluation, through procurement and production



FORGING MILITARY AEROSPACE POWER

AIR FORCE SYSTEMS COMMAND • Andrews Air Force Base • Washington, D.C.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

THE COMMANDER'S LETTER

January 1965

Air Force Systems Command bears a major responsibility for the advancement of Air Force aerospace technology, the timely application of technology to new aerospace systems, and military developments in space. During 1964 Systems Command made significant contributions in all these areas.

The Air Force long-range planning study, Project Forecast, provided a major stimulus for the technological efforts of the Command. One of its most significant effects was the resurgence of interest in aerodynamics. As a result of Forecast recommendations, a number of new aircraft systems are now under active study, and late in the year the President ordered the development of a new large transport aircraft, the C–5A. Forecast also stimulated intensive studies in such high pay-off technical areas as materials, flight dynamics, avionics, propulsion, guidance and computer programming.

The technological opportunities emphasized by Forecast offer many possibilities for improving present systems and for moving on to more advanced systems. For example, a new high-strength, lightweight material, formed from boron fibers and a plastic binder, would make possible great weight savings in aircraft and space vehicle structures with no sacrifice of either strength or stiffness. Other materials would allow advances in propulsion through increased engine operating temperatures. New guidance and navigation systems can make possible increased accuracy in weapon delivery. "Implicitly programmed" computers will make feasible increased speed, flexibility, and economy in command and control systems.

Since superior aerospace systems are dependent upon strong, technically competent laboratories, the Command continued to place major emphasis on the further strengthening of its in-house laboratories. As a result, Air Force in-house laboratories are now prime contributors to the nation's over-all aerospace capabilities. Such laboratories are a necessary, integral part of the Command resources in acquiring modern, technically superior systems. They not only support today's weapon and support systems and equipment, but also provide the advanced technology from which new systems will emerge.

Contributions of the in-house laboratories during the year include development of high-temperature coatings for space vehicles, a heavy-load grease to lubricate the sweep wing pivot bearings of the F–111 tactical fighter, micro-miniaturized electronic components for use in missile and space systems and self-sealing walls for space vehicles. Among the other accomplishments of the in-house laboratories were an experimental endurance test of an arc-jet space en-

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

gine, the successful demonstration of internal thrust from a supersonic combustion ramjet engine (scramjet) and the successful test and evaluation of the largest diameter rocket motor in the Free World.

Two essential ingredients of a vigorous technology program are facilities and people. In 1964 the Command acquired a number of new technical facilities such as the J–4 Rocket Test Cell dedicated at the Arnold Engineering Development Center in June and the Haystack radar research facility dedicated at Tyngsboro, Massachusetts, in October. Timely acquisition of such facilities continues to be a matter of great concern. Since they are indispensable in advancing technology, they must stand at the forefront of every development effort. Foresight is needed to insure early initiation of new technical facilities that are responsive to future needs and fortitude is needed to phase-out obsolete facilities.

Of even greater importance than facilities are trained and motivated people. During 1964 the Command continued to make improvements in the career management program; to conduct vigorous educational, recruiting, and training programs; and to further develop career incentives. The active interest of Air Force Systems Command people in both technological and management problems was displayed in the professional meetings sponsored during the year by the Command and several of its Divisions. All of these actions were aimed at creating an environment that is capable of both attracting and retaining the nation's most competent research scientists, engineers and managers.

The Command continued to work in close cooperation with the National Aeronautics and Space Administration. Air Force facilities, hardware, and people were employed in support of NASA programs, and NASA centers conducted research work of great interest and value to the Air Force. In September an agreement providing for assignment of NASA personnel to the Air Force when needed was reached.

Progress in technology is fundamental to continuing national security. The incorporation of new technology into advanced aerospace systems is a continual Command objective. A number of milestones were attained during the year in the development and deployment of aeronautical, ballistic, space and electronic systems. These included the rollout and first flight of the XB–70 and F–111 tactical fighter and the turnover of the C–141 jet cargo aircraft to the Military Air Transport Service; the successful first test flight of the Minuteman II missiles; the first launches of the Titan IIIA space boosters; and the completion of the Air Weapons Control System, 412L, network in West Germany.

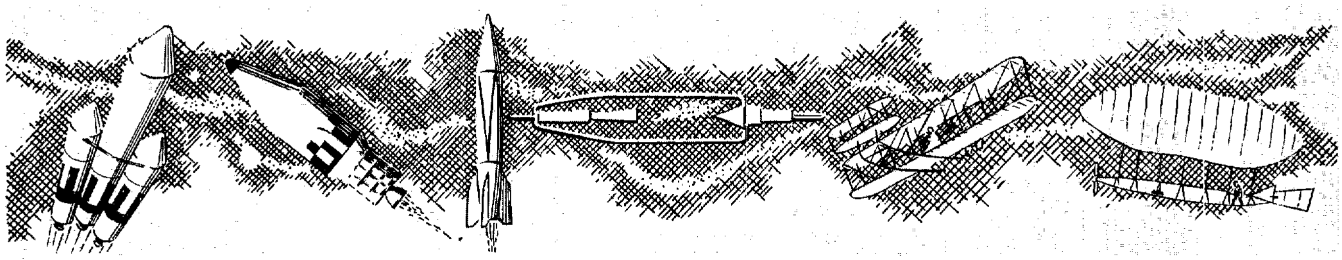
The year 1964 marked the tenth anniversary of the Air Force ballistic missile and space program. It started the phase-out of the early liquid-fueled ICBMs —the Atlas and Titan I missiles—as a result of attaining a sizable inventory of Titan II and Minuteman missiles. This is a dramatic reminder of the rapid pace missile development has achieved in a single decade. The formation of the National Range Division, to manage range resources on a global basis, also brought an enhancement of the Command's ability to conduct missile and space testing programs and to support the national space effort.

Among the significant management improvements introduced during the year was the establishment of PROM, an activity at Systems Command Headquarters designed to improve program, resources, and objectives management. PROM provides the Air Force with procedures for conducting rigorous scientific analysis of new system proposals, taking into account not only technical excellence, but also such factors as responsiveness to national defense policy and strategies, enhancement of military effectiveness and reasonableness of cost. It also gives a means of communicating to higher decision levels a better understanding of the comprehensive analysis that underlies Systems Command proposals, and thus should result in an improved climate for reaching decisions.

All of these activities, together with the many others also described in this publication, have been directed toward one objective—the most effective use of defense resources in attainment of superior aerospace strength. This is the hallmark of our achievements during 1964 and will be our constant aim for the years ahead.

B. A. Schriever

B. A. SCHRIEVER
General, USAF
Commander



THE PRIOR YEARS

The United States Air Force systems acquisition cycle encompasses research, development, test, engineering, procurement and production. The broad process continues to produce high-performance systems and sophisticated technology which combine to keep the nation's aerospace force at peak strength. A sampling of achievements in prior years affords a useful perspective for this year's publication.

1963 First flight of C–141 aircraft.
First flight of X–21, experimental laminar-flow aircraft.
First liftoff test of X–19, experimental V/STOL aircraft.
TITAN II completion and MINUTEMAN deliveries gave Strategic Air Command over 500 ICBMs.
Altitude records by X–15(354,200 feet, over 67 miles) and by NF–104A aircraft (120,800 feet).
First TITAN II ICBM launch by all-Air Force crew.
Milestone launches: 200th THOR IRBM and 100th AGENA upper stage.
THOR-DELTA launch vehicle placed SYNCOM II communication satellite in orbit.
First successful launch of the twin nuclear detection satellite (Vela Satellite Program).
First successful orbital launch of ATLAS-CENTAUR.
ATLAS-launched, 22-orbit final flight in Project MERCURY by USAF Major L. G. Cooper.
Successful test firing of solid-propellant rocket motor produced thrust over 1,000,000 pounds.
First demonstration of termination, restart, and throttling in solid-propellant rocket motor.
First launch in ASSET reentry series, launched by THOR booster.
Air Force Systems Command test track (Holloman) recorded 2,000th high-speed run.
Third and final BMEWS site (England) became operational.
Final link connected in Air Force radio relay station network between England and Turkey.
First successful operation of a very high-power, continuous-wave microwave transmitting tube.
SAGE underground center became operationally ready.
Orbital flight test of a thermoelectric converter.
Air Force assigned responsibility for developing Manned Orbiting Laboratory (MOL).

1962 Last R&D test flight of ATLAS ICBM closed an era of rocketry.
B–52 aircraft traveled non-stop 12,519 miles without refueling.
Acquisition cycle completed for ATLAS–D, first operational United States ICBM.
First successful launch of ATLAS–F ICBM.
First TITAN I squadron transferred to operational inventory.
Highly successful first launch of advanced TITAN II ICBM.
First three operational MINUTEMAN ICBM flights to Strategic Air Command control.
First GAM–87 SKYBOLT missile launched from B–52 aircraft.
THOR-DELTA launched TELSTAR I, first commercial international communications satellite.
ATLAS-launched NASA MARINER II space probe, passed within 20,000 miles of Venus.
Tri-service geodetic research satellite, ANNA, launched.
First manned orbital flight in NASA Project MERCURY launched by ATLAS-D.
ATLAS-launched NASA RANGER IV delivered first U.S. package on moon.
USAF Major R. M. White won astronaut wings for reaching 59.6 miles altitude in X–15 aircraft.
Rollout of the last of 744 B–52 aircraft completed ten-year production run.
Electrocardiogram data successfully telemetered from pilot in X–15 aircraft.

1961 Completely successful first launch of three-stage MINUTEMAN ICBM.
Both TITAN and MINUTEMAN ICBMs in first successful launches from underground silos.
THOR-DELTA booster launched NASA EXPLORER X.

First restart of AGENA–B upper stage while in orbit.
In separate flights, X–15 aircraft exceeded altitude of 41 miles and speed of Mach 6.0.
Official world altitude record set by H–43B helicopter at 32,840 feet.
High-altitude, full-pressure suit standardized.
Responsibility for military space development activities assigned to the Air Force.
AIR FORCE SYSTEMS COMMAND established.

1960 USAF Captain J. W. Kittinger, Jr., parachuted from record 102,800 foot altitude.
DISCOVERER XIII capsule became first known object recovered from orbital flight.
First long-range ATLAS ICBM flight, 9,000 miles into the Indian Ocean.
First orbital flight of AGENA–B upper stage.
First Ballistic Missile Early Warning System site became operational.
THOR-ABLE placed NASA TIROS I in orbit, opening new era of meteorological study.
THOR-ABLE launched NAVY TRANSIT IB navigational satellite.
THOR-ABLE-STAR launched ARMY COURIER IB communications satellite.
THOR-DELTA launched NASA ECHO I, passive communications satellite.

1959 First AGENA–A upper stage orbited THOR boosted.
First successful launch of GAM–77 air-to-ground missile, from B–52 aircraft.
Liquid rocket engine produced 1,000,000 pounds of thrust in static firing test.
First flight of TITAN ICBM.

1958 PROJECT SCORE placed 4-ton ATLAS in orbit, broadcast Presidential message from space.
First launch over Pacific Missile Range.
First Project ARGUS shot detonated low-yield nuclear device at 300-mile altitude.
THOR launched NASA PIONEER I deep space probe.

1957 First successful launch of ATLAS ICBM.
First successful launch of THOR IRBM.
PROJECT FARSIDE, giant balloon lifted 2 tons of equipment to 104,000 feet.

1956 First flight of B–58 supersonic bomber.
USAF Captain M. G. Apt attained speed of Mach 3.2 in fatal flight of X–2 aircraft.
First vertical-takeoff flight of X–13 VTOL aircraft.
Human subject reached simulated altitude of 37.64 miles in ARDC altitude chamber.
First test firing of Air Force liquid-fuel rocket with thrust over 400,000 pounds.

1955 First flight of YF–105 aircraft.
First flight of modified B–36 aircraft carrying experimental, inactive atomic reactor.

1954 USAF Lieutenant Colonel J. P. Stapp survived 40-g deceleration, highest ever recorded by man.
First flight of XC–123D—experimental boundary-layer-control aircraft.
First side-looking radar model designed, developed, built, and installed in aircraft.
WESTERN DEVELOPMENT DIVISION of ARDC established to direct ICBM development.

1953 First flight of XSM–62 SNARK, subsonic, atmospheric intercontinental missile.
First flight of X–10, prototype for NAVAHO supersonic, atmospheric intercontinental missile.
First test firing of Air Force liquid-fuel rocket with thrust over 200,000 pounds.

1952 First test firing of Air Force liquid-fuel rocket with thrust over 100,000 pounds.
First flight of YB–52 aircraft.

1951 First successful Air Force recovery of animals from rocket flight.
First flight of X–5 experimental aircraft with variable-sweep wings.

1950 First launch over Atlantic Missile Range.
Air Force assigned formal and exclusive responsibility for strategic guided missiles.
AIR RESEARCH AND DEVELOPMENT COMMAND established.

1949 First flight of B–36 aircraft.
Start of construction on DEW Line radar screen.

1948 General H. S. Vandenberg approved an Air Force policy for earth satellite development.
First symposium on space medicine.

1947 First official supersonic flight: USAF Captain C. E. Yeager in X–1 aircraft.
DEPARTMENT OF THE AIR FORCE established.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

HIGHLIGHTS OF OPERATIONS IN 1964

Ballistic Missiles

The ATLAS F and TITAN I acquisition and updating programs were completed during 1964. The TITAN II research and development program was completed in April 1964. The acquisition phase of the TITAN II program was completed in September.

The MINUTEMAN I achieved a peak rate in launcher turnover to the Strategic Air Command during 1964. At year's end, over 700 missiles and silos were under the operational control of SAC. A significant highlight was the completely successful first MINUTEMAN II R&D launch. The missile, which will provide increased payload, range and accuracy, is the only Air Force ballistic missile system currently in the operational development program.

The Advanced Ballistic Re-Entry System, ABRES, was identified as the DOD program for advanced reentry techniques and devices. Successful launches of both the 2-stage and 4-stage ATHENA missile highlighted this program during 1964.

Space

Command activities in space ranged from space oriented technology and equipment development to orbital launches. Experimental programs have provided a base for further development of an ionospheric satellite-to-satellite communication system and techniques to protect spacecraft from severe damage or destruction due to micrometeoroid impact. High-speed sled tests of the guidance systems for CENTAUR and SATURN were completed during the year in support of NASA space programs.

Highlights included a second successful launch in the Vela Satellite Program, placing an additional pair of nuclear detection satellites in near perfect orbits. The USAF ATLAS/AGENA combination launched the NASA RANGER 7 on its successful photographic mission to the moon and MARINER 4 on its way to Mars. The first test launch of the "man-rated" TITAN II GEMINI Launch Vehicle was highly successful. The Standard Launch Vehicle 5A, Titan III, completed two highly successful test launches in 1964. The Manned Orbiting Laboratory program, assigned to AFSC late in 1963, is well along in the pre-definition phase.

Aircraft

The first flight of the XB–70 was a major highlight in research and experimental aircraft operations in 1964. During the third flight, the aircraft exceeded Mach 1 for the first time. An advanced version of the X–15, designed to extend the speed and altitude range of this family of experimental aircraft to Mach 8, was delivered in early 1964. In the tri-service Vertical/Short Take-Off and Landing aircraft family, highlights include first vertical flight of the tilt-wing XC–142, the delivery of the tilting propeller X–19 and successful demonstration of laminar flow control techniques by the X–21.

The first flight of the F–111A supersonic fighter developed for both the Air Force and the Navy occurred on 21 December 1964. The YF–12A, a long-range Mach 3 interceptor, was delivered to Edwards AFB in March 1964. This aircraft, and its sister ships in other configurations, will make major contributions to the interception and reconnaissance capabilities. The C–141, Starlifter, test fleet was increased to 11 aircraft, including delivery of three aircraft to the MATS Transition Training Unit.

Over 1,000 combat and support aircraft were delivered to Air Force commands and the Military Assistance Program in 1964. Acquisition programs for the F–105D, F–105F, F–104G, T–37C, UH–34, KC–135 and the GAM–83A were completed during 1964.

Electronics

Air Defense Command's ability to detect, track and identify objects in space was enhanced by delivery of new equipment. Advanced detection, identification and tracking systems are undergoing development and test. A mobile command post has been delivered to the Commander-in-Chief/Strike Command. New communications systems—the links between the decisions of the Commander and his forces—also improved aerospace defense.

HAYSTACK, a space age radio research facility, was placed in operation at Tyngsboro, Massachusetts. This facility is the forerunner of a new generation of radio communication, radar and radio astronomy antenna systems.

Technology

In the continuing struggle to reduce structural weights for high performance vehicles and propulsion units, major technical advances were made. The capability to produce continuous filaments of composite structural materials employing elemental boron and tungsten was successfully demonstrated by the Air Force Materials Laboratory. The successful extrapolation of this technique to a quantity production process will permit drastic weight reductions in aircraft, missile and space systems. Coating compositions have been formulated which will increase the operating temperatures of propulsion units employing certain columbium, tungsten, and tantalum alloys. Operating temperatures ranging from 3000° to 3500°F are now possible for propulsion units using these new coating compositions.

Highlights in propulsion technology ranged from an experimental demonstration of a ground test version supersonic combustion ramjet (scramjet) engine and a 500-hour endurance test of an arc-jet engine, that weighs approximately ten pounds, for space applications, to the successful test firing of the world's largest solid propellant rocket engine.

Simulated nuclear explosions can now be created in the laboratory. An exploding wire device which closely simulates some effects of such explosions has been developed and is currently in operation at the Air Force Weapons Laboratory. The device will permit study of the effects of nuclear explosions without requiring explosions in the atmosphere.

COIN

To increase firepower available in support of air-ground operations a series of externally mounted, high-rate-of-fire gun pods has been developed. These pods are compatible with such aircraft as the B–26, YAT–28 and A1–E as well as the high speed F–4C, F–105 and F–111. After a successful test program, quantity production started late in the year.

Fabrication of instant airstrips by dropping or spraying a plastic-resin material from low-flying aircraft was investigated. Such landing sites would be available for operational use in approximately 15 minutes. A full-scale evaluation of a 60-foot pad of the material using an experimental VTOL aircraft was successfully completed in June.

Personnel

Professionalism was stressed by sponsorship or active participation in such activities as establishment of the Tennessee Space Institute, University of Florida GENESYS program, DOD Weapon System Management Center and the Ohio State University extension program and AFIT system management courses at Wright-Patterson AFB.

R&D Facilities

In this essential and frequently pacing area, some encouraging progress was shown during 1964. Notable achievements were the approval of the Altitude Propulsion Research Facility at Edwards AFB and the 100-inch Collimator Facility at Wright-Patterson AFB. The Radar Target Scatter Site, for measurement of the radar cross-section of reentry vehicles and other aerospace craft, and the Nuclear Effects Simulator became operational in 1964. A space environmental test chamber which can produce temperatures down to —300°F and pressure altitudes in excess of one million feet was installed at Holloman AFB.

Other major facilities such as the Lo-Density Tunnel Pilot Model, Acoustic Test Facility and the Dynamic Escape Simulator, were under construction during 1964.

Management

The continuing challenges facing management in the dynamic environment in which the Command must operate provided the setting for many management innovations and refinements. The PROM concept, which allows management to exercise options in arriving at well-balanced technology and system programs, was initiated. Increased efficiency in logistic support capabilities and procurement methods within the Air Force laboratories resulted from the efforts of task groups setup to identify and eliminate unwarranted constraints adversely affecting operations. Methods and techniques, proven by operating experience, were published as AFSC manuals to assure consistency and training in the system management process. Concerted effort was devoted to projects to strengthen cost estimating and control. The National Range Division was established to manage and operate the National Global Range. Management emphasis succeeded in realizing a cost reduction of $503 million in 1964.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

SYSTEMS DELIVERED

F/RF-4

Initial delivery of F-4C aircraft to the Tactical Air Command occurred in January. A total of 269 F-4Cs, produced by McDonnell were delivered in 1964. First flight of the RF-4C, the reconnaissance version of the F-4C, took place in May and delivery of the first aircraft to the Tactical Air Command was made in September. An additional 23 RF-4Cs were delivered during the balance of the year.

F-105 Thunderchief

Deliveries by Republic of the F-105D, first airplane designed for all-weather tactical air missions, were completed in January. Deliveries of the two-place version, F-105F, developed for operational and training use, were completed, as scheduled, in December.

F-104 Starfighter

The F-104G Military Assistance Program was essentially completed with the last US produced airplane for Grant Aid Assistance delivered in December. This terminates a 4-year program which has provided a first line Mach 2 fighter to our NATO allies.

F-5

The F-5 program is well underway and flight testing of the Northrop developed aircraft has been completed. Production aircraft, with complete support equipment, have been delivered to Williams AFB, Arizona, where classes of foreign pilots are in training. Aircraft for delivery under the Military Assistance Program are in production.

KC-135 Stratotanker

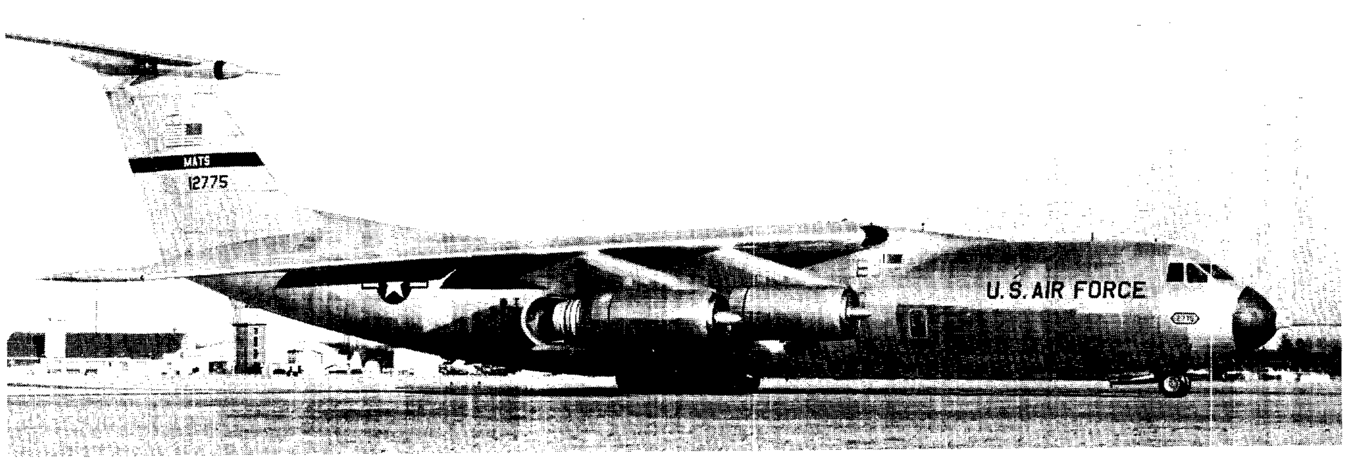
The KC-135, produced by Boeing, is a jet tanker aircraft capable of refueling the B-47, B-52, B-58 and Century series fighters. The tanker can off-load 116,000 pounds of fuel to receiver aircraft. It can also be used to haul cargo and personnel. The sixty-six aircraft delivered in 1964 completed a program that produced a total of 732 aircraft.

C-130 Hercules

During 1964, Lockheed delivered 128 C-130E medium cargo transports. Also delivered during this period were five C-130s for the Military Assistance Program. The major improvement in this aircraft over the C-130B is the extended range obtained by addition of two external pylon tanks.

C-141 Starlifter

Lockheed increased the Category I test fleet to the programmed five aircraft during the early part of 1964. In addition, three Category II test aircraft were delivered, and the Transition Training Unit of MATS received the first three of their programmed fourteen aircraft on schedule. The first operational squadron will receive aircraft in 1965.



C-141 Starlifter

T–41

Early in 1964, AFSC conducted a two-step competitive procurement for 170 conventional, light, single-engine aircraft. The Cessna Aircraft Company was the low bidder among three contractors remaining in the competition after the technical evaluation phase. The T–41A trainer is the Contractor's Model 172F. One trainer was delivered in 1964; the remaining 169 T–41A aircraft will be delivered from 1965 production.

T–38 Talon

An additional 144 T–38 aircraft were delivered by Northrop to the Training Command. The T–38, a high altitude, supersonic, twin-engine aircraft, is used for supersonic flight training of Air Force pilots.

T–37

The T–37 is a twin-jet intermediate trainer which features side-by-side seating of student and instructor. Cessna delivered 14 T–37B aircraft against the USAF schedule during the year. The Military Assistance Program was completed with delivery of 34 T–37C aircraft.

U–17

The U–17 is a single engine, high-wing monoplane available commercially as the Cessna Model 185 Skywagon. It is designed to conduct a wide variety of load-carrying missions. The Military Assistance Program received two aircraft in 1964.

CH–47 Chinook

CH–47A is a tandem rotor, amphibious transport helicopter being built by the Boeing Vertol Company for the Army. CH–47A has a range of 200 nautical miles carrying a 3-ton payload or 30 Army combat troops. There were 37 aircraft accepted this year, giving an over-all production through 1964 of 80 helicopters.

CH–3

The CH–3 is a single-rotor, long-range, rear-loading cargo/passenger helicopter with amphibious capabilities. The CH–3C has a 400-nautical-mile range with a 3,000 lb. payload. Sikorsky delivered a total of 18 CH–3 helicopters during 1964 making a total of 26 produced to date.

HH–43 Huskie

The HH–43 is a general utility helicopter produced by Kaman whose intermeshing rotors overcome torque and require no tail rotor. Air Force deliveries were completed in December 1963. The 24 helicopters delivered in 1964 were applied to Army Program and Military Assistance Program requirements.

UH–34 Choctaw

Sikorsky continued to deliver this helicopter for the Military Assistance Program. It is designed to carry 12 to 18 passengers, eight litters, or a two-ton payload and features folding rotor and tail assembly. The eleven helicopters delivered during this year completed the program.

UH–1 Iroquois

The UH–1F, produced by Bell, is a single-rotor helicopter with a 6,600 pound design gross weight. It can carry 9 passengers, 2,000 pounds of cargo or three litter patients. The aircraft is a modified version of the Army UH–1B configured to conform to specific Air Force requirements. The UH–1F made its first flight in February 1964. Eighteen aircraft were produced during the year.

BQM–34 Firebee

The BQM–34A drone is a high subsonic aerial target, ground or air launched. It is used for R&D testing of air-to-air missiles and for pilot proficiency training in operational units. Ryan delivered 59 units to the Air Force in 1964.

GAM–83 Bullpup

The GAM–83 Bullpup, built by Martin Orlando, was initially introduced into the Air Force inventory in 1959. It is an air-to-surface tactical missile launched from fighter aircraft. The Air Force procurement program was completed with the delivery of the last missile in August 1964.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

Anti-Satellite System

In announcing two operational anti-satellite systems, the President said: "We now have developed and tested two systems with the ability to intercept and destroy armed satellites circling the earth in space. I can tell you now that these systems are in space, they are operationally ready, and they are on alert to protect this nation and the free world." One system was developed and successfully tested by the US Air Force one year after receipt of program go-ahead.

Vela Satellite Program

The second successful launch in the Vela Program added two more satellites to the pair launched in 1963. Functioning with exceptional reliability in orbits over 60,000 miles above the earth, these satellites are gathering data that is expected to provide sufficient information to design a world-wide nuclear detection satellite system.

Launch Vehicles and Stages

The first of three "man-rated" Titan IIs, delivered for use in the NASA Project Gemini, was successfully launched on the initial attempt after a flawless countdown. Delivery of space "workhorses" continued with 60 launch vehicles and 31 stages accepted by users. The launch vehicles included 37 Thor (LV–2), 20 Atlas (LV–3), and three Titan II (LV–4). The stages included 29 second stage Agena (S–01) and two Able-Star (S–03).

Minuteman ICBM

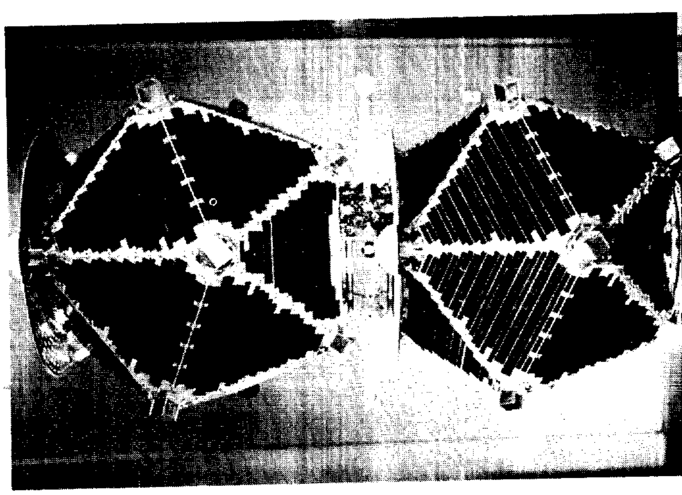
Site activation proceeded on schedule and achieved a peak rate of turnover of launchers to the Strategic Air Command of better than one per day during the January to June time period. At year's end over 700 missiles and silos were under SAC's operational control. In-commission rates have been experienced which are the highest in missile history and which exceed the forecasted predictions.

Titan ICBM

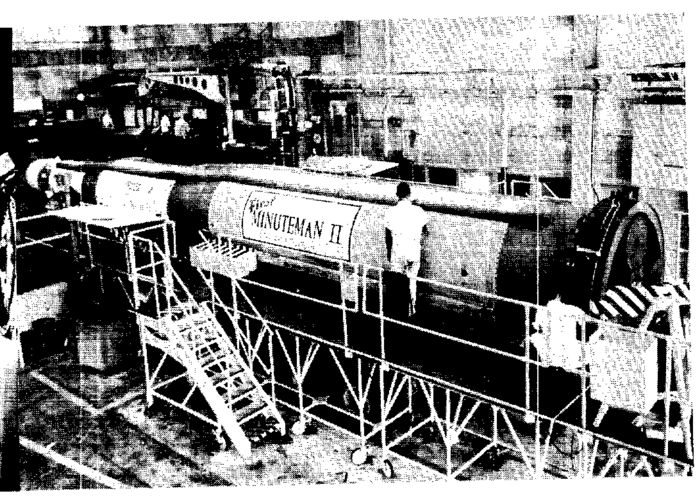
Updating of the Titan I weapon system was completed in August 1964. Titan II research and development flight testing was terminated in April 1964 with 24 successful flights and 8 partially successful flights in a program of 33 launches. The acquisition phase was completed on 30 September 1964 when responsibility for engineering support and service was transitioned to the Air Force Logistics Command. In November, the Strategic Air Command completed the very successful Demonstration and Shakedown Operations, DASO, with all five missiles impacting in the target area.

Atlas ICBM

In February 1964, the asquisition of the last of the Atlas series was completed and the Air Force Logistics Command accepted engineering responsibility for the Atlas F weapon system. Updating of the Atlas F force was successfully completed in October 1964, three months ahead of the originally negotiated date.



Twin Vela Satellites



Minuteman II

BMEWS

The Ballistic Missile Early Warning System was declared fully operational in mid-January and was turned over to the Air Defense Command following four months of exhaustive testing of the third and final site at Fylingdales, England. Other sites are at Clear, Alaska, and Thule, Greenland.

Cloud Radar

Precise measurement for bases and tops of successive cloud layers—data previously not available to Air Force weather forecasters—was made possible by the AN/TRQ-11 radar cloud detecting set. This is the first major piece of equipment produced under the 433L Weather Observing and Forecasting System, which is charged with the responsibility of modernizing equipment and procedures of the Air Weather Service.

USSTRICOM

A prototype Joint Airborne Communications Center/Command Post was delivered to Strike Command. It was tested during a major exercise and is in daily use by STRICOM. The system, now in operational development test, will give CINCSTRIKE a mobile command post that can be flown to any trouble spot in the world and operated enroute.

NUDETS

A Nuclear Detonation Detection and Reporting System network was turned over in mid-year to the Air Defense Command. This system uses electromagnetic, optical and seismic sensing devices to gather data on nuclear explosions within its area of observation. Even though subsequently destroyed, the sensors dispatch their messages prior to any nuclear blast damage.

AWCS

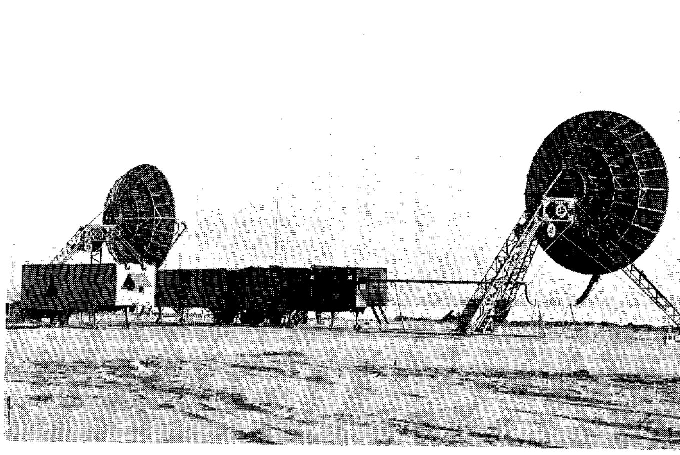
A seven-site Air Weapons Control System network in West Germany went into operation in August. This system blends radar stations, communications links, computer and display equipment into a dual-purpose network for directing air defense and tactical operations.

Green Pine

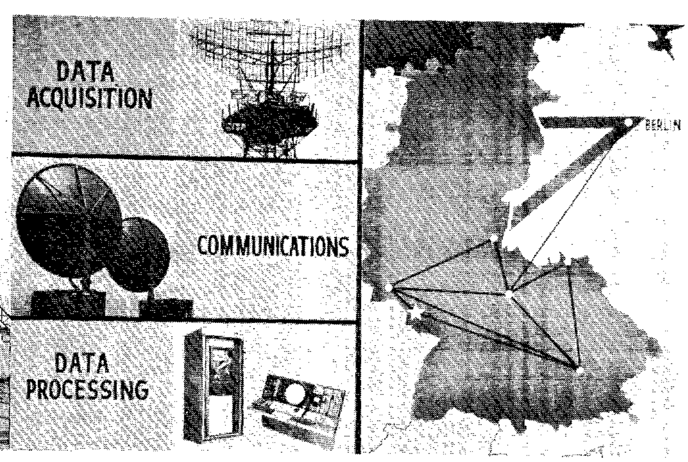
Increased distance and reliability were added to the communications link between continental ground stations and aircraft of the Strategic Air Command flying in the far north and Arctic regions. These improvements strengthen the existing communications network and also permit alternate communications to Strategic Air Command aircraft in the event of high frequency black-out.

Big Rally II

A transportable communication system linking military centers in Italy, Greece and Turkey was turned over to the Air Force Communication Service. For the first time, Air Force commanders can telephone directly from the United States over military circuits to key installations in the three countries.



Big Rally II Mobile Site



Air Weapons Control System

TECHNOLOGY AND TEST

Technology

National security—in terms of both military and economic strength—demands that technology move strongly forward. Advances in technology are not the exclusive property of any one nation, but are potentially available to any nation willing to devote effort to achieve them. The task is to assure the advances are used to strengthen the cause of free nations. The ensuing are illustrative of AFSC laboratory and test center efforts.

Materials Advances

A technical breakthrough, which may drastically reduce the structural weight of missile and other high-performance systems, was made by the Materials Laboratory. The capability to produce continuous high-modulus, high-strength, low-density filaments of elemental boron deposited on a 0.005-inch diameter tungsten wire was demonstrated in the laboratory. The filament tensile strength is equal to that of the best glass fibers, a density slightly lower, and a stiffness about five times that of glass fibers. This combination of strength, lightness and stiffness makes possible the production of very strong structural composites similar to fiberglas but with much greater stiffness at no increase in weight. The composite thus formed is potentially as strong as high-strength steels, as structurally rigid as a beryllium composite, light as magnesium and is highly corrosive resistant.

Refractory materials and coatings are fundamental to advanced propulsion systems and aerospace vehicles. When properly coated for protection against oxidation, refractory metals such as columbium, molybdenum, tantalum and tungsten can resist temperatures up to 2000°F. Coatings usable up to 3000°F have been developed for columbium and some tantalum alloys. Alloys of tantalum containing 10% tungsten coated with a tin-aluminum alloy have been used in radiation-cooled attitude controlled thrust chambers on the Agena vehicle. Coating compositions have also been formulated which may protect tungsten up to 3500°F.

An experimental heavy load grease developed as a result of in-house research at the Materials Laboratory exceeded requirements for lubricating the variable sweep wing pivot bearings on the F-111. This use involves extremely heavy loads over a wide temperature range. Of the many lubricants evaluated, this grease is the only one which met all the requirements for this specific application.

Until recently the use of beryllium was limited by its lack of ductility. Under a Materials Laboratory program, a useful degree of ductility in beryllium sheet of moderate thickness was achieved without appreciable sacrifice of other properties. This made possible the all beryllium interstage connector for the Minuteman ICBM. This unit is 50% lighter than the previous aluminum structure.

Space Communications

A research program at the Avionics Laboratory is under way to provide beyond line-of-sight communication between aerospace vehicles and vehicle-to-ground communication using ionospheric duct propagation modes. Propagation was obtained at frequencies of 23, 30 and 40 megacycles a second over distances between 6,000 and 8,000 kilometers. All frequencies exceeded the predicted maximum usable frequency. An ionospheric satellite-to-satellite communication experiment is planned. Design and construction of the satellite transmitter and receiver payloads is under way. Satellites in a nearly circular low altitude orbit will provide valuable information on the position and characteristics of duct boundaries and other essential data.

Molecular Electronics

Molecular electronics achieved the size, weight and reliability requirements for incorporation in the Minuteman II and Apollo computers making increased payloads possible. Techniques are being developed to combine the properties of matter into functional electronic blocks. A complete molecular electronic radar system is being developed.

Instant Airstrips

Engineers of the Aero Propulsion Laboratory are investigating an aerially delivered plastic-resin material for rapid preparation of landing sites for future jet vertical take-off and landing aircraft. Operational VTOL aircraft would drop or spray the semi-liquid preparation in forward areas and land on it fifteen minutes later. In June, a 60-foot pad was fabricated at Moffett Field, California, for full scale evaluation using the X-14 vertical take-off aircraft. In this test neither the 1500°F temperature nor the wheel loads adversely affected the rapidly prepared pad. The X-14, the French Balzac, and the German VJ-101C will be used in further development testing of instant airstrip tests during 1965.

Conventional Armament

A series of externally mounted gun pods for use on tactical aircraft in support of air-ground operations are under development by the Armament Engineering and Evaluation Group. The caliber 7.62mm gun pod mounts the GAU-2 Gatling gun, which fires at a rate of 6000 rounds per minute. Performance tests to date have been outstanding. Test models of a 20mm gun pod were completed in June 1963 and evaluated in competiton with other systems before being selected for standardization. The pod contains the M61A1 gun, which fires at a rate of 6000 rounds per minute. It was designed primarily to fill the gun pod requirements for the F-4C. It is also compatible with the F-100, F-105, and F-111. Quantity production began late this year.

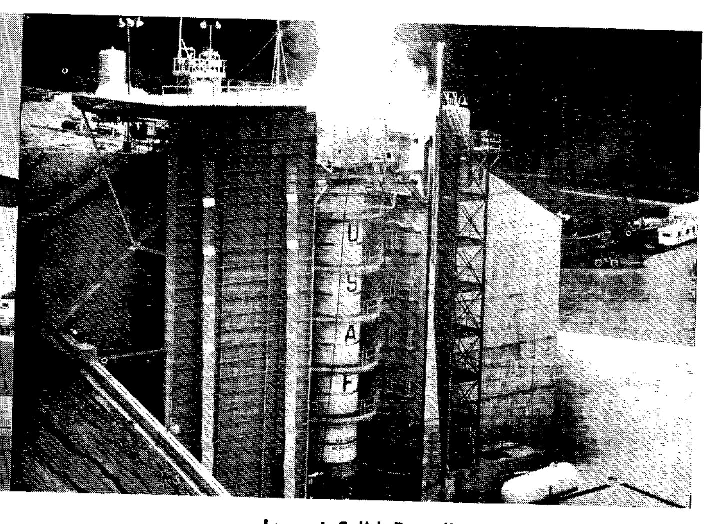
High Mach Facility

High Mach number altitude simulation for aerodynamic and propulsion systems is now limited by the pressure and temperature to which air can be raised before expansion through a conventional wind tunnel nozzle. For test durations longer than fractions of a second, the present limit for true temperature simulation is about Mach 7. Pilot facilities have been operated at AEDC to investigate the feasibility of significantly extending the present simulation limit by accelerating ionized particles in the air stream using combined magnetic and electric fields. Results to date are encouraging, and it is anticipated that speeds approaching planetary escape velocity can eventually be accurately simulated in ground test facilities.

Solid Rocket Propulsion

On 28 May 1964 the free world's largest diameter rocket motor was test fired. During the two minute firing, the 75-foot tall, 156-inch diameter motor developed over one million pounds of thrust. In addition to demonstrating the feasibility of developing, fabricating, transporting and firing an ultra-large solid propellant motor, Rocket Propulsion Laboratory engineers were able to evaluate the rocket's jet tab thrust vector control system, ablatively cooled plastic nozzle throat and 18% nickel maraging steel case. All components were the largest ever made and tested for the Air Force. The motor is providing critical research data for development of reliable, low cost, propulsion systems for future weapon and space system application.

F-105 Mounting 20mm Gun Pod



Largest Solid Propellant Motor

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

Automatic Language Translation

The automatic translation of foreign languages is required to provide the nation's scientists and engineers with accurate and useful information in the shortest possible time. The Mark II Russian-to-English automatic translator, was developed by scientists of the Rome Air Deveplopment Center and installed at the Foreign Technology Division to assist in solving the translation problem. The new equipment is capable of translating three million words a month, using a photoscopic disc memory dictionary of 150,000 words.

A major difficulty in preparing Oriental languages for data processing is the development of a method of coding the ideographic characters. A research effort resulted in the development of the Sinowriter for coding more than 10,000 different Chinese characters to a form for use in processing machines. This is an inexpensive machine which can be operated by typists who are not familiar with the Chinese language. In two weeks typists can attain a speed of 40 characters a minute, or the equivalent of about 40 words a minute in English.

Three-D Vision

The Weapons Laboratory has taken delivery of a vehicle which has three-dimensional vision and two 19-foot robot arms. The vehicle will be used as a laboratory test bed to determine the value of unmanned radio controlled vehicles for operations in areas of hazardous radiation. Four television cameras are mounted between the two robot arms. The cameras, which are one foot long and three inches in diameter, serve as the eyes of the operator in the control van. Depth perception is such that the operator, located a mile away, can pick up an object the size of a lead pencil with one of the robot arms. When fully extended the arms can each lift 600 pounds. They have a grip force of 3000 pounds, yet are dexterous enough to turn bolts and operate a variety of power tools.

Self-Sealing Satellites

Perforation of aerospace vehicles by micrometeoroids can result in loss of the life supporting internal atmosphere in the spacecraft. To counter this eventuality, the Materials Laboratory has developed a novel method of self-sealing such punctures. The method entails the establishment of two spaced impermeable barriers next to the vehicle outer wall. A stable prepolymer fluid is placed within the barrier next to the vehicle outer wall, and a polymerization fluid is placed between the two impermeable barriers. When puncture occurs, the fluids mix and solidify, resulting in self-sealing the puncture. This concept has been evaluated by firing metal particles through specimens under vacuum conditions, simulating a space environment. Repeated tests have shown a high degree of reproductivity of self-sealing.

Energy Conversion

The world's largest solar tracking facility was unveiled and demonstrated in October 1964. The facility is a major step in a long-range program to develop a system to provide continuous electrical power for future space missions. In operation, the solar tracking unit automatically locks onto the sun and accurately follows its path across the sky. This is accomplished by solar sensing devices which keep the 22-ton unit in perfect alignment with the sun. The 45-foot concentrator focuses the intense rays of the sun into a spot approximately eight inches in diameter. The facility will be used to test components for the Advanced Solar Turbo-Electric Concept Program.

Advanced Propulsion

An experimental arc-jet space engine completed a 500-hour endurance test early in 1964. The continuous operation for this period of time is a significant advance in electrical propulsion research. The engine, weighing ten pounds, is regeneratively cooled and uses a hydrogen propellant. It has a specific impulse greater than 1000 seconds and an efficiency of 55%. During the 500-hour qualification test no significant deterioration occurred in the engine. Further tests, to increase reliability, will be conducted in the Aero Propulsion Laboratory's chambers.

The first successful demonstration of internal thrust from a supersonic combustion ramjet engine (scramjet) was completed in late 1964. The test was one of a series to demonstrate that scramjet engines can be developed for very high speed vehicles. Test conditions in the 30-inch-long scramjet simulated a speed of approximately six times that of sound over a brief burning period. The engine was a boiler plate model only. However, test conditions inside the engine inlet, combustor, and nozzle were the same as expected in actual hypersonic vehicle applications. Scramjets differ from conventional engines in that they have moving parts only in the fuel feed system and produce thrust by burning fuel in a supersonic air stream.

Rat Scat

The Radar Target Scatter Site has been established to be the national radar reflectivity measurement site. The site, located on the Alkali Flats near Holloman AFB, is available for use by all government agencies. It is used to measure the actual or full-scale static radar reflectivity of nose cones, reentry vehicles and other aerospace craft. It is also used to establish and validate aerospace vehicle design criteria. Attaining quality data is paramount. For the first time bistatic measurements of full-scale models have been obtained. To date over 4000 radar reflectivity measurements have been made. The objective set for RAT SCAT is to provide a reflectivity measurement range so that the quality of measurements obtained will be universally accepted as scientific data. The site represents an appreciable extension of the state of the art in radar reflectivity measurement. This is an in-house effort with Rome Air Development Center responsible for instrumentation development and the Missile Development Center responsible for site operation and maintenance.

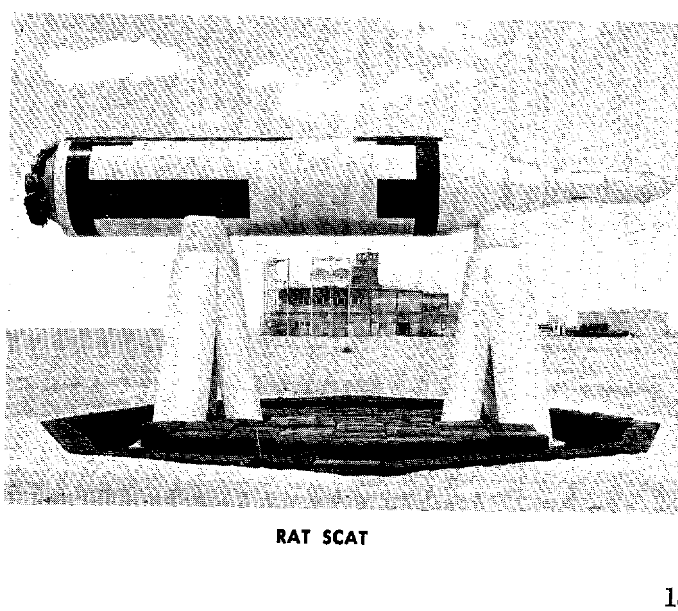
Nuclear Effects Simulation

The treaty banning atmospheric nuclear testing necessitates a laboratory research program in the simulation of nuclear effects and their analysis. An exploding wire device has been developed and is operating at the Weapons Laboratory in a program to simulate nuclear explosion effects. The device can discharge 20 billion watts of power—the equivalent of that generated by 10 Grand Coulee dams—in a pulse lasting over 50 billionths of a second. The device, charged by conventional power sources, requires about two minutes to store the energy. The very high temperatures generated in short time periods cause the wire to explode violently. This creates similarities with nuclear explosions allowing study of nuclear effects in the laboratory.

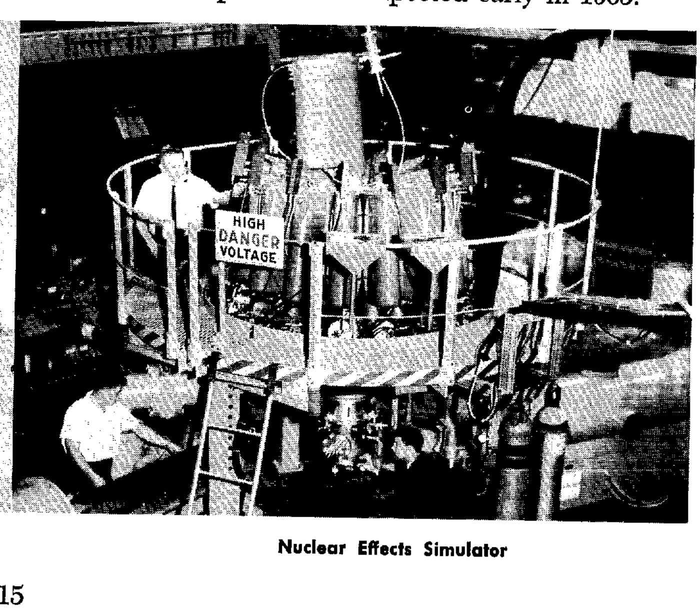
Space Flight Test

The first in a series of Titan III–A boosters was launched at the Air Force Eastern Test Range. All phases of the booster portion of the flight worked well; but, due to apparent failure of a valve in the transtage pressurization system, thrust decayed and the payload did not achieve orbit. The Titan III–C which has a configuration that employs the Titan III–A with two additional 120-inch diameter solid propellant boosters for initial thrust will be used to place the Manned Orbiting Laboratory in space.

The first Titan II-Gemini launch took place during the year and an unmanned payload was placed in orbit. The first manned orbital flight with the two-man Gemini spacecraft is expected early in 1965.



RAT SCAT



Nuclear Effects Simulator

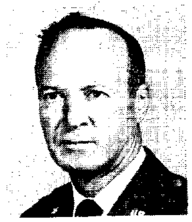

Bernard A. Schriever
General, USAF
Commander


W. A. Davis
Lieutenant General, USAF
Vice Commander


Joseph J. Cody, Jr.
Brigadier General, USAF
Chief of Staff

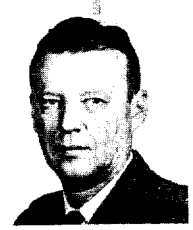

Leighton I. Davis
Lieutenant General, USAF
Deputy Commander for
Gobal Range

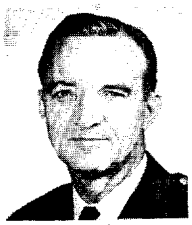

Jerry D. Page
Major General, USAF
DCS/Plans


Gerald F. Keeling
Major General, USAF
DCS/Procurement
and Production


Wendell E. Carter
Brigadier General, USAF
DCS/Comptroller


Robert H. Cobb
Colonel, USAF
Acting DCS/Systems

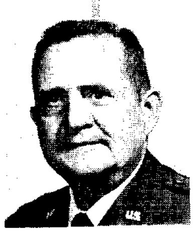

Gerhard J. Schriever
Colonel, USAF
DCS/Personnel


Raymond S. Sleeper
Colonel, USAF
DCS/Foreign Technology

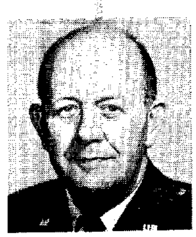

Calvin W. Fite, Jr.
Colonel, USAF
DCS/Materiel


Bernard W. Marschner
Colonel, USAF
DCS/Science and Technology


Benjamin A. Strickland, Jr.
Brigadier General, USAF
Command Surgeon

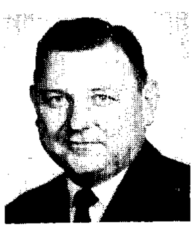

Adrian W. Tolen
Brigadier General, USAF
Staff Judge Advocate

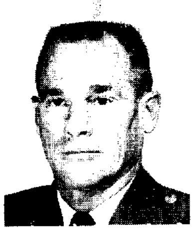

John R. V. Dickson
Colonel, USAF
Inspector General


John P. Fellows
Colonel, USAF
Chaplain


James H. Voyles, Jr.
Colonel, USAF
Director, Manpower and
Organization

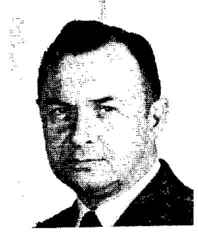

William J. McGinty
Colonel, USAF
Director, Office of
Information

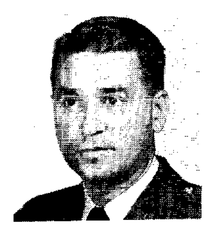

Marvin J. Franger
Captain, USN
Navy Liaison


Russell D. Hale
Colonel, USAF
Chief, Staff Management
Office


John F. Rash
Colonel, USAF
Director, Administrative
Services


Coy T. Sevier
Colonel, USAF
Headquarters Commandant


James B. Hilton
Colonel, USAF
Command Secretariat


Colin D. Ciley, Jr.
Lieutenant Colonel, USA
Chief, Army Field Office

The MANAGEMENT TEAM

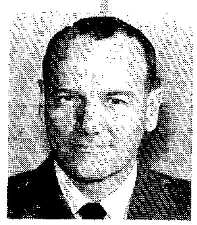

Osmond J. Ritland
Major General, USAF
Deputy Commander for Space


Dr. B. H. Goethert
Chief Scientist


Ernest A. Kiessling
Colonel, USAF
Assistant for Management Policy


Carl Arnold
Colonel, USAF
Director
Prom Central


Leighton I. Davis
Lieutenant General, USAF
Commander, NRD


Ben I. Funk
Major General, USAF
Commander, SSD


Marvin C. Demler
Major General, USAF
Commander, RTD


Charles H. Terhune, Jr.
Major General, USAF
Commander, ASD

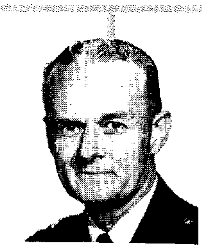

Theodore C. Bedwell, Jr.
Major General, USAF
Commander, AMD


John W. O'Neill
Major General, USAF
Commander, ESD

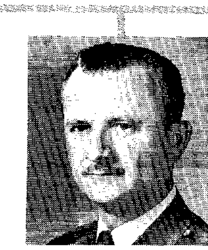

Harry J. Sands, Jr.
Brigadier General, USAF
Commander, BSD

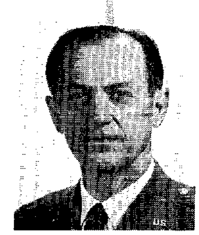

Arthur W. Cruikshank
Brigadier General, USAF
Commander, FTD


James E. Roberts
Major General, USAF
Commander, APGC


John W. White
Major General, USAF
Commander, AFSWC

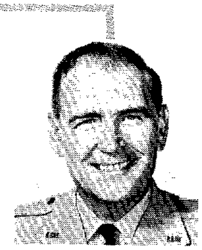

Irving L. Branch
Brigadier General, USAF
Commander, AFFTC


Lee V. Gossick
Brigadier General, USAF
Commander, AEDC


Ralph S. Garman
Colonel, USAF
Commander, AFMDC


William R. Large
Colonel, USAF
Commander, ECMR


Henry G. MacDonald
Colonel, USAF
Commander, CCMR


Fred L. Rennels, Jr.
Colonel, USAF
Commander, WCMR

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

DIVISIONS, CENTERS AND REGIONS—of SYSTEMS COMMAND

AERONAUTICAL SYSTEMS DIVISION—ASD
Wright-Patterson AFB, Ohio

ASD is responsible for development, acquisition and delivery of aircraft, nonballistic missiles and related equipment. This Division conducts programs in the fields of limited war, counterinsurgency and reconnaissance.

SPACE SYSTEMS DIVISION—SSD
AF Unit Post Office, Los Angeles, California

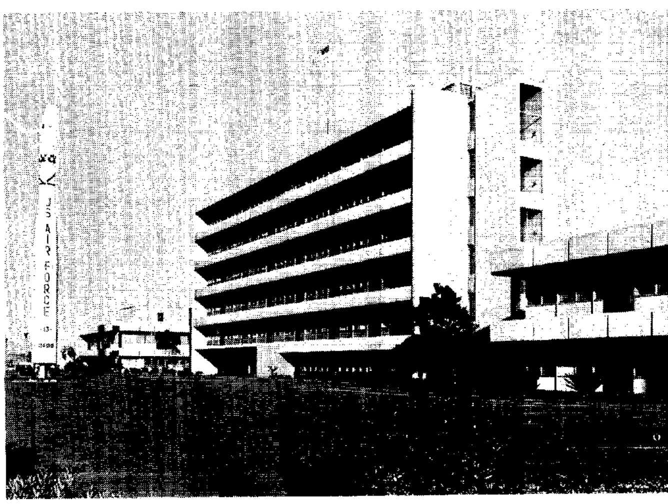
Development, acquisition and launch of space vehicles and research satellites are responsibilities of this Division. These responsibilities include launch support, on-orbit control and retrieval.

FOREIGN TECHNOLOGY DIVISION—FTD
Wright-Patterson AFB, Ohio

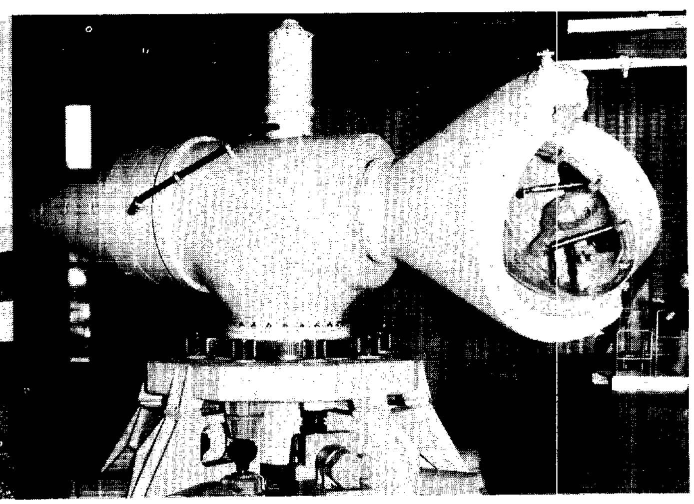
FTD acquires, analyzes, and disseminates foreign scientific and technical information to provide assessment of foreign technology for application in the development of the Air Force weapons systems.

AEROSPACE MEDICAL DIVISION—AMD
Brooks AFB, Texas

AMD conducts bioastronautics research and development in support of aerospace programs, the USAF personnel system, clinical and aerospace medicine, and provides specialized educational programs in aerospace medicine.



Headquarters, Space Systems Division



Dynamic Escape Simulator

BALLISTIC SYSTEMS DIVISION—BSD
Norton AFB, California

BSD manages Air Force ballistic missile acquisition programs and DOD programs for Advanced Ballistic Re-Entry Systems. Responsibilities begin with system concepts, include development, production, delivery of operational systems and site activations.

ELECTRONIC SYSTEMS DIVISION—ESD
L. G. Hanscom Field, Massachusetts

ESD is responsible for development, acquisition and delivery of electronic systems and equipment for command and control of aerospace forces. This includes ground-based warning, aerospace support systems, satellite tracking and ground assessment of objects in space.

RESEARCH AND TECHNOLOGY DIVISION—RTD
Bolling AFB, Washington, D.C.

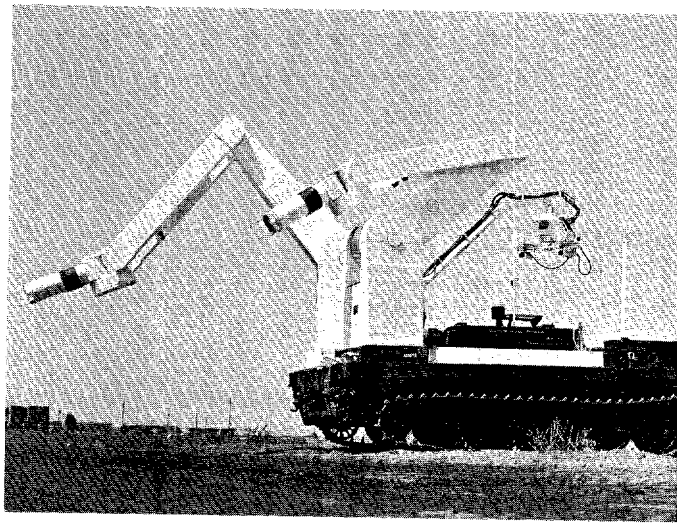
RTD is responsible for maintenance of a broad base of exploratory and advanced technology programs to aid in timely development of aerospace systems. Its laboratories cover electromagnetic, avionic, flight dynamics, materials, rocket propulsion, aero-propulsion and weapons technologies.

NATIONAL RANGE DIVISION—NRD
Andrews AFB, Washington, D.C.

NRD plans, operates and maintains assigned range facilities in support of national ballistic missile and space programs. This recently established Division provides a major step forward in range management within the Defense Department.

AIR FORCE SPECIAL WEAPONS CENTER—AFSWC
Kirtland AFB, New Mexico

AFSWC is responsible for conducting tests and providing operational and technical support in the fields of nuclear effects and applications for weapon systems.



Remote Radioactive Material Manipulator

ARNOLD ENGINEERING DEVELOPMENT CENTER—AEDC
Arnold AFS, Tennessee

The unique wind tunnels and space simulators at AEDC support research, development, test and evaluation of aerospace systems. These facilities provide support to both military R&D programs as well as those of NASA and other government agencies.

AIR FORCE FLIGHT TEST CENTER—AFFTC
Edwards AFB, California

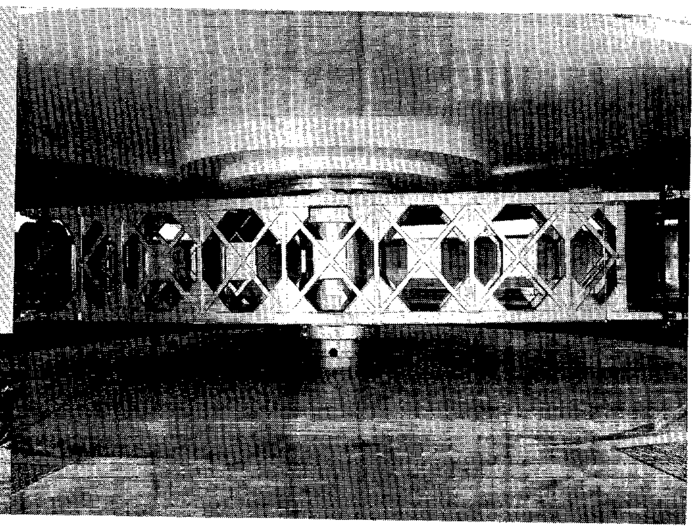
This Center conducts and provides support for tests of aircraft systems, operates the aerospace pilot school and supports rocket propulsion, laboratory and testing activities conducted at this base.

AIR PROVING GROUND CENTER—APGC
Eglin AFB, Florida

This Center provides an operational test environment for aircraft and nonballistic missiles, provides support to the Tactical Air Warfare Center and is responsible for development and operation of the Gulf Test Range.

AIR FORCE MISSILE DEVELOPMENT CENTER—AFMDC
Holloman AFB, New Mexico

This Center tests air-to-air and ground-to-ground missiles, target drones, ballistic missile nose cones and reentry aids and executes Air Force responsibilities at the White Sands Missile Range.



Two-Hundred-Sixty-Inch Precision Centrifuge

EASTERN CONTRACT MANAGEMENT REGION—ECMR
Olmsted AFB, Pennsylvania

ECMR manages and administers contracts with industry for DOD and other government agencies. The geographic area administered covers the 19 eastern states, District of Columbia, Caribbean area, Iceland, Greenland, Bahamas, Bermuda, Ascension Island, Puerto Rico and Central and South America.

CENTRAL CONTRACT MANAGEMENT REGION—CCMR
Wright-Patterson AFB, Ohio

This Region manages and administers DOD and other government agency contracts with industry which have been placed in the 18 central states, Canadian Provinces and Mexico.

WESTERN CONTRACT MANAGEMENT REGION—WCMR
AF Unit Post Office, Los Angeles, California

WCMR manages and administers contracts with industry for DOD and other government agencies. The geographic area under WCMR cognizance covers the 13 western states, including Alaska and Hawaii.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

As it is important to strive for new advances in technology, it is equally important to find more effective ways to manage research and development efforts. The key to technical progress is innovation—the use of fresh insights and new approaches. The need for innovation is not confined to technical areas. It is equally needed in management, administration and procurement areas. Innovation, intelligent application, and cooperative efforts are essential keys to the solution of management problems. Selected representative Systems Command items follow:

Prom

This management concept was implemented in May of this year. The acronym PROM is drawn from Program Management, Resources Management, and Objectives Management. It is a management technique employed at Headquarters AFSC to improve management visibility, to increase staff interaction, and provide analysis of Command decisions and proposals. PROM Central serves as the nerve center for PROM activities. Its principal functions are providing an operating environment, specialized analytical techniques, and display devices to assist decision-making on future programs. The PROM Central workroom displays the dollar cost of currently approved programs and the intermediate and long-range plan for a fiscal period ten years into the future in the context of the total force structure. The concept requires daily interaction among staff elements by participation in PROM-generated actions. Thus, it provides an effective means for interplay between desired planning objectives, resources and alternate solutions. PROM will provide an ideal method to exercise management options to achieve well balanced programs, within budgets in consonance with Air Force and Defense Department objectives.

Automation

The continuing Command program aimed at expediting the availability of management information received considerable impetus with the installation of advanced real time computers at eight key sites. A primary feature of the system is the real time capability through remote input and inquiry devices which eliminates the delay associated with other systems. A standard financial management system was installed at each site as the first application in real time. Thus, financial managers at field level are instantly advised on status; and concurrently, other managers have financial information immediately available. Support of the system management process was enhanced by the automation of Rainbow milestone reporting and an application to control aircraft and missile utilization. Additional major applications nearing completion are computerizing PERT/Cost and Contractor Data Management information. A test is planned for early 1965 to automate essential information in the personnel functional area at Division and Center level. Constant improvements, such as addition of ultra-high speed printers and tape drives, continue to increase the capabilities of the computer system.

Technological Management

A dynamic Long Range Plan supplementing the AFSC Technological War Plan was produced, delineating the proposed course of Air Force Exploratory/Advanced Development in future years. The Plan is inclusive as it considers projected resource availability, and packages necessary manpower, funds and facilities with specific areas of technical effort. It is objective-oriented as it correlates technical programs with system applications and over-all Air Force plans and requirements. A series of reviews of in-house programs was initiated to assure proper orientation and coordination. Review panels composed of eminent scientists from government agencies, industry, and educational institutions, chaired by the Research and Technology Division's Scientific Director, examined laboratory plans and programs in several scientific disciplines.

Closer relations between the Research and Technology and the Systems Divisions were promoted by high level meetings. These meetings assist in aligning exploratory and advanced development programs with system requirements and permit Systems Divisions' personnel to become intimately aware of trends in technology which can form the building blocks for future systems.

AFSC has significantly enlarged the foreign scientific and technological intelligence data base and expanded its use in the R&D decision process. As an example, a one-year R&D effort was avoided when foreign technology elements provided details and results of a similar experiment. The exploitation of foreign aerospace technologies has been improved, at reduced cost, by AFSC-sponsored advances in machine translation. In seven months, more than 19 million words were machine translated at a cost of about 1¾ cents per word, as compared to 7 million words by human translation at a cost of about 4¾ cents per word in the same time period.

Systems Management

Much of what was broad guidance in 1963 has been converted to standard publications describing the system management process. New manuals include the System Program Office Manual, Chapter 2 of the System Program Management Manual and Volume II of the Data Management Manual. The first explains systems management and operation of the System Program Office. The second provides a road map for accomplishing the Program Definition Phase. The last provides a controlled data list from which contract data requirements must be selected. By-products of the revised Configuration Management Manual include an integrated configuration accounting system and a cost accomplishment/cost-to-completion system. Procedures were also formalized for initiating and terminating programs when system management is used.

Many essential functional responsibilities have been aligned to the system management process. Logistics efforts related to Logistics Command's system support task as opposed to Systems Command's activation task were identified and separated to the advantage of both Commands. A study effort titled "Presentation of Information for Maintenance and Operations" was initiated to compare effectiveness of the current technical data presentation system to a system using advanced audio-visual techniques.

Achievements in reliability include establishment of the Air Force Parts Data Bank and the RADC Reliability Analysis Central. The Weapon System Effectiveness Industry Advisory Committee, under AFSC guidance, submitted reports on prediction and optimization techniques and their use in the system management process. Educational programs and selective application of validated concepts will follow.

Financial Management

AFSC has initiated a program to strengthen cost management capability through design and test of improved cost estimating and cost control procedures. The Cost Estimating Project goal is to improve capability in making credible, realistic system cost estimates. The major aspects of the project are development of standard estimating methods, uniform tracking procedures and a responsive cost information system. Organizational concepts, manning and training needs will also be recommended.

The Cost Control Project is directed at improving program cost management during the acquisition phase for systems and equipment. It focuses on an integrated system that meets management needs at all levels. The project is designed to provide better methods for determining progress versus funds expended, better management of program change costs and stronger incentives for overhead management to contractors.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8

In the procurement accounts, the Command obligated over 96% of the fiscal 1963 directed program and more than 87% of comparable fiscal 1964 programs. In the RDT&E appropriation, obligations for fiscal year 1964 exceeded 96%. Reimbursement policies of the Command were strengthened to insure that Air Force funds are conserved for application to Air Force programs. A special effort was made during the year to recoup excess funds from prior year contracts and make them available for reprogramming. These efforts contribute to the over-all objective of full use of financial resources.

The Command crusade against excessive costs is carried out through many programs combined under Project Purse Strings. Savings of $503 million had been identified at year's end. Of this amount $392 million was reportable under the DOD Cost Reduction Program. All goals set by DOD/Air Force in fiscal 1964 were exceeded.

Procurement Management

Extensive programs to strengthen R&D procurement practices resulted in improved technical evaluations, reduction in sole source negotiations and improved facility capability reports. Direction was provided to system program offices to assure timely accomplishment of advanced procurement planning. Procedures were implemented to reduce determinations and findings processing time. The Contractors Estimating Methods Review Manual is being revised to reflect improvement resulting from a six-month field test completed this year. Continuous support was given to the DOD program to reduce procurement directives and develop consolidated policies and procedures. A Relaxation of Controls Program was implemented on a test basis. Selected contracts are being reviewed to identify government methods and controls that can be relaxed yet assure appropriate management by the Air Force and industry.

The total dollar obligation using incentive or fixed price contracts increased 17% over 1963. The shift to this type of contracting resulted in an estimated 285 million dollar savings. The Value Engineering Program was also effective in realizing sizable cost reductions. The Command worked effectively with the aerospace industry in the implementation of the Contractor Performance Evaluation Program and the Zero Defects Program to further reduce procurement costs.

Material Management

Computerized techniques were applied in determining the validity of initial support planning for systems entering the operational inventory. Information supplied by mathematical models led to improvement in maintainability, reliability and refinement of ground equipment and personnel requirements in initial support planning for the F-4C.

Management emphasis was given to packaging and shipment, base level repair, contract technical services and utility operation. An increase to an 84% repair rate at base level was achieved. Packaging and shipping innovations and study of minimum essential in transit protection for aircraft engines resulted in substantial savings. Competitive procurement and insistence on gaining in-house capability as soon as possible contributed to sizable savings in the Contract Technical Services Program. Total utility costs fell due to negotiation of new rate schedules and improved distribution systems. Modernization of communications facilities, urgently needed to support the National Range, continued as did efforts to modernize the test aircraft fleet.

Organizational Changes

The National Range Division, NRD, was created in January 1964. The Western Test Range, Vandenberg AFB, California, and Eastern Test Range, Patrick AFB, Florida, now compose NRD. The Division will operate and manage the National Global Range comprised of Atlantic and Pacific Missile Ranges. Management of the PMR will be assumed during 1965.

A Command Communications Management Office was established at NORAD by the Electronic Systems Division. The Office will enable Commanders of Unified/Specified Commands to play an active role in development of communication systems for control over their forces. A Deputy for Effectiveness Testing was created at APGC for the Weapons Effectiveness Testing Program. The program supports SAC, TAC, ADC, the Tactical Air Warfare Center and R&D tests.

Improved organizational structures for four centers and the Aerospace Medical Division and standardized functional organizations such as personnel and comptroller were developed and implemented. As a result of DOD Project 60, a new Contract Management Division will be formed in early 1965.

The Critical Resource

A concerted effort was made to adjust manpower authorizations to priority mission needs. Reprogramming has been directed toward maintaining mission capability at the expense of support functions. Full use has been made of available standards, analytical methods, and empirical judgment. Standards applicable to approximately 13 per cent of the Command strength were developed. Plans call for establishing standards in all measurable areas. An automated man-job match manpower authorization file can now provide accurate personnel assignment data every three days. Mechanized manpower accounting has been developed to provide constant zero error between authorization and allocated manpower resources.

A test of the Management Engineering Team phase of ECONOMAN was implemented at three organizations. It combines the manpower and organization function at these locations with the Command Management Engineering function at Headquarters AFSC. The test will be completed in August 1965.

AFSC Pamphlet 36–2, which describes typical jobs that lieutenants can expect on initial assignment to the Command, was published. New system program management specialties were created as a part of the total revision of the scientific and development engineering classification structure. Actions were initiated, in conjunction with the Air Staff, to develop an optimum scientific and development engineering officer force distribution. This will appear as Phase IIA of a project titled "The Road Ahead." Under this project AFSC will develop progression patterns and career management policies and procedures for these officers.

Extensive briefings and training sessions enabled Commanders to respond rapidly to the Executive Order and Air Force directives concerning employee unions.

Professional Education

The Tennessee Space Institute, which will conduct educational programs in aerospace sciences, opened at AEDC in September. The Institute evolved through cooperative efforts of the State and University of Tennessee and AFSC. Also, a Graduate Engineering Education System, GENESYS, was initiated by joint effort with the State and University of Florida. Temporary facilities were provided at Patrick AFB.

Technical Facilities

New emphasis was given to accelerated disposition of technical facilities not absolutely essential, and making maximum use of the wide range of technical facilities and equipment comprising the RDT&E plant. This emphasis is assured by the AFSC Technical Utilization Plan for 1964. The Plan is a first attempt to consolidate data to determine the desirability of facility disposal, modification or modernization, or new facility development. Some vitally needed laboratory facilities were obtained by converting obsolete facilities to accommodate new trends in aerospace technology. The conversion of an old carburetor test cell for use in space power projects is but one example. Approval of the 100-inch Collimator Facility and Altitude Propulsion Research Facility attests to the increased recognition at higher levels of the fact that timely availability of R&D facilities is essential.

Interagency Cooperation

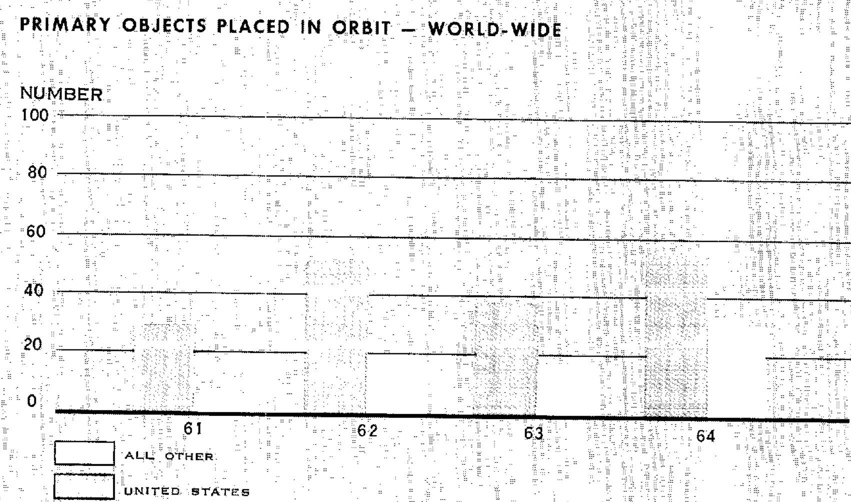
Relationships with other agencies progressed extremely well during the year. Extensive coordination with NASA in bioastronautics and space medicine led to joint projects and funding in these fields. The National Range Division is planning jointly with NASA for future range support of NASA programs. Fifty-five AFSC officers have been placed on duty with NASA, several occupying key positions in the NASA organization. In addition, senior officers of of the AFSC staff have been designated to provide assistance to NASA and to the Joint Chiefs of Staff in specialized areas in support of space programs. Final arrangements were made which provide Air Force Academy cadet participation in summer programs at several NASA development centers.

In cooperation with the Navy and NASA an Instrumented Ships Project Office was established under Navy Management. Excellent cooperation by the Navy will allow transfer of PMR range responsibilities to AFSC much earlier than originally planned. Plans are being finalized with the Army to transfer the Kwajalein Test Site to Army control. Periodic joint meetings have also been initiated between the Commander, Army Materiel Command, Chief of Naval Material, and Commander, AFSC, to achieve mutual understanding and joint approaches to matters of tri-agency interest in which improved management effectiveness and capability can be attained.

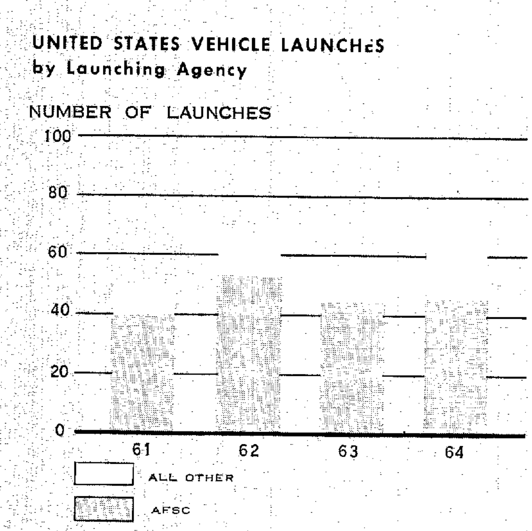
SELECTED COMPARATIVE DATA

	1964	1963	1962	1961
RESEARCH AND DEVELOPMENT				
Exploratory Development Projects	259	345	354	343
Advanced and Engineering Development Programs	44	49	31	13
Operational Systems Development	20	4	12	15
SYSTEMS IN ACQUISITION				
Aeronautical	27	21	28	26
Ballistic Missile	1	2	4	4
Electronic	22	14	15	15
Space	1			
PRODUCT DELIVERIES FOR THE YEAR				
Fighters/Bombers	400	238	243	298
Cargo/Transports	225	225	183	115
Trainers/Utility	160	194	211	182
Helicopters	37	75	47	80
Aircraft for Other Services	302	651	308	234
Intercontinental Ballistic Missiles	405	486	186	111
Boosters for Space Payloads	66	67	58	41
CONTRACTS				
Numbers of Contracts	47,927	50,061	69,641	50,089
Face Value of Contracts	$58,500,000,000	$58,800,000,000	$56,100,000,000	$59,300,000,000
RESOURCES (Note 1)				
Fiscal Year Funds Programmed During the Year—Total	$ 6,881,200,000	$ 8,238,500,000	$ 8,988,374,000	$ 7,465,179,000
Procurement of Aeronautical Systems	1,935,500,000	1,865,300,000	2,224,500,000	1,671,400,000
Procurement of Missile Systems	1,147,100,000	2,012,500,000	2,101,400,000	2,647,200,000
Procurement of Electronic Systems/Subsystems	369,600,000	395,700,000	399,700,000	401,200,000
Research, Development, Test and Evaluation	3,161,000,000	3,604,000,000	3,507,774,000	2,250,653,000
Military Construction Program (Note 2)	132,000,000	218,000,000	584,000,000	331,726,000
Operation and Maintenance	136,000,000	143,000,000	171,000,000	163,000,000
Manpower—Total	66,901	67,412	64,954	65,135
Military	29,779	29,232	27,013	27,896
Civil Service	37,122	38,189	37,941	37,239
Materiel				
Systems Command Facilities	$ 1,150,000,000	1,193,000,000	1,095,000,000	999,000,000
Air Force Owned Industrial Facilities	1,718,000,000	1,999,000,000	1,993,000,000	2,077,000,000

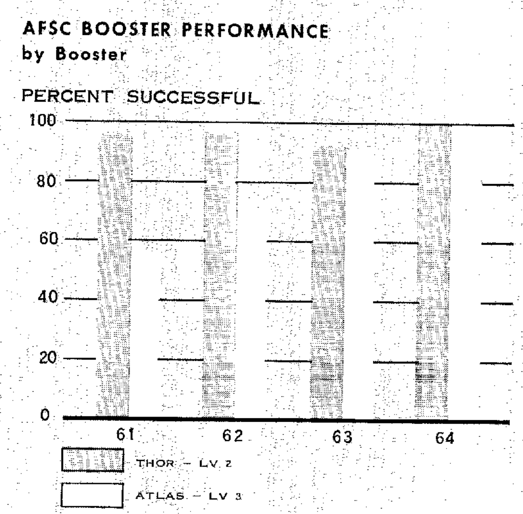
Note 1: 1963 fiscal data adjusted to reflect final program changes.
Note 2: Includes Missile-Site Construction



The United States continues to surpass all others in the total number of objects intentionally placed into near earth, lunar impact, or heliocentric orbits. While certain launches placed two or more objects in orbit simultaneously, these data reflect only primary objects. They do not include scientific probes employing ballistic trajectories nor do they represent the number of objects still in orbit.

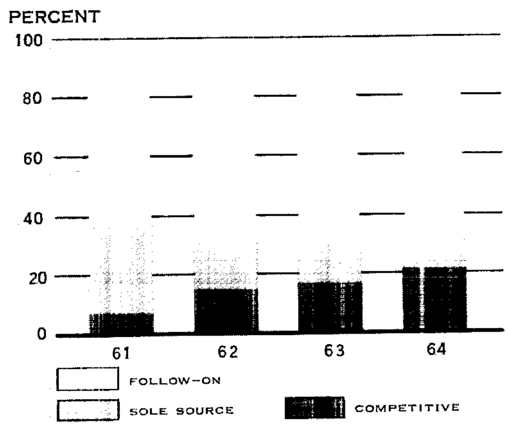


These figures represent all space launches; orbital and nonorbital; successful and unsuccessful. AFSC has delivered and been responsible for launching the majority of the United States launch vehicles.



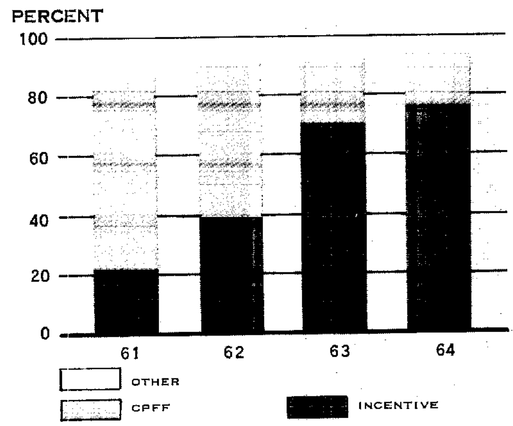
The perfect record this year is primarily a result of the Standard Launch Vehicle concept initiated in 1962. The SLV–5A (Titan III), soon to enter the "family," had a highly successful record in its first two R&D launches this year.

CONTRACT TRENDS



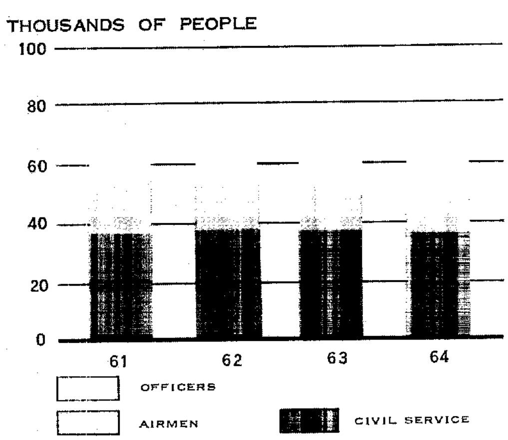
The use of design technical and price competition awards has shown a marked increase since Command emphasis in 1962 on multiple source competition awards. The optimum contract mix has not yet been obtained and further change is expected.

INCENTIVE VS. CPFF CONTRACTING
by Percent of Total Dollars



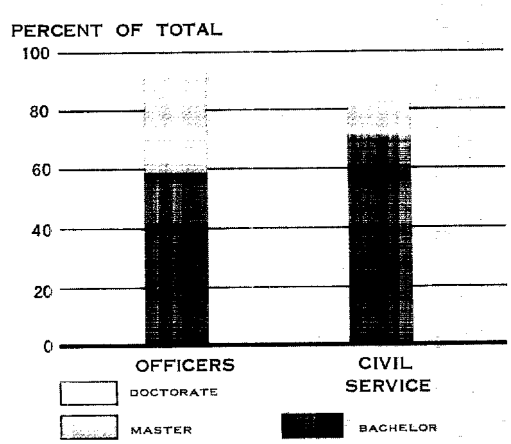
The relative proportion of the Cost Plus Fixed Fee (CPFF) and the Incentive type contracts appear to be approaching an optimum mix for the Command program structure.

COMMAND MANPOWER RESOURCES



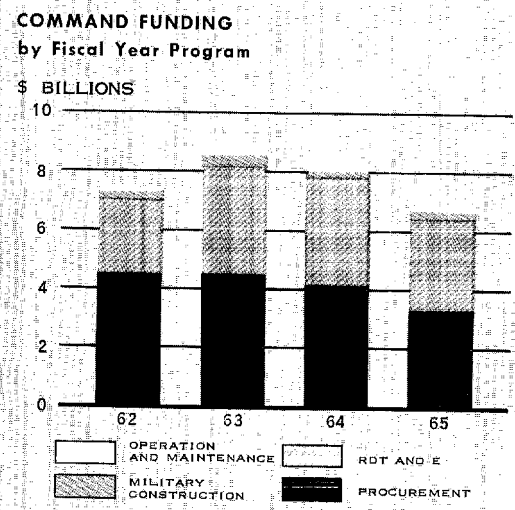
The Command has created an effective military and civilian team through aggressive personnel management programs dedicated to the principles contained in the Command Accent on People program.

SCIENTIFIC & ENGINEERING MANPOWER
by Educational Attainment - 1964

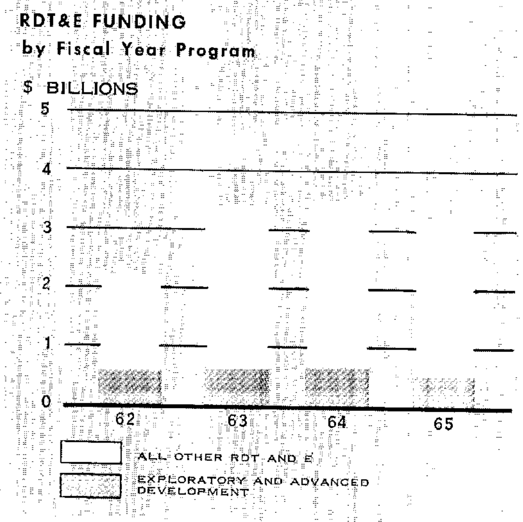


The Command educational level is one of USAF's highest. In the key S&E area, 96% of all officers and 87% of all civilians have at least a Bachelor degree.

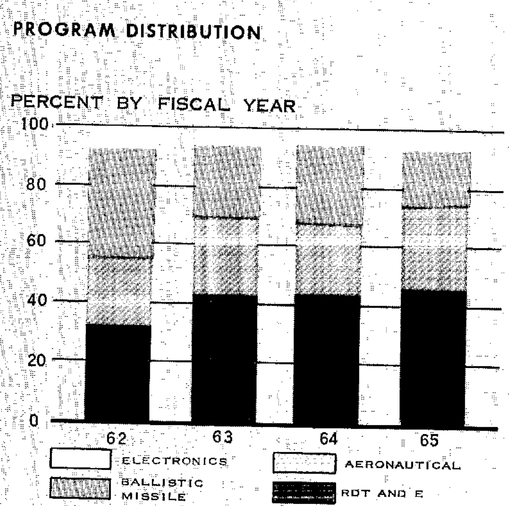
Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8



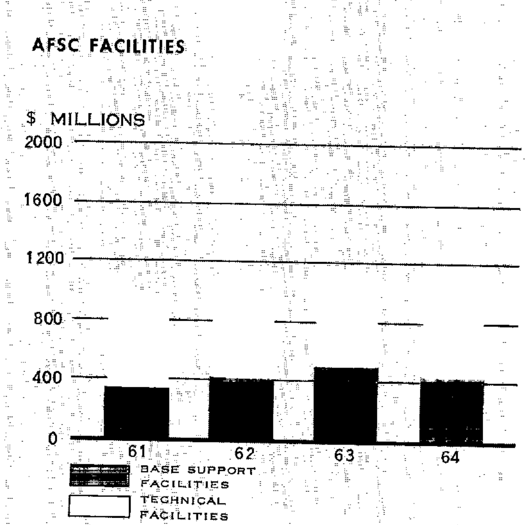
The decline in funds for the procurement of missile systems is the primary contributing factor in the continuing reduction of Command funding. Completion of Atlas and Titan leave the Minuteman the only remaining active missile program.



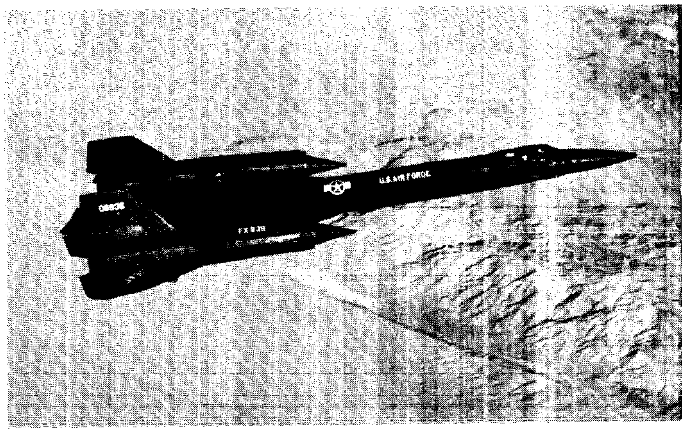
While the FY 65 reduction in total Research, Development, Test, and Evaluation funding reflects the decline in ballistic missile programs, that amount devoted to Exploratory and Advanced Development programs remained fairly constant.



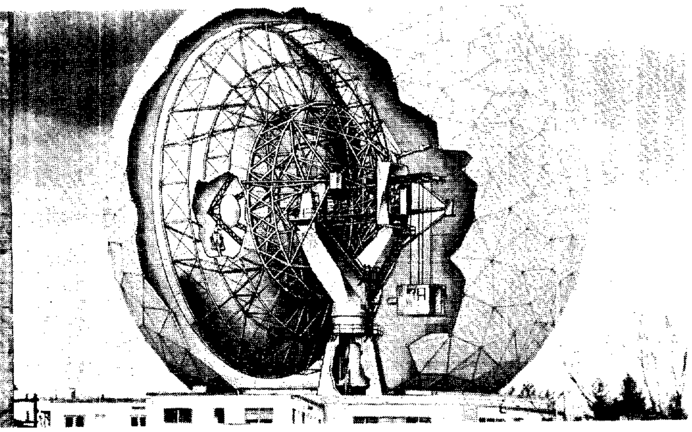
With the accelerated reduction of missile procurement funds, the percentage of total Command monies being devoted to Research, Development, Test, and Evaluation was increased.



The chart includes only the value of land, buildings, structures, and improvements for facilities owned by AFSC. The Command uses extensive facilities on a tenant basis.



YF-12



Haystack Microwave Facility

Aircraft

The YF-12A Long Range Interceptor, LRI, a Mach 3+ aircraft of conventional design, was delivered to the AFFTC in March 1964 for test and evaluation of its capability as an Improved Manned Interceptor, IMI. It represents a giant stride in technological advancement through use of titanium and materials and components capable of withstanding a high temperature operational environment. The YF-12A is equipped with the ASG-18 pulse doppler radar and AIM-47A air-to-air missile.

The SR-71, a strategic reconnaissance aircraft, is heavier and has a longer range than the YF-12A. Using the same J-58 engine as the YF-12A, the SR-71 will operate at altitudes in excess of 80,000 feet at speeds exceeding Mach 3 and be capable of worldwide reconnaissance.

Development of the supersonic Air Force/Navy F-111 fighter continued during 1964. The F-111 features a variable sweep wing to provide low takeoff and landing speed coupled with supersonic speeds at low and high altitudes in the neighborhood of Mach 2.5. The first F-111A test aircraft off the production line was unveiled during a 15 October 1964 rollout ceremony. First flight occurred 21 December 1964. Takeoff was normal and all subsystems operated normally except for failure of the flaps to fully retract. Test pilots reported excellent handling characteristics. Demonstration of swept wing and supersonic flight will be conducted in early 1965.

A program, initiated in 1963 to adapt the basic C-130 configuration to the MATS air rescue mission, continued in 1964. The HC-130H features a retrieval subsystem with which the rescue forces can pickup one or two people from the earth's surface during a low fly-by. The first aircraft of this series was delivered in 1964 for R&D testing. Production quantities are scheduled for delivery in 1965.

The tri-service V/STOL program was continued to determine the operational suitability of aircraft having Vertical and/or Short Take-Off and Landing characteristics. The XC-142, developed by Ling-Temco-Vought to evaluate the operational suitability of the tilting wing for V/STOL transport aircraft, made its first vertical flight in December 1964. The X-19, developed by Curtiss-Wright to evaluate the operational suitability of the tilting propeller concept for small V/STOL utility aircraft, made its first flight in June 1964.

The XB-70 program was reoriented to a two-prototype vehicle program. First flight occurred on 21 September 1964 when the first aircraft was flown from Palmdale to the Air Force Flight Test Center at Edwards AFB. On 21 October 1964, during the third flight, the aircraft exceeded Mach 1.0 for the first time.

The X-15-2 aircraft was rolled out in February. Extensive modification increased its speed capability to Mach 8 (almost 6,800 statute miles per hour.) Flights in this speed range are scheduled for 1965.

Interim configuration changes in the X-21 Laminar Flow Control Program were highly successful, producing significant increases in per cent of wing area over which laminar flow may be attained.

Space

A number of important studies were completed on the Manned Orbiting Laboratory presently planned to be a two-part tandem spacecraft including a ferry vehicle and a cylindrical orbiting laboratory. These Pre-Program Definition Phase studies are being evaluated and documented for presentation to USAF and DOD as the basis for requesting Program Definition Phase approval.

ASSET, the Aerothermo-dynamic/elastic Structural Systems Environmental Test program, is designed to test various materials at high-speed reentry into the atmosphere. Using a small delta-wing reentry vehicle, valuable data has been gathered on structures, materials, control and reentry communication. Three of the four launch attempts were successful.

The Titan III, SLV–5, being developed under the "building block" concept by combining proven boosters, guidance, and command and control systems for specific payloads, was highly successful on both the first and second test launches.

Missiles

A major highlight of the year was the complete success of the first Minuteman II ICBM launched for R&D test on 24 September 1964 at Cape Kennedy. Construction of the first Minuteman II facilities was initiated at Grand Forks, North Dakota. Minuteman II will bring increased payload, range and accuracy to the operational inventory.

The Advanced Ballistic Re-Entry System, ABRES, program received special identification as the Department of Defense Program for advanced reentry techniques and devices. The program was placed on the list for Designated Systems Management in August 1964. The Athena missile, launch complex and instrumentation tie-in between Green River and WSMR are complete. The Data Center located at Air Force Missile Development Center achieved full capability in June 1964. The first successful Athena live 2-stage flight occurred in July; the first successful live 4-stage flight in November 1964.

The Mobile Mid-Range Ballistic Missile, MMRBM, program was terminated on 31 August 1964 with study efforts to be continued on Command and Control subsystem and the Stellar Inertial Guidance subsystem.

Electronics

Dedication ceremonies were held for the Haystack space age radio research facility at Tyngsboro, Massachusetts late in the year. This facility is a forerunner of a new generation of radio communications, radar and radio astronomy antenna systems. A 150-foot diameter radome houses a 120-foot diameter computer controlled "dish" antenna. With its first transmitter, the system could communicate with space probes a hundred million miles in space. As a radio telescope, it will produce accurate "radio maps" of the universe, or as a radar, track a target the size of a .22-caliber bullet 1,000 miles away.

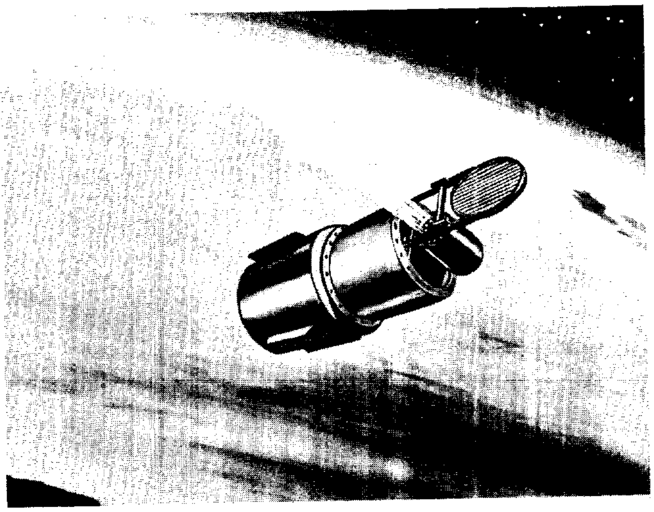
Testing of the AN/FSR–2 electro-optical satellite detection and tracking system was begun at Cloudcroft, New Mexico, this year. This system combines the advantages of the detailed vision of optics with the speed-of-light capability of electronic information processing.

In furtherance of the tropospheric scatter communication development, test messages were transmitted over the longest frequency modulation troposheric scatter hop in the world. Transmissions covered the span between Thule, Greenland, and North America.

Mobile equipment produced under System 433L will receive weather information direct from satellites. Designed to be air-transportable, the mobile weather vans will be capable of providing vast, large scale cloud observations not possible with conventional weather-observing techniques.

An air transportable air traffic control system entered the test phases of its development at Eglin AFB, Florida. Designed to be placed into operation within a few hours, the equipment can control enroute and landing traffic under both instrument and visual flight conditions. Development continued on a portable airfield lighting set capable of bringing stateside quality airfield lighting to remote sections of the world.

A new device for command and control research, the Systems Design Laboratory, was placed in operation at the Electronics Systems Division. Included in the Laboratory are two "command posts" and an advanced computer to provide valuable insight into the nature of decision making. The Laboratory also serves to introduce senior defense officials to the automated command systems.



Ion Space Engine

The Technological War Plan

The Technological War Plan is an expression of the future courses of Command action. The Plan is the primary source of guidance for plotting potentials of capabilities and technologies and the effective use of resources. Future alternatives are derived by analysis of the capabilities of existing military forces, a postulation of potential threats and environments, and the creative application of new technologies. These alternatives, based on today's situation, are shown in the TWP as capability, technology and resource planning guidance.

Analysis

Command analyses performed as a part of the planning cycle are not restricted to evaluation of technological progress and its impact on future systems. These analyses include an evaluation of the national and international impact the system or equipment may have in the intended operational environment. From this base, postulations of the many possible future world situations and potential threats can reasonably be made and the United States military course of action considered in the light of other factors. Recently instituted controls of the analysis process used in the formulation and conduct of system conceptual planning efforts will place greater emphasis on the selection process. They will also strengthen the analytical base of the planning process in determining and recommending new programs.

Capabilities

The major emphasis in the systems planning area during the year was placed on the implementation of selected findings of the USAF Project Forecast that was conducted during 1963. Considerable progress has been made on several of the new system developments recommended by the Project.

Preliminary planning studies and analyses leading to the initiation of an acquisition program for an advanced strategic aircraft were completed. A short range attack missile program, which will extend the operational life and the effectiveness of the B–52, has been defined. Similar efforts were completed in preparation for the program definition phase of a heavy logistics aircraft. This aircraft will provide rapid, efficient, and reliable world-wide air transportation of large items of equipment as well as combat elements of all services.

Feasibility studies were initiated for two vertical/short take-off and landing transport aircraft. The first of these would be the workhorse in a limited war or counterinsurgency theatre of operations. It is to be capable of carrying payloads of troops or supplies up to ten tons. The second, a lighter aircraft, would be used for rapid delivery of light loads right up to the battle area or to isolated trouble spots in the theatre.

A series of in-house studies were conducted to formulate an approach to the acquisition of a vertical/short take-off and landing strike reconnaissance fighter aircraft for limited war and counterinsurgency operations.

Three Industry/Air Force studies of major national significance were completed during 1964. Results of the Range Instrumentation Planning Study are being implemented by the Command's newly formed National Range Division.

The study of defensive measures against Submarine Launched Ballistic Missiles, SLBM, has produced a wealth of technological and operational parametric data. The results will provide the Research and Technology Division's Mobile Air-Space Defense Office with the analytical background essential to the development of a family of defensive concepts for countering this type of missile.

Technologies

Alternative system concepts of the future are made possible by the expansion and acceleration of a number of selected high return technical efforts. On the basis of high potential returns, special emphasis is being placed in the areas of propulsion, guidance, avionics, flight dynamics and materials technologies. High pay-off potentials have a commensurate high risk; yet, through analysis, the relationship between pay-off and risk permits the decision planning process to exploit the tremendous and exciting potentials of technologies.

Propulsion

Advances in airbreathing propulsion technology, along with improved fuels will result in large increases in the range and payload of future manned aircraft. The thrust-to-weight of turbine engines will be significantly increased through the use of new high strength and high temperature materials. Specific fuel consumption will be reduced through regenerative cycles, higher turbine temperatures, variable engine geometry to allow optimum cycle operation over a range of altitudes and speeds and high bypass ratio cycles. Hypersonic flight up to orbital speeds will be achievable by the use of ramjet engines using high energy fuels.

Guidance

Advanced guidance techniques and equipment will be developed to provide major increases in ballistic missile and air-to-surface missile accuracy and operational flexibility. Aircraft navigation and terrain clearance technologies will be developed to permit high-speed low altitude flight with greatly increased penetration effectiveness. Guidance technology for space missions will provide greater accuracy and more importantly the higher functional reliability required for manned operations.

Avionics

Future avionics efforts will be concentrated on the expansion of technology to attain electronic systems with increased performance, decreased size and weight, and increased reliability. Molecular electronics has presented a means for large strides in miniaturization of electronic equipment. Today a 10:1 improvement in size, weight and reliability is available with major cost savings and no loss in performance. Future developments seek devices that simultaneously reduce both circuit and material complexity and that correlate the physical, chemical, and structural properties of matter with the electronic properties. Some major avionics objectives are superior devices for generating and amplifying microwave power, improved electro-optical transducers, adaptive electronics and integrated circuits, and increased knowledge regarding theory and design of electronic devices.

Flight Dynamics

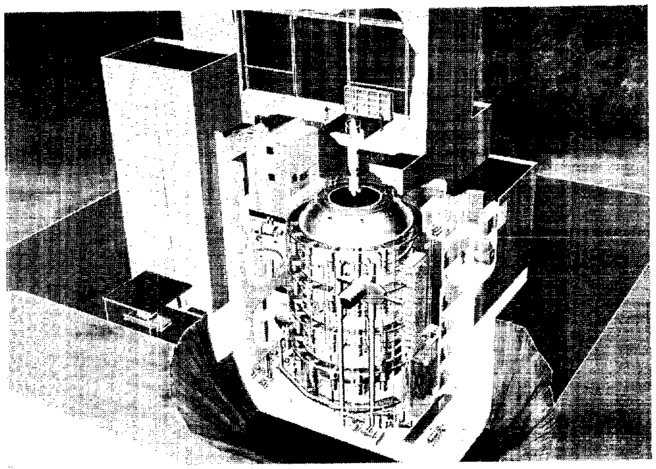
Future efforts in the aircraft and space vehicle flight dynamics area will be concentrated on improving vehicle reliability throughout flight envelopes ranging from supersonic low altitude flight to hypersonic maneuverable reentry. Particular emphasis will be placed on gaining a better understanding of hypersonic flow, low altitude gust alleviation, variable geometry, structural integrity and flight control problems induced by thermal deformations, and crew escape mechanisms. Technological advances will provide solutions to the problems associated with blind landing systems, control-display, adaptive flight control, aero-elastic effects, and will provide fundamental design criteria for the full spectrum of future aerospace vehicles.

Materials

New types of composite structural materials, using stiff, strong, lightweight fibers as reinforcements for plastics and metals will revolutionize aerospace design concepts. The first of a family of new continuous filament materials, boron, offers possibilities of being formed into composites that are strong, structurally rigid, and lightweight. Use of such composites could reduce aircraft structural weights over 35 per cent and airbreathing engine weights by as much as 33 per cent.

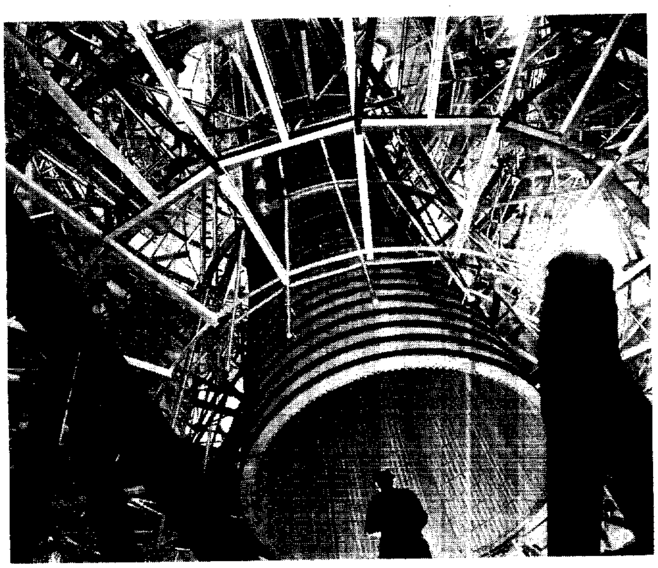
Environmental protection materials will provide long-term, reliable protection from radiation and corrosive agents at both high and low temperature extremes. Advantages to be gained are extended life of components, greater reliability, increased safety of flight and a reduction in costs. Improved high temperature alloys, using oxide dispersion techniques, will allow engine turbines to operate at temperatures several hundred degrees above what is now possible. Both performance and operating life will be increased through application of these materials.

Approved For Release 2000/08/25 : CIA-RDP69B00596R000100190080-8



Mark I Space Environmental Chamber

Materials Science Laboratory



J–4 Propulsion Test Facility

Resources

The Technological War Plan, in addition to presenting trends and objectives for technology and force capabilities, also presents the related command resource requirements in terms of manpower, funds and facilities. Although manpower and funds are critical resources, the prolonged lead time in acquiring modern technical facilities causes this resource to be a major concern. During the year an aggressive program to identify and obtain the facilities necessary to support advancing technologies and to demonstrate the ever increasing performance of new systems was pursued. Construction continued on several vitally needed facilities such as the Electro-Gas Dynamics Hypersonic Tunnel, the Dynamic Escape Simulator and the Mark I Environmental Chamber. Future plans include construction of the Aerospace Medical Accelerator, the Aerodynamic Hypersonic Wind Tunnel and the Materials Science and the Celestial Inertial Guidance Laboratories. In many cases these facilities represent a basic national resource as well as supporting Command programs.

The importance of technical facilities in support of the total national RDT&E effort for future systems and technologies was highlighted by the Large Facility Working Group during 1964. The group, consisting of selected Air Force scientists and engineers supplemented by an advisory panel composed of eminent technical facility consultants from industrial and educational organizations, emphasized the need for long-range planning and research for technical facilities.

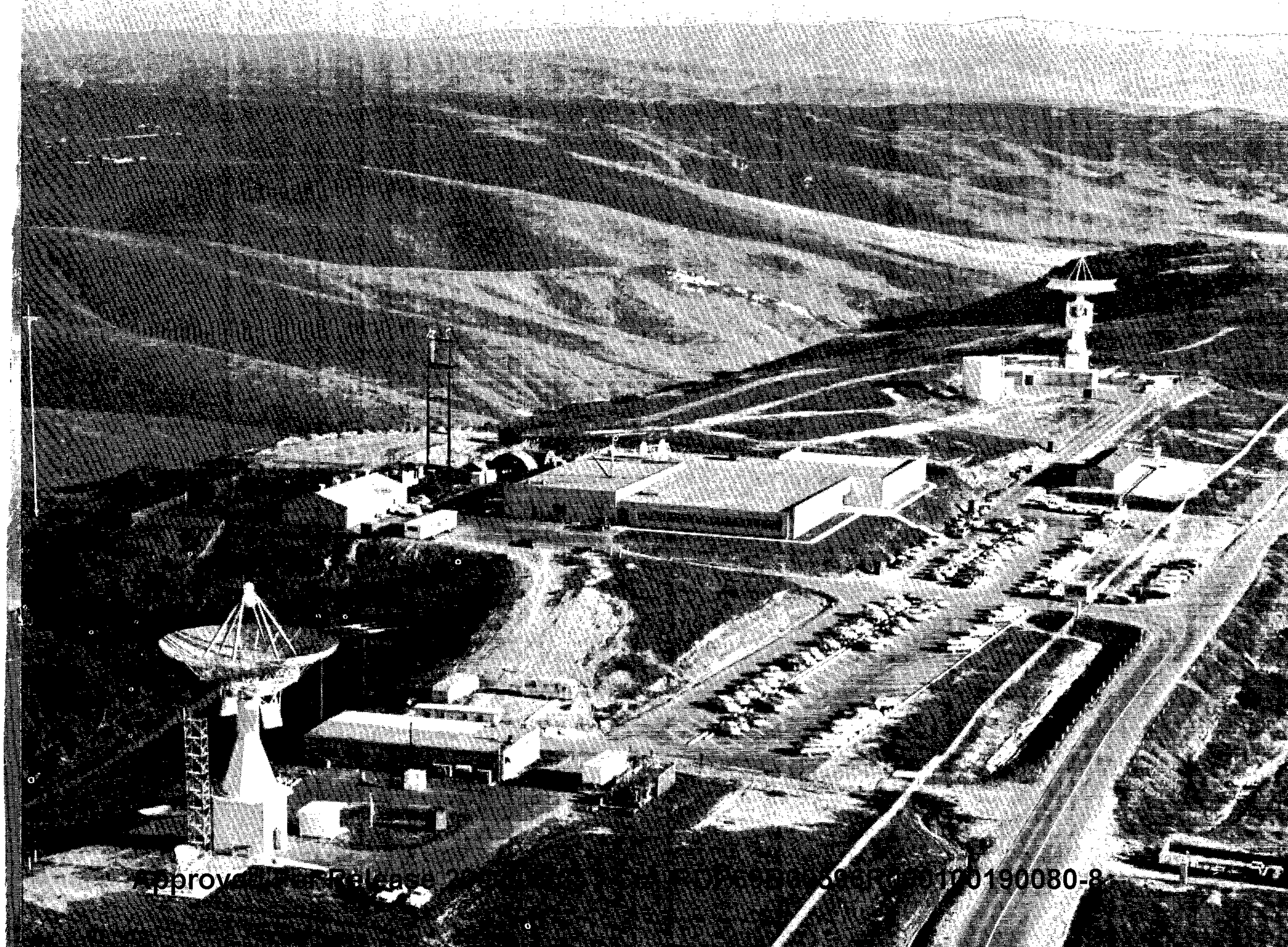
In 1964, a study was initiated by the Command to design an information system which would facilitate maximum use of the Command's facilities by technical organizations of the nation. The resulting Systems Command RDT&E Facility Register will contain technical and management data for each of the RDT&E facilities in the Command. Included in the Register will be data on wind tunnels, environmental simulators, laboratory capabilities and many other specifics on technical facility capabilities available in AFSC.

The Command, in conjunction with the Office of Naval Material and the Army Materiel Command, has formed a study group to develop an application of the Register as a tri-agency compilation. NASA and several industrial organizations have indicated a strong desire to participate in any further expansion of the coverage.

THE NATIONAL RANGE DIVISION

Front Cover— (Inside) Titan III Integrated Launch Facility located at the Air Force Eastern Test Range, Cape Kennedy, Florida. The Titan III can be completely assembled and checked out in the vertical position prior to transport to the launch site.

Rear Cover— (Inside) Data Acquisition and Tracking Station located at the Air Force Western Test Range, Vandenberg AFB, California. This Station is a part of a world-wide network of satellite tracking facilities.



10th Aerospace Anniversary

Accelerate development of the ATLAS ICBM! This decision, in 1954, was destined to set the future course for military strategy and the foundation of national space programs.

The years since 1954 mark a decade of unprecedented development progress. Products of this dynamic decade can be seen in silos within the earth and in the space above. The government-science-industry team organized to develop a weapon system spawned a vast new national enterprise which now ranks with the automotive industry as the world's largest.

The challenges were time and technology. The problems of time were those of providing an adequate defense and the difficulty of inventing on schedule. Technology was studded with many unknowns and uncertainties that had to be resolved. The small team assembled in 1954 built the THOR; developed ATLAS, TITAN and MINUTEMAN, and forged technologies that helped lead the nation into space.

The first ATLAS and THOR launches were attempted in 1957. By late 1957 THOR had logged four successful flights. The 54th anniversary of the Kitty Hawk flight also marked the first fully successful ATLAS test.

THOR entered the space arena in October 1958, launching PIONEER I toward the moon. ATLAS followed in December when Project SCORE broadcast the President's Christmas message from space. ATLAS served as the booster for the MERCURY man-in-space series in 1962 and 1963. TITAN has also entered the space arena as the booster for the Gemini series. The number of successful United States satellite and space-probe launches exceed two hundred.

As a surveyor focuses on points behind to gain an accurate line of sight on objectives ahead, such must be the outlook on this Anniversary. We will retain from the past only what is time-proven, not time-worn.