NASA Historical Report

FIRST SIX YEARS OF NASA

A Concise Chronology

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Washington, D.C., 20546

FOREWORD

This chronology was compiled to satisfy numerous requests for highlights of historical information on the activities during the first six years that the National Aeronautics and Space Administration has existed as the Federal agency conducting the U.S. program for the scientific exploration of space and the exploitation of space science and technology for peaceful uses.

A chronology is not a substitute for a full history. This concise treatment of NASA's experience to date was compiled to show:

- Highlights of NASA's administrative, organizational, and policy experience
- Major NASA milestones in space science and technology
- Representative items reflecting contributions of NASA offices, centers, and individuals
- Major policy statements by the President and NASA Administrators
- Summary items reflecting evolution, growth, and accomplishments of NASA

Obviously a concise chronology may only whet the interest of serious readers. Annual NASA chronologies provide additional available and indexed information. This NASA Historical Report was mostly compiled by Miss Molly Holme, with updating by Jonathan D. Casper.

Eugene M. Emme
NASA Historian

NASA's FIRST YEAR

October 1958 - October 1959

October 1: First official day of the National Aeronautics and Space Administration (NASA), Oct. 1, with T. Keith Glennan as first Administrator and Hugh L. Dryden as Deputy Administrator. Existing NACA facilities and personnel were transferred to NASA. By executive order of the President, DOD responsibilities for the remaining U.S. IGY satellite--including Project Vanguard--and space probe projects and a number of engine development programs were also transferred to NASA. Hq. organization featured three principal offices--Business Administration, Albert F. Siepert; Aeronautics and Space Research, J. W. Crowley; and Space Flight Development, Abe Silverstein.

October 7: NASA formally approved Project Mercury to orbit a man, investigate man's capabilities and reactions in space flight, and return man to earth safely.

October 11: PIONEER I, U.S. IGY space probe was launched from Cape Canaveral, Fla., by Thor-Able. Traveling 70,700 miles, it determined radial extent of the radiation belt, made first observation of earth's and interplanetary magnetic field, and first measurement of micrometeoroid density.

October 14: NASA requested transfer of Cal Tech's Jet Propulsion Laboratory and the space activities of Army Redstone Arsenal to NASA.

October 30: NASA-DOD Civilian-Military Liaison Committee was formed and William M. Holaday was appointed by President Eisenhower to be Chairman.

November 8: Second U.S. IGY lunar probe, PIONEER II, suffered third-stage failure.

November 21: NASA formed new Special Committee on Life Sciences to provide advice on human factors, medical, and allied problems on NASA's manned space vehicle programs.

December 1: First vacuum tank for use in ion and plasma electric propulsion research received at NASA Lewis Research Center.

December 3: President Eisenhower transferred contract functions and facilities of Jet Propulsion Laboratory (California Institute of Technology) from Army to NASA.

December 3: NASA and the Army reached an agreement whereby ABMA and its subordinate organizations at Redstone Arsenal, Huntsville, Ala., would be responsive to NASA requirements.

December 6: U.S. IGY lunar probe, PIONEER III, was launched by Juno II, did not succeed in placing a scientific payload in the vicinity of the moon but did discover that the radiation belt was comprised of at least two bands.

1959

January 8: NASA requested eight Redstone-type launch vehicles from the Army to be used in suborbital Project Mercury development flights.

January 9: NASA-DOD agreement signed for a "National Program to Meet Satellite and Space Vehicle Tracking and Surveillance Requirements" for FY's 1959 and 1960.

January 12: NASA selected McDonnell Aircraft Corp., to design, develop, and construct Mercury capsule.

January 19: NASA let $100,000,000 contract to Rocketdyne Div. for development of 1 1/2-million-lb.-thrust rocket engine.

January 23: Dr. T. Keith Glennan, NASA Administrator, appointed chairman of 13 research advisory committees to provide technical counsel from industry, universities, and Government organizations.

January 28: NASA selected 110 candidates for Project Mercury astronauts.

February 2: First annual report on U.S. Aeronautical and Space Activities, covering all U.S. activities during the year 1958, was forwarded to the Congress by President Eisenhower.

February 17: VANGUARD II (SLV-4) successfully launched, first satellite to transmit cloud photos.

February 20: NASA awarded $105 million in contracts for 1959 projects (15 satellites).

March 1: Economical solid-propellant space booster, Scout, originally conceived by Maxime Faget and his associates at Langley Research Center, was announced by NASA and USAF.

March 3: PIONEER IV, lunar probe was launched from AMR by Juno II, became the first U.S. sun orbiter.

. NASA's Langley Research Center launched first in a series of six-stage solid-fuel rocket research vehicles, the world's first, from Wallops Island, Va., to a speed of mach 26 in a re-entry physics program.

March 10: First captive flight of NASA-USAF-USN X-15, with A. Scott Crossfield as pilot.

March 11: NASA granted $350,000 to National Academy of Sciences-National Research Council for program of research appointments in theoretical and experimental physics to stimulate basic research in the space sciences.

April 2: Seven astronauts, all military jet test pilots, were selected for Project Mercury.

April 13: Vanguard (SLV-5) satellite failed to achieve orbit.

April 20: NASA accepted Canadian Defence Research Telecommunications Establishment proposals to continue joint, nonmilitary rocket and satellite ionospheric experiments.

April 24: Dr. Hugh L. Dryden and Loftus E. Becker appointed to assist Ambassador Henry Cabot Lodge in the forthcoming meetings at the United Nations of the Committee on Peaceful Uses of Outer Space.

April 27: DX priority assigned to Project Mercury.

. The 1958 Annual Report of the National Advisory Committee for Aeronautics, the 44th and final report of the NACA established in 1915, was submitted to Congress by the President.

April 28: NASA signed $24-million contract with Douglas Aircraft Co., for production of Delta boosters.

During April: NASA took over the Tiros meteorological satellite program from DOD, a Joint Meteorological Satellite Advisory Committee was established.

May 1: Beltsville Space Center, Md., was renamed Goddard Space Flight Center, honoring the American rocket pioneer, Robert H. Goddard, Dr. Harry J. Goett was later named as Director.

May 6: NASA created a committee to study problems of long-range lunar exploration, to be headed by Dr. Robert Jastrow.

May 12: NASA announced training program for seven Project Mercury astronauts to provide them with necessary additional technical knowledge and skills.

June 1: Richard E. Horner, Assistant Secretary of the Air Force for R&D, was appointed first Associate Administrator of NASA.

June 5: Construction was begun at Cape Canaveral for Saturn booster launch facilities.

June 8: X-15 (No. 1) research airplane piloted by A. Scott Crossfield made its first gliding flight, from an altitude of 38,000 ft.

June 22: Vanguard (SLV-6) satellite failed to go into orbit.

June 29: NASA welcomed United Kingdom approval of proposals for cooperative scientific research in space with the U.S.

July 1: The first experimental reactor (Kiwi-A) in the NASA-AEC nuclear space rocket program operated successfully.

July 16: NASA-Army Explorer satellite was destroyed at launch.

July 20: NASA selected Western Electric Co. to build world-wide network of tracking and ground instrument stations to be used in Project Mercury.

During July: Portion of Chincoteague (Va.) Naval Air Station was transferred to NASA for use in connection with NASA Wallops Station rocket range.

. Project Mercury astronauts completed disorientation flights on three-axis space-flight simulator, the MASTIF (Multiple Axis Space Test Inertia Facility), at NASA Lewis Research Center.

August 7: "Paddlewheel Satellite," EXPLORER VI, launched by Thor-Able from AMR. Equipped with 14 experiments and a photocell scanner, it transmitted pictures of the earth's surface and cloud cover from an altitude of 17,000 miles.

August 17: First of NIKE-ASP sounding rockets to provide geophysical information on wind activity between 50 and 150 miles altitude was launched successfully from NASA Wallops Station.

August 21: NASA established Bioscience Advisory Committee, headed by Dr. Seymour S. Kety, to study U.S. capability in space-oriented life science research and development and to recommend future NASA role in this area in terms of a national space program.

August 25: NASA Western Operations Office, Santa Monica, Calif., was made responsible for liaison, administrative, and management support west of Denver, Colo.

September 9: NASA boilerplate model of Mercury capsule was successfully launched from AMR by Atlas-Big Joe and recovered in the South Atlantic.

September 17: First powered flight of X-15, NAA's A. Scott Crossfield as pilot.

September 18: VANGUARD III, sixth U.S. IGY satellite was launched from AMR, orbited successfully, and produced data on magnetic field, radiation belts, and micrometeoroids, marked end of Vanguard program.

September 27: High Speed Flight Station at Edwards, Calif., was renamed NASA Flight Research Center, Paul A. Bikle named as Director.

During September: Hugh L. Dryden discussed with European scientists the possibility of working out cooperative space research programs.

In its first year of space operations, NASA launched a total 12 orbital and deep space flights, of which 2 were successful, 4 partially successful, and 6 unsuccessful. Th[illegible]et research aircraft made its first glide and powered flights. Flight tests of Mercury spacecraft configuration were begun.

NASA's SECOND YEAR

October 1959 - October 1960

October 1: NASA personnel total reached 9,347.

October 4: NASA Little Joe 1 (LJ-6) launch vehicle carrying a boiler-plate Mercury spacecraft with a dummy escape system successfully launched from Wallops Station, Va.; successful flight qualified the booster for use in the Mercury test program.

October 8: PIONEER IV reached its first aphelion (estimated 107,951,000 miles) in its orbit around the sun.

October 13: NASA and Army orbited EXPLORER VII, the last of seven U.S. IGY earth satellites, completing the orbiting of all planned IGY experiments. EXPLORER VII telemetered data on radiation and magnetic storms.

October 21: President announced that he was transferring, subject to Congressional approval, the Army's rocket development team and facilities at Huntsville, headed by Dr. Wernher von Braun, to NASA. At the same time, the work beind conducted by the Army at Huntsville on the Saturn booster was also transferred to NASA.

November 4: Little Joe 2 (LJ-1A) was successfully launched from Wallops Station in a capsule escape test.

November 18: NASA-DOD memorandum of understanding signed providing for interim management of Project Saturn pending its formal transfer to NASA.

December 4: Little Joe 3, part of Project Mercury test program, was launched at NASA Wallops Station; monkey "Sam" went 55 miles into space and was recovered safely.

December 7: Administrator of NASA, Dr. T. Keith Glennan, offered services of U.S. world-wide tracking network in support of any manned space flight the U.S.S.R. might plan to undertake, in a speech before the Institute of World Affairs in Pasadena, Calif.

December 22: In a United States-Canadian cooperative project, NASA launched the first four-stage Javelin sounding rocket from Wallops Station to an altitude of 560 miles to measure the intensity of galactic radio noise.

December 30: Scientists reported at press conference that preliminary findings from EXPLORER VII interplanetary experiments indicated sporadic burst of radiation from the sun could influence manned space flight.

1959

December 31: The IGY/IGC-59 program ended but International Council of Scientific Unions continued to sponsor international cooperation in geophysics; NASA made space data available to the world scientific community through COSPAR and World Data Centers.

. Mercury astronauts completed basic and theoretical studies in their training program and started practical engineering studies.

. Approximately 300 U.S. research rockets were launched during the 30-month IGY/IGC-59 period: 221 of these were launched during the IGY. This compared with some 400 U.S. research rockets fired during the entire preceding 12-year period from the beginning of high-altitude rocket research circa 1945 to July 1, 1957.

1960

January 1: NASA headquarter reorganization created a new Office of Launch Vehicle Programs, with Maj. Gen. Don Ostrander (USAF) as Director.

January 14: The President directed NASA Administrator to examine need for additional money for large-thrust launch vehicles, leading to NASA's request for $113 million additional for FY 1961.

. The President formally asked Congress to amend the National Aeronautics and Space Act of 1958, "to clarify management responsibilities and to streamline organizational arrangements concerning the national program of space exploration."

January 20: NASA presented its 10-year plan of space activities to Congress.

Janaury 21: Little Joe 4(LJ-1B) fired Mercury spacecraft in successful test of emergency-escape system to an altitude of 9 miles from Wallops Station; rhesus monkey passenger, "Miss Sam," successfully recovered after 20-g and 48,900-foot altitude flight.

January 29: NASA established the Office for the United Nations Conference, with Dr. John P. Hagen as Director, to prepare for U.S. particpation in an international scientific conference on the peaceful uses of outer space.

February 1: NASA Administrator requested another $113 million for fiscal year 1961 to increase large launch vehicle program based on study directed by the President on January 14.

February 7: New EXPLORER VII data showed that outer Van Allen belt rim moved north and south as much as 500 miles in latitude and varied in intensity tenfold within a few hours.

February 10: President Eisenhower toured Cape Canaveral.

February 26: Establishment of Project Mercury tracking stations in Australia was sanctioned by joint agreement, one of a series of international arrangements.

February 27: Atmosphere entry simulator at NASA Ames Research Center completed first successful launch and recovery of test model launched at satellite speed of 17,000 mph.

During early 1960: NASA Lewis Research Center completed flight safety research program involving over 30 full-scale experimental aircraft crashed and laboratory studies leading to improved criteria for passenger survivability.

March 1: NASA established Office of Life Sciences, with Dr. Clark T. Randt as Director.

March 10: Office of Reliability and Systems Analysis was established in NASA Headquarters to conduct program design to evaluate and improve operational reliability of launch vehicles and payloads. Landis S. Gephardt was named Director.

March 11: PIONEER V, NASA space probe, was successfully launched on a historic flight that would measure radiation and magnetic fields between Earth and Venus and set space communications records which lasted until the flight of MARINER II in late 1962.

March 13: PIONEER V transmitted radio signals from a distance of more than 409,000 miles, a new communications record.

March 14: NASA established Space Flight Center at Huntsville facility, and the transfer of Saturn space booster to NASA became effective.

March 15: Saturn project officially transferred to NASA from ABMA.

March 17: VANGUARD I still in orbit and transmitting on its second anniversary after traveling 131,318,211 miles. NASA reported that VANGUARD I orbit was being altered by solar pressure.

March 19: United States-Spanish agreement on Project Mercury tracking station in Canary Islands was announced (1 of 16 similar agreements with other nations).

April 1: First weather observation satellite, TIROS I (Television Infrared Observation Satellite), was launched into orbit; it took pictures of earth's cloud cover from 450 miles altitude.

April 12: First production model of McDonnell-built Mercury spacecraft was delivered to NASA.

April 17: PIONEER V transmitted telemetry a distance of 5 million miles from earth.

April 23: NASA fired first of five Aerobee-Hi sounding rockets from Wallops Station in program to measure ultraviolet radiation.

April 29: Interim or formal agreements concluded for all overseas Mercury tracking stations.

During April: Seven Mercury astronauts completed centrifuge training at the Navy Aviation Medical Acceleration Laboratory, Johnsville, Pa.

May 4: Lewis Research Center began testing of high-energy hydrogen-oxygen engines in an altitude test facility capable of subjecting an entire propulsion system to a space environment. On June 17, LRC began similar testing of hydrogen-fluorine engines.

May 8: PIONEER V transmitted telemetry at a distance of 8,001,000 miles from earth.

May 9: First production model of Project Mercury spacecraft was successfully launched from NASA Wallops Station to test escape, landing, and recovery systems. No booster was involved.

May 12: In the first remote launch operation, a speed of mach 3.2 and 78,000-foot altitude attained in X-15 (No. 1) with interim engines, by NASA's Joseph A. Walker.

May 19: X-15 (No. 1) flown to 107,000 feet, its highest altitude to date, by Maj. Robert M. White (USAF), at Edwards AFB.

May 30: NASA established Office of Technical Information and Educational Programs (OTIEP) in Headquarters. Shelby Thompson of AEC was named as Director.

May 31: 100-foot inflatable sphere launched from NASA Wallops Station to an altitude of 210 miles to test payload configuration carrying two beacon transmitters, a development flight of Project Echo.

June 26: Six-minute message received by Jodrell Bank, England, was last communication received from PIONEER V, then 22.5 million miles from earth--a space communications record. PIONEER V would fly 18 million miles closer to the sun than any manmade object.

June 29: TIROS I ended its operational lifetime, transmitting a total of 22,952 picture frames of the earth's cloud cover and completing 1,302 orbits since launch on April 1.

July 1: NASA's Launch Operations Directorate (LOD) became operational at Cape Canaveral, headed by Dr. Kurt Debus of Marshall Space Flight Center.

. George C. Marshall Space Flight Center, at Huntsville, Ala., with Dr. Wernher von Braun as Director, opened as a NASA center with formal transfer to NASA from Army Ballistic Missile Agency.

. First Complete Scout launch vehicle fired from NASA Wallops Station, but fourth-stage separation and firing was not accomplished.

July 17: First of three NASA experiments carried by USAF balloon, a NASA capsule containing 12 mice to 130,000-foot altitude for 11 $\frac{1}{2}$ hours, in support of study of effects of heavy primary cosmic ray particles.

July 22: First flight of NASA's Iris sounding rocket successful, designed for 100-pound payloads to altitudes of about 200 miles, from Wallops Station.

July 28-29: First NASA-Industry Program Plans Conference held in Washington, D.C.

July 29: Project Apollo, advanced manned spacecraft program, was first announced at NASA-Industry Conference.

July 29: MA-1, first Mercury suborbital capsule test, failed when Atlas launch vehicle exploded.

July 31: Dr. John F. Victory, the first NACA employee and recently Assistant to the Administrator of NASA, retired after 52 years of continuous Government service.

August 4: X-15 (No. 1) established new unofficial world speed record of 2,196 mph with Joseph Walker as pilot.

August 12: X-15 (No. 1) with Maj. Robert M. White (USAF) as pilot established a new altitude record for a manned vehicle--136,000 feet.

. NASA's ECHO I, the first passive communications satellite, was orbited--the most visible and largest satellite to date, and would provide years of data on communications experiments and solar pressure.

August 31: Joint NASA-AEC Nuclear Propulsion Office (NPO) created at Germantown, Md., with Harold B. Finger as Manager.

September 1: Dr. Robert C. Seamans, Jr., became Associate Administrator of NASA, succeeding Richard E. Horner.

September 8: President Eisenhower dedicated George C. Marshall Space Flight Center.

September 13: NASA and DOD announced creation of the Aeronautics and Astronautics Coordinating Board with Dr. Hugh L. Dryden, Deputy Administrator of NASA and Dr. Herbert F. York, DOD Director of Research and Engineering, as co-chairmen.

September 13-14: First meeting of the NASA Advisory Committee on Space Biology, chaired by Dr. Melvin Calvin.

September 19: Nerv (Nuclear Emulsion Recovery Vehicle) experiment successfully launched from Point Arguello, Calif., the first NASA launching at PMR. Nerv instrumented capsule reached an altitude of 1,260 miles--the highest known altitude that any man-made object had attained to be recovered successfully from space.

September 25: Atlas-Able 3 (Pioneer) lunar orbital probe of NASA failed to achieve orbit.

September 26: NASA and Weather Bureau issued joint invitation to scientists of 21 nations to particpate in meteorological research connected with future Tiros satellite.

September 30: Formal agreements for all NASA tracking stations, planned at present, were either concluded or near conclusion.

In its second year of operation, NASA launched a total of 8 orbital and deep space flights, of which 4 were successful and 4 unsuccessful. The X-15 rocket research aircraft broke the existing speed and altitude records set by the X-2 four years previously. Five flight tests were conducted with the Mercury capsule configuration. The world's first true meteorological satellite (TIROS I) and passive communications satellite (ECHO I) were orbited, and a space communications record (22.5 million miles) was set by PIONEER V. The Scout solid-propellant booster began flight tests.

NASA's THIRD YEAR

October 1960 - October 1961

October 12: Dr. T. Keith Glennan, NASA Administrator, announced that communications satellites developed by private companies on a commercial basis would be launched by NASA at cost to assist private industry in developing a communications network.

October 17: Project Mercury weather support group established at NASA's request in the Office of Meteorological Research of the Weather Bureau.

October 19: Kiwi-A No. 3 static test of nuclear rocket propulsion was succesful, resulting in NASA-AEC call for bids for industrial development phase of Project Rover.

November 3: EXPLORER VIII, containing instrumentation for detailed measurements of the ionosphere, was orbited by Juno II from Atlantic Missile Range.

November 8: Little Joe 5 (LJ-5) was fired from Wallops station as a test of escape system but suffered a premature escape-rocket firing.

November 17: NASA established Test Support Office at Pacific Missile Range, under Launch Operations Directorate, Marshall Space Flight Center.

November 23: TIROS II weather satellite launched by Thor-Delta--the 14th successful U.S. satellite launched to date during 1960.

December 4: American Bar Association's "Report to NASA on the Law of Outer Space" was released, which contained collation of legal opinion on the broad spectrum of space activites.

December 9: X-15 made first flight with ball-shaped "hot nose," reaching 50,000 feet and 1,254 mph, NASA's Neil Armstrong making his second familiarization flight.

December 15: Atlas-Able (Pioneer) launch vehicle with NASA cislunar spacecraft exploded 70 seconds after launch from Cape Canaveral.

December 19: Unmanned Project Mercury spacecraft was launched in a suborbital trajectory by Redstone booster. MR-1A capsule was recovered about 50 minutes after firing.

December 27: EXPLORER VIII ceased transmitting ionospheric measurement data acquired in 207,866,706 miles and 694.3 orbits, which produced more than 700 miles of magnetic tape since launch on November 3.

December 29: Dr. T. Keith Glennan offered his resignation as Administrator of NASA, to be effective January 20, 1961.

December 31: To date, the United States had successfuly launched 31 earth satellites (9 of 16 still in orbit were still transmitting) and two deep space probes into orbit around the Sun. The U.S.S.R. had launched seven satellites (one of which remained in orbit) and one deep space probe. The U.S.S.R. had also launched one lunar impact mission (LUNIK II), while LUNIK III had passed once around the moon and then went into earth orbit before decaying.

1961

January 3: NASA's Space Task Group became a separate NASA field element.

January 16: Final assembly of first Saturn flight vehicle (SA-1) was completed.

January 17: First invention award under the authority of the National Aeronautics and Space Act of 1958 given to Dr. Frank T. McClure of the Applied Physics Laboratory of Johns Hopkins for his satellite Doppler navigation system, the $3,000 award being presented by NASA Administrator Glennan at NASA Hq.

January 29: Goddard Institute for Space Studies established in New York City, headed by Dr. Robert Jastrow.

January 30: In his State of the Union address to Congress, President Kennedy said: "This Administration intends to explore promptly all possible areas of cooperation with the Soviet Union and other nations 'to invoke the wonders of science instead of its terrors.' Specifically, I now invite all nations--including the Soviet Union--to join with us in developing a weather prediction program, in a new communications satellite program, and in preparation for probing the distant planets of Mars and Venus, probes which may some day unlock the deepest secrets of the universe."

. James E. Webb nominated as Administrator of NASA by President Kennedy.

January 31: Mercury spacecraft containing chimpanzee Ham was launched on suborbital MR-2 flight to 157-mile altitude and recovered safely.

February 1: NASA established Life Sciences Laboratory at Ames Research Center.

Feburary 14: NASA and United Kingdom agreed to establish joint program to test communications satellites to be launched by NASA in 1962 and 1963 in Projects Relay and Rebound.

February 15: James E. Webb sworn in as NASA Administrator.

February 16: NASA EXPLORER IX placed in orbit by four-stage Scout booster from Wallops Station, the first satellite launching from Wallops, and the first satellite boosted by a solid-fuel rocket.

February 21: Mercury (MA-2) suborbital capsule test flight was launched, made a successful 1,425-mile flight.

. NASA Space Task Group selected John H. Glenn, Jr., Virgil I. Grissom, and Alan B. Shepard, Jr., to begin special training for first manned Mercury space flight.

February 23: NASA Administrator James E. Webb and Deputy Secretary of Defense Roswell Gilpatric signed letter of understanding confirming the National Launch Vehicle Program, the integrated development and procurement of a family of space boosters by NASA and DOD.

February 27: FCC-NASA memorandum of understanding for delineating and coordinating civil communication space activities was signed. It stated that "earliest practicable realization of a commercially operable communication satellite system is a national objective."

March 10: NASA announced first success in immediate detection in real time of radar signals off planet Venus by Jet Propulsion Laboratory Goldstone, as part of two-month research program.

March 17: VANGUARD I completed third year in orbit and was still transmitting. VANGUARD I provided much useful data on orbits, including the slight pear-shape of the Earth and the effect of solar pressure. Vanguard also provided the second stage for the Able, Delta, and Able-Star as well as the third stage of Scout, pioneering solid-propellant stages used in Polaris and Minuteman.

March 22: Dr. Edward C. Welsh, a former aid to Senator Symington, was nominated by the President to be the Executive Secretary of the National Aeronautics and Space Council.

March 23: Responding to inquiry by the chairman of the House Science and Astronautics Committee, President Kennedy stated in a letter: "It is not now nor has it ever been my intention to subordinate the activities of /NASA/ to those of the Department of Defense...there are legitimate missions in space for which the military services should assume responsibility... /and there are/ major missions, such as the scientific unmanned and manned exploration of space and the application of space technology to the conduct of peaceful activities, which should be carried forward by the civilian space agency.

March 25: EXPLORER X fired into highly elliptical orbit by Delta launch vehicle to conduct a study of earth's magnetic field.

March 30: NASA-USAF-USN rocket research X-15 flown to 169,600 feet by Joseph A. Walker, NASA pilot, the highest altitude ever reached by man to date and which included two minutes of weightlessness at the top of his climb.

April 1: Brig. Gen./Dr. Charles A. Roadman (USAF) named as Acting Director of the NASA Office of Life Sciences to succeed Dr. Clark Randt, who resigned effective this date.

April 10: JPL scientists refined "astronomical yardstick" of 93,498,125 miles as the distance between the Earth and the Sun, based on radar tracking of Venus.

April 12: U.S.S.R. achived world's first manned orbital spaceflight, Maj. Yuri A. Gagarin as cosmonaut.

April 14: In response to pointed questioning concerning the Soviet orbiting of manned VOSTOK I on April 12, by the House Science and Astronautics Committee, Associate NASA Administrator Seamans repeated the general estimate of $20 to $40 billion as the cost for the total effort required to achieve a manned lunar landing, that an all-out program might cost more, and that 1967 could be considered only as a possible planning date at this stage of such a complex task.

April 21: USAF-USN-NASA X-15 flown to controlled-flight record speed of 3,074 mph by Maj. Robert White (USAF)--the first full-throttle flight.

April 22: First seven-stage Trailblazer rocket from Wallops Station, first three stages firing meteorite to 175-mile altitude and next four stages back through the atmosphere in a high-speed re-entry experiment.

April 27: EXPLORER XI, a gamma-ray satellite, was successfully launched into orbit by NASA Juno II from Cape Canaveral.

May 5: FREEDOM 7, carrying Astronaut Alan B. Shepard, Jr., as pilot, was launched on suborbital MR-3 flight from Cape Canaveral to 117 miles altitude and recovered 303 miles downrange--the first American manned space flight.

May 15-17: Final reports of study contracts on Project Apollo presented by the three contractors at Langley Research Center and Space Task Group.

May 23: TIROS II completed six months in orbit, transmitting over 31,000 photographs of which over 75 per cent have been classified as fair to good for meteorological analysis.

May 25: President Kennedy, urging the Nation before the Congress to take a leading role in space achievement, set forth an accelerated space program involving long-range goals: a manned lunar landing in this decade, early development of the Rover nuclear rocket, increased use of earth satellites for worldwide communications, and use of weather satellites. "Now is the time to take longer strides--time for a great new American enterprise--time for this Nation to take a clearly leading role in space achievement which in many ways may hold the key to our future on Earth."

May 26-27: First National Conference on the Peaceful Uses of Space, held at Tulsa, Okla., at which leading American space scientists appraised the current and future applications of space science and technology for human welfare.

June 3: Dr. Edward R. Sharp, former Director of Lewis Research Laboratory (1942-61), was presented NASA's first Outstanding Leadership Medal by Dr. Hugh L. Dryden.

June 13: NASA Engineer Test Pilot Joseph A. Walker received the 1961 Octave Chanute Award at IAS Meeting in Los Angeles.

June 14: NASA's Plum Brook nuclear test reactor at Sandusky, Ohio, went critical for the first time.

June 19: Harmon International Aviator's Trophy for 1961 announced as going to three winners for the first time--X-15 rocket research airplane pilots: A. Scott Crossfield of North American, Joseph A. Walker of NASA, and Maj. Robert A. White (USAF).

June 22: In an explanatory letter to Chairman Robert S. Kerr, of the Senate Committee on Aeronautical and Space Sciences, NASA's Deputy Administrator Dryden stressed the importance of "the great cooperative national effort" involved in attaining the goal of landing a man on the moon: "The national enterprise involved in the goal of manned lunar landing and return within this decade is an activity of critical impact on the future of this nation as an industrial and military power, and as a leader of a free world."

June 23: NASA-USAF-USN X-15 was flown to 3,603 mph (mach 5.3) record for manned aircraft, by Maj. Robert White (USAF).

June 30: Dr. Henry J. E. Reid, senior staff associate and former Director of the Langley Research Center, retired after over four decades of Government service. He began as a junior engineer at Langley in April 1921, became Director in 1926, in which capacity he served for 34 years.

July 12: NASA TIROS III weather satellite was successfully launched into near-circular orbit from Cape Canaveral.

July 18-20: NASA-Industry Apollo Technical Conference held in Washington, D.C., which assembled Apollo requirements with participation of Space Task Group, representatives of other NASA centers, and the three Apollo study contractors--General Dynamics/Astronautics, General Electric, and Martin.

July 21: Mercury LIBERTY BELL 7, manned by Astronaut Virgil I. Grissom, made successful suborbital flight, but pickup of Grissom caused loss of spacecraft.

July 24: White House issued statement by President Kennedy on "Communication Satellite Policy" in which he invited "all nations to particpate in a communications satellite system in the interest of world peace and closer brotherhood among peoples throughout the world.

July 28: NASA and AT&T signed a cooperative agreement for the development and testing of two active communications satellites during 1962.

August 11: Thomas F. Dixon was appointed Director of NASA's Office of Launch Vehicle Programs.

August 12: ECHO I completed first year in orbit, still clearly visible to the naked eye, after 4,480 orbits and traveling 138 million miles. ECHO I provided basis for over 150 communications experiments and significant data on atmospheric drag and solar pressure.

August 15: EXPLORER XII placed into highly eccentric orbit from AMR to provide detailed evaluation of behavior of energetic particles between 170 -and 50,000-mile altitude.

August 23: RANGER I, first flight test of unmanned lunar spacecraft, launched from Cape Canaveral into low parking orbit but did not attain programed eccentric orbit.

August 24: NASA announced decision to launch manned lunar flights and other missions requiring Saturn and Nova-class vehicles from expanded Cape Canaveral facilities. Expansion of Cape Canaveral was noted as first of three major steps in accelerating the U.S. space program, the remaining two steps being a manned space flight research center, and a booster fabrication and test facility.

August 25: EXPLORER XIII was orbited by NASA Scout from Wallops, a micro-meteoroid counting satellite developed by Langley Research Center and Goddard Space Flight Center.

September 7: NASA announced that Government-owned Michoud Ordnance Plant near New Orleans would be the site for fabrication and assembly of the first stage of Saturn as well as for making stages for larger booster.

September 12: X-15 flown to record 3,614 mph by NASA's Joseph A. Walker at Edwards AFB.

September 13: Unmanned Mercury spacecraft (MA-4) was first orbited, by Mercury-Atlas vehicle from AMR, confirming capsule and tracking readiness for manned orbital flight.

September 19: NASA Administrator Webb announced that the new Manned Spacecraft Center would be located in Houston, Tex. It would be the development and command center for the Gemini, Apollo, and any follow-on manned space flight missions.

September 21: D. Brainerd Holmes was appointed NASA's Director of Manned Space Flight Programs.

September 24: Administrator Webb announced major organizational changes and top-level appointments in NASA. Effective November 1, major headquarters program offices would be headed as follows: Ira H. Abbot, Director of the Office of Advanced Research and Technology; Homer E. Newell, Director of the Office of Space Sciences; D. Brainerd Holmes, Director of the Office of Manned Space Flight; and an Office of Applications Programs with no director yet named. Thomas F. Dixon was appointed Deputy Associate Administrator. Abe Silverstein was named Director of the Lewis Research Center, and Robert R. Gilruth, Director of the Manned Spacecraft Center.

September 30: NASA Office for the United Nations Conference headed by Dr. John P. Hagen was closed, effective this date.

In its third year of space operations, NASA launched a total of 18 orbital, deep space, and manned space flights, of which 10 were successful, 2 partially successful, and 6 unsuccessful. The X-15 rocket research aircraft exceeded 3,600 mph and mach 5 and reached an altitude of 169,000 feet. Project Mercury attained manned space flights with two suborbital flights, and orbited an unmanned Mercury spacecraft. Successful flights included four scientific satellites, two meteorological satellites, and the first of the scientific lunar probes (RANGER I).

NASA's FOURTH YEAR

October 1961 - October 1962

October 4: Beginning of the fifth year of the "space age," being the anniversary of the launching of SPUTNIK I in 1957.

October 19: P-21 probes with 94-lb. payload was launched on NASA Scout from Wallops Island, Va., to 4,261-mile altitude in a study of the ionosphere.

October 25: Pearl River site in southwestern Mississippi was selected for static-test facility for Saturn and Nova-class vehicles.

October 27: Largest known rocket launch to date, the Saturn I first-stage booster was successful in its first test flight from AMR.

November 1: New organization of NASA Hq. became effective, which established four major program offices (Manned Space Flight, Space Sciences, Advanced Research and Technology, and Applications), and provided center directors with direct line to the Office of the Associate Administrator.

November 18: RANGER II placed into low earth orbit from AMR by Atlas, but Agena second stage did not restart, leaving deep-space probe Ranger in parking orbit.

November 23: TIROS II completed first year in orbit, still transmitting cloud-cover photographs of usable quality, although it had been expected to have a useful lifetime of only three months. TIROS II had completed 5,354 orbits and had transmitted over 36,000 photographs.

November 29: Mercury-Atlas 5 flight from AMR was successful; chimpanzee "Enos" was recovered in excellent condition after two orbits.

December 7: Plans for the development of a two-man spacecraft for Project Gemini were announced by Robert Gilruth, Director of NASA's Manned Spacecraft Center. One of the major objectives in the two-man spacecraft program would be a test of orbital rendezvous.

December 19: NASA announced that Ira H. Abbott, Director of Advanced Research and Technology, would retire in January after 32 years of service with NACA and NASA.

December 29: Dr. Hugh L. Dryden, Deputy Administrator of NASA, speaking in Denver before the American Association for the Advancement of Science, said: "The sheer magnitude of the manned lunar exploration program, amounting as it will to $3 billion or more /in FY 1963/ represents a significant application of the Nation's resources. These billions of dollars will be spent in the laboratories, workshops, and factories of the Nation and thus constitute a significant factor in the Nation's employment and economy generally. The personnel in the space program are not all scientists and engineers but come from every walk of life.

"The ultimate and practical purpose of these large expenditures is two-fold: (1) Insurance of the Nation against scientific and technological obsolescence in a time of explosive advances in science and technology; and (2) insurance against the hazard of military surprise in space."

December 31: NASA established a Management Council, chaired by D. Brainerd Holmes, to ensure orderly, timely progress in the manned space flight programs.

During December: USIA reported that U.S. space achievements were a leading item in its overseas information program because they dramatized the basic difference between the American open society and the Soviet closed society.

1962

January 1: NASA announced that Mercury Mark II spacecraft would be named "Gemini." A two-man spacecraft for developing the rendezvous technique, it would be 50% heavier than the Mercury spacecraft and launched into orbit by a Titan II booster.

January 10: X-15 (No. 1) piloted by Cdr. Forrest Petersen (USN) made its first forced landing in 48 flights when its rocket engine failed to ignite in mid-air.

January 11: In his State of the Union message, President Kennedy said: "... our objective in making this effort, which we hope will place one of our citizens on the moon, is to develop in a new frontier of science, commerce, and cooperation, the position of the United States and the free world. This nation belongs among the first to explore it. And among the first, if not the first, we shall be."

January 15: Echo 2 balloon satellite (AVT-1) was launched from AMR on Thor booster in suborbital test flight but 135-ft. sphere ruptured.

January 18: Administration budget for FY 1963 was presented to Congress by President Kennedy. NASA requests totaled $3,787,276,000, with $2,968,278,000 going to research, development, and operations, and $818,998,000 to construction.

. In a NASA press conference following the presentation of the Administration's budget to Congress, Mr. James Webb, NASA Administrator, commented on the general attitude toward NASA's doubled appropriation request: "I would say that the people I have talked to have felt that we ought to go forward with the effort at about the level the President has recommended."

January 26: RANGER III was launched from AMR but missed the moon.

January 31: EXPLORER I completed its fourth year in orbit with a life expectancy of several more years.

February 7: President Kennedy proposed Congress create a "Communications Satellite Corporation." Financed through the sale of stock to communications companies and the general public, this corporation would develop, own, and operate communications relay stations in space.

February 8: NASA's TIROS IV was launched from Cape Canaveral, assisted weather coverage of Glenn flight, achieved semi-operational status during its 30,000-picture lifetime.

February 16: Dr. Robert C. Seamans, NASA Associate Administrator, outlined NASA's views of solid-propellant Nova-class motors in a letter to John H. Rubel, Deputy Director, Defense Research and Engineering:

"NASA has a strong interest in the technology of solid-propellant rockets and hopes to make use of them in NASA vehicles when the appropriate feasibility is demonstrated..."

February 19: NASA-AEC designated the Jackass Flats area of the AEC Test Site as the Nuclear Rocket Development Station.

February 20: First U.S. manned orbital flight, Mercury spacecraft FRIENDSHIP 7, with Astronaut John H. Glenn, Jr., as pilot was launched from AMR, reentered safely after 3 orbits.

February 23: DOD and NASA signed an agreement that neither agency would begin the development of a launch vehicle or a space booster without the written acknowledgment of the other.

February 28: NASA announced that the Pacific Missile Range would be used for all NASA Thor-Agena B launches requiring a polar orbit.

March 1: Morton J. Stoller was named Director of the Office of Applications in NASA Hq., a post he had held in an acting capacity since January 1962. He was made Deputy Director in November 1961.

March 2: Mercury astronauts visited the United Nations, and John Glenn, during an informal reception given by Acting Secretary-General U Thant, said: "As space science and space technology grows still further and our projects become more and more ambitious, we will be relying more and more on international teamwork."

March 7: OSO I (Orbiting Solar Observatory) was orbited from Cape Canaveral.

. NASA established the NASA Launch Operations Center at Cape Canaveral, with Dr. Kurt H. Debus as Director.

March 11: Second anniversary of the launching of the PIONEER V space probe. PIONEER V produced first data on the nature of interplanetary space, including solar flare effects in interplanetary space which were compared with earth-orbiting-satellite readings, and sent back telemetry 22.5 million miles from earth on June 26, 1960, a communications record unmatched until the flight of MARINER II.

March 13: Dr. Abe Silverstein, Director of NASA's Lewis Research Center, received the National Civil Service League's Career Service Award, one of 10 Government leaders so recognized.

March 14: United Nations opened a public register on satellites in orbit. At the time of opening, it contained only the U.S. report submitted on March 5, which reported "72 U.S. space vehicles and associated objects in sustained orbit or space transit" as of February 15, 1962.

March 15: NASA announced that LCdr. M. Scott Carpenter (USN) would be the pilot on the next Mercury orbital space flight (MA-7). Major Donald K. Slayton (USAF), the astronaut originally scheduled for the flight, was disqualified because of an "erratic heart rate." Astronaut Walter M. Schirra was named as Carpenter's backup pilot.

March 16: First anniversary of the dedication of the Goddard Space Flight Center, NASA. During that year, seven Goddard satellites were orbited, the Center successfully operated the new 18-station world tracking network for the Glenn flight, began expansion of the 13-station scientific satellite tracking and data network, saw some 70 of its sounding rocket payloads launched from Wallops Station, established the Institute for Space Studies in New York, and added three buildings and 700 persons to the Goddard staff.

. At Robert H. Goddard Memorial Dinner, Vice President Lyndon B. Johnson pointed out areas in which international cooperation should begin in outer space: "As we attempt to look 25 years into the future, we catch visions of breathtaking journeys in large man-made planets around the sun to Mars and Venus--of a new freedom of movement of man across millions of miles of space--of a permanent colony on the moon and of large space stations or space forts at key locations for the conduct of space research, for aid to space navigation, and for rescue operations."

March 17: VANGUARD I began fifth year in orbit, having travelled 543,195,264 miles in 15,712 orbits and still transmitting. Its rotation had slowed from three revolutions per second to one revolution in 23 seconds due to dampening effect of the earth's magnetic field.

March 23: Bell Telephone Laboratories announced the formation of a new corporation, Bellcom, Inc., to supply system engineering support to NASA's space program.

March 29: P-21A probe electron-density measuring payload carried 3,910 miles into space by four-stage NASA Scout rocket.

April 1: Beginning of third year of successful weather satellite operations by the U.S. NASA's TIROS I, launched on April 1, 1960, performed beyond all expectations, operated for 78 days, transmitted almost 23,000 cloud photos, of which some 19,000 were useful to meteorologists. TIROS II, launched November 23, 1960, transmitted more than 33,000 photos and one year after launch was still occasionally taking useful photos. TIROS III, launched July 12, 1961, took 24,000 cloud photos and was most spectacular as a "hurricane hunter." TIROS IV, launched February 8, 1962, had averaged 250 operationally-useful photos per day.

April 5: X-15 (No. 3) flown to speed of 2,830 mph (mach 4.06) and to altitude of 179,000 ft. in a test of new adaptive control system to be used in Dyna-Soar and Apollo vehicles. NASA's Neil A. Armstrong was pilot.

April 9: Astronaut John H. Glenn was awarded the Hubbard Medal of the National Geographic Society "for extraordinary contributions to scientific knowledge of the world and beyond as a pioneer in exploring the ocean of space." Awarded only 20 times since it was struck in 1906, the Hubbard Medal honorees have included Adm. Robert E. Peary, Charles A. Lindbergh, Roald Amundsen, and Adm. Richard E. Byrd.

April 11: NASA Administrator James E. Webb, testifying before Senate Committee on Commerce, supported the President's bill setting up a communications satellite corporation and approved of all the Senate amendments, except for a caution on the one that would direct the FCC to encourage communications common carriers to build and own their own ground stations. Mr. Webb summarized NASA's responsibilities under the bill: (1) to advise FCC on the technical characteristics of the system; (2) to advise FCC on the technical feasibility of attaining the desired technical characteristics; (3) to coordinate its space communications R&D work with that of the corporation; (4) to furnish launching facilities, vehicles, and services in connection with the development and operation of the system; (5) to furnish other services on a reimbursable basis; and (6) to advise the Secretary of State on technical feasibility of the system providing communications service to a particular point in the world.

April 12: NASA awarded $1,000 to NASA engineers for inventions contributing to the advancement of aeronautical and space science and technology. Langley Research Center's Henry J. E. Reid, Jr., and H. Douglas Garner split a $1,000 award for conceiving a simple, light-weight attitude control system to control the axis of a spinning vehicle. Goddard Space Flight Center's James S. Albus received a $1,000 award for his digital solar aspect sensor that has been flown in several Explorer satellites.

April 13: NASA Administrator James E. Webb, addressing the National Conference of the American Society for Public Administration in Detroit, said: "No new department or agency in the recent history of the Executive Branch of the Federal Government was created through transfer of as many units from other departments and agencies as in the case of NASA. Three and one half years ago, NASA did not exist. Today NASA comprises approximately 20,500 employees, ten major field centers, and an annual budget approaching the $2 billion mark."

April 18: The highest national priority was approved for the Apollo program.

April 19: X-15 made its 50th successful flight from Edwards AFB, Calif., piloted by NASA's Joseph A. Walker.

April 19: NASA announced that FRIENDSHIP 7, the Mercury spacecraft in which Astronaut John Glenn orbited the earth three times, would be lent to USIA for a world tour, with some 20 stops on the itinerary and touching all continents. In mid-August, the spacecraft would be displayed at the Century 21 Exhibition in Seattle, Washington, before being presented to the Smithsonian Institution in Washington, D.C., for permanent exhibition.

April 23: NASA's RANGER IV was launched from AMR, hit the far side of the moon, but loss of communications prevented operation of experiments and reception of data.

April 25: Saturn I achieved its second successful test flight from AMR.

April 26: ARIEL I, the first international satellite, carrying six British experiments to make integrated measurements in the ionosphere, was launched from Cape Canaveral by Thor-Delta booster.

. U.S. and Japan launched a joint sounding rocket from Wallops Station, Va. NASA furnished the Nike-Cajun rocket, launch facilities, a langmuir probe to measure electron temperature, and data acquisition. Japan furnished instrumentation, a device designed to measure electron temperature and density simultaneously, functions which up to now have required two separate instruments. Height of the flight was 75.6 mi.

April 27: Langley Gold Medal of the Smithsonian Institution was awarded to Dr. Hugh L. Dryden, NASA's Deputy Administrator.

April 30: X-15 piloted by Joseph A. Walker flew to record altitude of 246,700 ft.

During April: TIROS IV continued in operation and provided excellent data. Over 20,000 pictures had been received. 217 nephanalyses had been prepared up to March 26, and 199 transmitted over national and international weather circuits. Nineteen special storm advisories were issued to such countries as the Malagasy Republic, Mauritius, New Zealand, and Australia. In more than seven cases, the Tiros data led to significant readjustments in the analyses of the National Meteorological Center. TIROS IV nephanalyses had been used at both Australia and McMurdo Sound in connnection with forecasts for Antarctic operations.

May 3: House of Representatives passed the Communications Satellite Act of 1962 by a vote of 354 to 9, creating machinery to operate the U.S. portion of a worldwide communications satellite system.

May 4: NASA announced appointment of Dr. Raymond L. Bisplinghoff, Professor of Aeronautical Engineering at MIT, as Director of NASA's Office of Advanced Research and Technology (OART), effective in July.

May 8: First launch of Centaur liquid-hydrogen rocket from AMR was unsuccessful.

May 8-10: Second National Conference on the Peaceful Uses of Space sponsored by NASA was held at Century 21 Exhibition in Seattle, Wash.

May 10: In address at dedication of the NASA Space Exhibit at the Seattle World's Fair, Vice President Lyndon B. Johnson said: "...our space program and its by-products will stimulate a sharp increase in the Nation's productive output which in turn will increase our gross national product, our income, and the Federal Government's intake..."

May 11: NASA announced establishment of an on-site management unit of some 100 persons at the Space and Information Systems Division Plant of North American Aviation at Downey, Calif., as an element of the NASA Western Operations Office.

May 12: OSO I, the Orbiting Solar Observatory launched March 7, completed 1,000 orbits; approximately 900 telemetry data tapes were acquired and forwarded to all experimenters.

May 17: In an address to the Duke University Symposium on "Regional Implications of Space Research," NASA Administrator James E. Webb stated: "I believe the regional approach is sound. It permits a number of universities to pool resources for research and to plan complementary programs directed to the needs of the region. Industry, too, has much to gain from regional cooperation... beginning, more and more, to look to the universities of their region for the most important resources of the age--ideas, scientific brainpower, and advanced technological skill and experience.

"It is not a question today of whether a region can already qualify.... The question is whether the region is creatively doing what it can to equip its citizens to serve their area and their Nation in a period when our prosperity and our very existence as a free people depend on scientific and technological leadership..."

May 18: NASA launched 76-lb. payload to 83-mile altitude with Nike-Cajun from Wallops Station, a University of Michigan experiment to measure air density and composition.

May 22: OSO I ceased transmission after 1,138 orbits (launched March 7), having produced for 77 days and provided 200 miles of scientific data tape. It observed and measured over 75 solar flares and subflares.

. First display of FRIENDSHIP 7 spacecraft in Belgrade, Yugoslavia. When President Tito viewed it he said: "I was under the impression when I saw the documentary film that the capsule was larger but it's fantastic..."

May 23: NASA and the Swedish Committee on Space Research announced signing of a memorandum of understanding for a cooperative program in space research.

May 24: AURORA 7 (MA-7) with Astronaut M. Scott Carpenter as pilot was launched from Cape Canaveral and recovered after three orbits--the second U.S. manned orbital flight.

. The House of Representatives (342-0) approved the NASA authorization for FY 1963 of $3.67 billion. This was almost three times the NASA budget for FY 1962.

May 25: One year ago, President Kennedy in his address to Congress declared the national space goal of "landing an American on the moon in this decade."

May 26: NASA's F-1 rocket engine first fired at full 1,500,000-lbs. thrust for full duration at Edwards, Calif.

May 29: Joint DOD-NASA Agena D Agreement signed which would authorize DOD to develop a standardized Agena D for joint use with the Atlas or Thor first stages.

June 1: Deadline for applications for NASA's new astronaut positions; NASA began screening more than 250 applications. The armed services supplied 53 applicants. Once selected, the new astronauts would undergo intensive training at Manned Spacecraft Center for Projects Gemini and Apollo.

June 5: NASA announced cooperative program for testing Relay and Telstar communications satellites by NASA and communications organizations in the U.S., Europe, and South America.

June 7: Pakistan made its first space experiment, the launching of a Rehbar I sounding rocket from a site near Karachi. Part of a cooperative program between NASA and the Pakistan Upper Atmosphere and Space Research Committee, the Rehbar I was a Nike-Cajun rocket supplied by the U.S., carrying a sodium vapor payload to an altitude of about 80 miles to measure upper-altitude winds.

June 8: NASA Deputy Administrator, Dr. Hugh L. Dryden and Soviet representative Anatoli Blagonravov announced in Geneva that the U.S. and U.S.S.R. had agreed to coordinate launching of weather satellites and to work together to map the earth's magnetic field.

June 14: TIROS IV weather satellite was no longer transmitting pictures usable for global weather forecasting, although TIROS IV was still taking "direct" pictures on command which were suitable for limited U.S. weather analysis.

June 15: First two of six tests of the performance of the Canadian Black Brant sounding rocket launched from Wallops.

. Senate Committee on Aeronautical and Space Sciences unanimously approved authorization for NASA in FY 1963 of $3,749,515,250. Also authorized was $71 million supplemental authorization for FY 1962, including $55 million for expansion of Cape Canaveral and $16 million for real estate at the Mississippi test facility.

June 17: Testimony by NASA Administrator Webb before House Appropriations subcommittee was released in which he declared that the U.S. has given far more than it has received in exchanges of space flight findings with the Soviet Union. By publicly releasing information gained from space flights, the U.S. is "...cooperating with them, but not getting very much in the way of return cooperation," he said. Webb defended U.S. policy of making space research results generally available:

"We are, in this open way, exposing the problems just ahead of us to the largest number of able minds all around the world. This is really the way mankind has made its forward advance. No one can tell from which mind comes the solution to a problem.

"I think the progress which can come from this can never be matched by Russia and the nations which do these things in secret."

June 19: TIROS V, designed to chart the origin, formation and movement of tropical storms, was launched from Cape Canaveral.

June 21: NASA announced that Dr. George L. Simpson, Jr., University of North Carolina sociologist, had been named Assistant Administrator for Public Affairs, effective September 1.

. Neil A. Armstrong, NASA research pilot, awarded the 1962 Octave Chanute Award by the Institute of the Aerospace Sciences (IAS).

June 27: X-15 flown to unprogramed record speed of 4,104 mph (mach 5.92) by NASA's Joseph A. Walker at Edwards, Calif.

. NASA named Charles H. Zimmerman as Director of Aeronautical Research in the Office of Advanced Research and Technology.

. Dr. Eugene B. Konecci appointed NASA's Director of Biotechnology and Human Research in the Office of Advanced Research and Technology.

June 30: By this date, 57 nations had joined the U.S. to support the development of peaceful uses of outer space, uniting with NASA in joint-flight, flight-support, or training programs.

. During Fiscal Year 1962 ending this date, North American Aviation, Inc., received highest dollar-value contracts from NASA--$199.1 million worth of contract awards. Other top contractors were McDonnell Aircraft Corp., with $68.4 million; Douglas Aircraft Co., $68.3 million; and Aerojet-General Corp., $66.3 million.

July 1: OSO 1 was transmitting continuous signals and 20% of real-time data was being acquired from each 95-min. orbit. During 11 weeks of near-perfect operation from launch on March 7 to May 22, OSO I transmitted 1,000 hours of scientific information. Before OSO I, less than an hour of solar phenomena data had been collected above the earth's atmosphere by all previous rocket-flight observations. OSO I had begun transmitting again on June 24, 1962.

July 2: NAA announced that the 1961 Robert J. Collier Trophy, U.S. aviation's highest honor, was awarded to four test pilots of the X-15 rocket research airplane: Scott Crossfield (NAA), Joseph Walker (NASA), Major Robert White (USAF), and Cdr. Forrest Petersen (USN).

July 3: NASA Administrator James E. Webb announced establishment of NASA's Northeastern Operations Office, to be located in the Boston area.

July 10: TELSTAR I, the first privately financed satellite, was launched into orbit from AMR by NASA Thor-Delta rocket. Launching of TELSTAR marked tenth straight successful flight of the 3-stage Delta rocket. The history of Delta goes back to the Thor-Able and the earlier Vanguard, from which it acquired its upper stages. Originally designed as an interim booster when NASA ordered twelve Deltas from Douglas Aircraft in April 1959, it achieved what NASA Administrator Webb called "the greatest level of reliability of any of our launch vehicles...." The following satellites were orbited by Delta boosters: ECHO I; TIROS II, III, IV, and V; EXPLORERS X and XII; OSO I; ARIEL I; and TELSTAR.

July 10: First commercial transmission of live TV via satellite and first trans-atlantic TV transmission, when TELSTAR experimental communications satellite of AT&T demonstrated vast new capabilities. Pictures were telecast from AT&T center near Andover, Me., to TELSTAR, then received and placed on all three major TV networks in the U.S. TV signals also were relayed from Andover, Me., to TELSTAR, and then relayed to French antenna at Pleumeur-Bodou on the Brittany peninsula and the British station at Goonhilly, Cornwall.

. NASA Langley Research Center (LaRC) announced plans to build a cyclotron laboratory on 1,300 acres of USAF-owned land, a former Bomarc missile site, halfway between LaRC and Williamsburg, Va.

July 11: Second successful test of USAF Titan II rocket, 5,000-mi. flight from AMR. Second generation ballistic missile with storable liquid fuels would be used as a booster in NASA's Project Gemini.

. NASA press conference explained the decision on Apollo manned lunar exploration program: to base its planning, research and development, procurement, and space flight program on the Saturn V booster to accomplish the initial manned lunar landing and return to earth, using the lunar orbit rendezvous as the prime mission mode.

July 17: X-15 (No. 3) flown to record altitude of 59.6 mi. (314,750 ft.) by Maj. Robert M. White (USAF). White's flight made him eligible for astronaut wings.

July 18: President Kennedy presented the Robert J. Collier Trophy to four X-15 pilots: Maj. Robert M. White (USAF), A. Scott Crossfield (NAA), Joseph A. Walker (NASA), and Cdr. Forrest S. Petersen (USN).

. Administrator Webb presented NASA Outstanding Leadership Awards to Paul F. Bikle (Director of the NASA Flight Research Center) and Hartley A. Soulé (Langley Research Center X-15 project manager) in the X-15 awards ceremony.

. Second Echo 2 (AVT-2) suborbital flight test from AMR was successful.

July 19: NASA test pilot John B. McKay flew X-15 (No. 2) in sustained heat test, reaching peak altitude of 84,500 feet and speed of 3,375 mph (mach 5.11).

July 20: NASA Administrator Webb announced that the Mission Control Center for future manned flights would be located at Manned Spacecraft Center (MSC), Houston, Tex.

July 20: U.S. Weather Bureau transmitted TIROS V photographs to Australia from Suitland, Md., the first time that Tiros photographs had been transmitted abroad for current weather analysis by a foreign country.

July 23: TELSTAR relayed two 20-minute live TV shows, the first formal exchange of programs across the Atlantic.

July 25: NASA Wallops Station launched Aerobee sounding rocket with GSFC-University of Colorado 208-lb. payload to an altitude of 68 miles, experiment orienting an ultraviolet spectrophotometer in the direction of the sun to study wave-length profile as a function of attitude and to calibrate instrumentation for future satellite flights.

July 27: NASA Administrator Webb named Franklyn W. Phillips, Assistant to the Administrator (October 1, 1958-present), to establish and direct NASA's Northeastern Operations Office in Boston, Mass.

During July: NASA Marshall Space Flight Center announced first static test of P&W liquid-hydrogen engine. In first firing of series, which was run in vacuum chamber to simulate space environment, RL-10 ran nine seconds and generate a rated 15,000 pounds of thrust.

. First successful reactor tests using liquid hydrogen as coolant were performed by Los Alamos Scientific Laboratory at the Nuclear Rocket Development Station (NRDS), Jackass Flats, Nev.

. NASA announced that it was establishing computer center at Slidell, La., to service the Michoud Operation's by November; facility will be one of the Nation's largest computer centers.

August 2: First full-scale research model of an inflatable space station was displayed at NASA Lewis Research Center.

August 4: NASA General Counsel John A. Johnson, speaking before the American Bar Association's Section on International and Comparative Law in San Francisco, stated: "It appears that the existing state of the law is that we have an area of space extending upward from the surface of the earth for an indefinite distance which is exclusively controlled by the underlying State, and above that, beginning at some undefined point, lies the 'free' realm of outer space. Whether there is or should be an intermediate third realm to which the exclusive power of the underlying State does not extend, but in which the full freedom of outer space may not be enjoyed, is an interesting item for speculation.

August 6: Sweden launched U.S. Nike-Cajun sounding rocket, first of series of U.S.-Swedish cooperative program for peaceful exploration of the upper atmosphere, the rocket reaching 68-mi. altitude after launch from Kronogard range in northern Sweden.

August 7: Dr. Hugh L. Dryden, Deputy Administrator of NASA, testified before the Senate Foreign Relations Committee that the U.S. "can be the leader in the establishment of a communications satellite system to serve the communications needs of the world, thus demonstrating our technical capabilities and our desire to utilize these capabilities for the benefit of all mankind... I urge that the Committee report the bill favorably."

. President Kennedy presented President's Award for Distinguished Federal Civilian Service to Robert R. Gilruth, Director of NASA Manned Spacecraft Center.

August 9: Establishment of NASA Industrial Applications Advisory Committee announced, with Earl P. Stevenson (former president and chairman of the board of Arthur D. Little, Inc.) as chairman.

August 12: Second birthday of ECHO passive communication "balloon" satellite. Since launch, the mylar ballon had orbited the earth 9,000 times and travelled 277,257,677.67 miles; it had been used for approximately 150 communication experiments. ECHO proved that inflatable structures would survive for long periods in space, despite sensitivity to aerodynamic drag and solar radiation. Initial orbit was 1,049-mi. apogee and 945-mi. perigee; before first birthday, orbit was 1,350-mi. apogee and 580-mi. perigee; solar pressures caused orbit to become nearly circular again; then , on second birthday, orbit was 1,175-mi. apogee and 704-mi. perigee.

August 15: Walter L. Lingle, Jr., was appointed Assistant Administrator for Management Development, NASA.

August 18: Norway, in cooperation with Denmark and the U.S., launched its first ionosphere probe from Andoeya, Norway, the probe reaching altitude of about 100 km., to measure electron density and collision frequency in the ionosphere.

August 27: NASA Goddard Space Flight Center (GSFC) announced it was training Italian scientists and engineers for the launching of Italy's first satellite. The 165-lb. satellite would be launched by 1965 from platform in Indian Ocean off eastern coast of Africa.

August 27: MARINER II Venus probe launched from Cape Canaveral, went into parking orbit, restarted on escape trajectory, and headed on its 180-million mile, four-month flight past Venus.

September 2: MARINER II, 1.2 million mi. from earth on its voyage to vicinity of Venus, successfully swung a yard-wide antenna around and focused it on earth, sending radio beam back to scientists at JPL. The antenna maneuver was performed on command of on-board timer and was first of two in-flight maneuvers crucial to correcting the probe's path to fly near Venus.

September 4: Radio signals to Venus probe MARINER II, nearly 1.5 million mi. from earth, repositioned the craft and fired an on-board rocket to send the probe on desired trajectory toward Venus.

September 5: Agreement establishing U.S.-Italy cooperative space program, signed in May, was confirmed in Rome by Vice President Lyndon B. Johnson and Italian Foreign Minister Attilio Piccioni.

September 8-22: First NASA exhibit in Europe was displayed in pavilion of Swiss National Trade Fair, in Lausanne.

September 11: President Kennedy toured NASA Marshall Space Flight Center, Huntsville, Ala.; Launch Operations Center, Cape Canaveral, Fla.; and Manned Spacecraft Center, Houston, Tex.

September 13: Paresev (Paraglider Research Vehicle), first manned vehicle designed to be towed aloft and released like a conventional glider, was flown at NASA Flight Research Center.

September 17: NASA's nine new astronauts were named in Houston by Dr. Robert R. Gilruth, Director of NASA Manned Spacecraft Center (MSC). Chosen from 253 applicants, the former test pilots who would join original seven Mercury astronauts in training for Projects Gemini and Apollo were: Neil A. Armstrong, NASA civilian test pilot; Maj. Frank Borman (USAF); Lt. Charles Conrad, Jr. (USN); LCdr. James A. Lovell, Jr. (USN); Capt. James A. McDivitt (USAF); Elliot M. See, Jr., civilian test pilot for General Electric Co.; Capt. Thomas P. Stafford (USAF); Capt. Edward H. White, II (USAF); and LCdr. John W. Young (USN). Dr. Gilruth stressed that they would not all necessarily make actual space flights. "Assignment to flight crews will depend upon the continuing physical and technical status of the individuals concerned and upon the future flight schedule requirements.

September 17: Reported that NASA would build facilities worth $15 to $18 million at White Sands Missile Range (WSMR), N.M., for testing Apollo spacecraft's propulsion and abort systems.

September 18: MARINER II entered gravitational field of the sun; the Venus probe was 3,608,857 miles from earth. The velocity of MARINER II relative to the earth now stopped decreasing and began increasing due to the effect of the gravitational field of the sun.

. NASA's TIROS VI weather satellite was orbited from Cape Canaveral two months early to provide operational photos of storm season.

September 27: NASA announced that Venus-bound MARINER II had been in flight one month, during which time it had travelled more than five million mi. from earth and had transmitted scientific data on interplanetary space from a greater distance than any space probe except PIONEER V (launched March 11, 1960).

September 28: Canadian satellite ALOUETTE I was placed in polar orbit from Vandenberg AFB by NASA Thor-Agena rocket, the first satellite designed and built by a nation other than the U.S. or U.S.S.R.

. X-15 (No. 2)was flown by NASA pilot John B. McKay in longest engine run to date (127 sec.), the craft reaching 67,000-ft. altitude and 2,693-mph speed (mach 4.08) in successful 9-min. flight near Edwards AFB, Calif.

. Cdr. Alan B. Shepard, Jr. (USN), the first U.S. astronaut, and Lt. Col. R. G. Robinson (USMC) were awarded the FAI DeLaVaulx Medal.

In its fourth year of space operations, NASA launched a total of 18 orbital, deep space, and manned space flights, of which 13 were successful, 2 partially successful, and 3 unsuccessful. The X-15 rocket research aircraft exceeded its design specifications in setting new records of 4,104 mph and 314,750 ft. Project Mercury achieved the Nation's first and second manned orbital flights, each flight orbiting three times. Satellites launched included the first orbiting solar observatory (OSO I), the first active communications satellite (TELSTAR II), the first successful interplanetary fly-by (MARINER II), and the first and second international satellites (ARIEL I and ALOUETTE I). Launch vehicle development saw the first two flight tests of the big Saturn space booster, both successful; the unsuccessful flight test of the Centaur booster, the first liquid-hydrogen rocket; and the first satellite orbiting (EXPLORER IX) by a solid-propellant booster (Scout).

NASA's FIFTH YEAR

October 1962 - October 1963

October 2: EXPLORER XIV satellite was launched from Cape Canaveral in highly elliptical orbit to study natural and manmade radiation in space.

October 3: Mercury six-orbit flight, SIGMA 7, was launched from Cape Canaveral, piloted by Astronaut Walter M. Schirra, Jr.

October 4: Fifth anniversary of the Space Age, inaugurated with the orbiting of first manmade satellite, SPUTNIK I, by the U.S.S.R. According to the Goddard Satellite Situation Report of Oct. 10, 1962, the first half decade of the Space Age saw the orbiting of 134 satellites, lunar probes, and space probes. U.S.S.R. orbited 26 (6 still in orbit), the U.S. 108 (48 still in orbit). Of U.S. total, NASA orbited 36 (24 still in orbit), DOD 72 (24 still in orbit). Two of the NASA launches must also be credited to the nations contributing the experiments or the payload--U.K. for ARIEL and Canada for ALOUETTE. Of the U.S. total, three were manned orbital spacecraft, as were four of the U.S.S.R.'s. Totals for manned space flight--U.S.: 12 orbits, with 19 hrs., 3 min. flight time; U.S.S.R.: 130 orbits, with 192 hrs., 41 min. flight time.

October 18: RANGER V lunar probe, launched from Cape Canaveral, passed within 450 miles of the moon but power failure made payload inoperative.

October 25: Maj. Virgil I. Grissom (USAF) was first astronaut to pilot paraglider in test at Edwards, Calif., in development tests for Gemini manned spacecraft landings.

October 27: EXPLORER XV energetic particles satellite was orbited from Cape Canaveral.

October 30: MARINER II Venus probe passed the earth on 65th day of its 110-day flight to vicinity of Venus.

. NASA realigned functions within office of Associate Administrator Robert C. Seamans, with NASA centers reporting to two Deputy Associate Administrators.

October 31: ANNA IB geodetic satellite was launched into orbit by Thor-Able-Star vehicle from Cape Canaveral. By comparing simultaneous observations of the satellite from various points on earth, scientists could measure Earth's size, shape, and surface features with accuracy never before possible.

November 1-3: First NASA-University Conference on the Science and Technology of Space Exploration held in Chicago, with 1,181 educators and scientists representing NASA Hq., NASA field installations, and other Government agencies, as well as more than 300 colleges and universities.

November 6: NASA and the Japanese Ministry of Posts and Telecommunications signed a Memorandum of Understanding for cooperative testing of NASA-launched communications satellites.

November 15: Venus-bound MARINER II spacecraft set new record for communications, transmitting engineering and scientific data to earth from nearly 18 million miles in space. Previous transmission record was set by PIONEER V space probe at distance of 17.7 million miles June 14, 1960.

November 16: NASA Ames Research Center announced construction of four space research facilities, totaling more than $14 million, had been authorized for FY 1963: biosciences laboratory, guidance facility, radiative heat system for Mass Transfer Facility, and helium tunnel.

November 20: NASA named Adm. W. Fred Boone (USN, Ret.) to newly-created post of Deputy Associate Administrator for Defense Affairs.

November 25: MARINER II Venus probe established new communications record, transmitting "excellent quality" data from more than 22.5 million miles in space.

November 30: Franco-American scientific sounding rocket launchings coordinated when two U.S. launchings were made from Wallops Island while France launched one from Algeria and failed to launch one from France.

December 5: U.S. and U.S.S.R. announced in U.N. their bilateral agreement to cooperate in space exploration programs on weather observation, magnetic field study, and satellite communications.

December 12: NASA Agena B vehicle program, including Atlas and Thor boosters, was transferred from NASA Marshall Space Flight Center to NASA Lewis Research Center.

December 13: RELAY I active-repeater communications satellite was launched into orbit from Cape Canaveral.

1962

December 14: In world's first close interplanetary contact, MARINER II passed within 21,600 miles of planet Venus and made 42-minute instrument-scan of Venutian atmosphere and surface, confirmed Venus had no magnetic field of significance and that its surface was 800° F.

December 16: EXPLORER XVI satellite, designed to measure micrometeoroid puncture hazards, was launched into orbit from NASA Wallops Station.

December 20: Management of Project Anna geodetic satellite program was transferred from DOD to NASA. ANNA 1-B, launched Oct. 31, would remain a responsibility of DOD, with NASA scientific direction, but further launchings would be planned and executed by NASA.

December 21: NASA announced selection of 88 colleges and universities to receive graduate training grants for academic year 1963-64.

December 27: Establishment of joint AEC-DOD-NASA program for development of space nuclear reactor was announced by the three agencies.

1963

January 1: NASA Ames Research Center was assigned direction of future Pioneer space probes, first of which would be launched in 1964.

January 4: MARINER II Venus probe lost radio contact with earth at a distance of 54.3 million miles, a new space communications record.

January 6: Review of Space Research, report of eight-week Space Science Summer Study sponsored by National Academy of Sciences in support of NASA, was transmitted to NASA Administrator James E. Webb. Consensus of the more than 100 U.S. scientists from Government, universities, and industry: "...finding and exploring extraterrestrial life should be acclaimed as the top-priority scientific goal of our space program..." The report also recommended that trained scientist -observers be assigned important roles in future U.S. space missions.

Early January: Dr. Wernher von Braun, Director of NASA Marhsall Space Flight Center, visiting West Berlin's Technical University to receive honorary doctorate, said: "I am convinced personally that the Russians will not succeed in making a manned space flight to the moon and back before the Americans. The Russians now could send a man to the moon but that would be a one-way trip."

Early January: NASA Marshall Space Flight Center awarded preliminary, 90-day contract for development of variable-thrust RL-10 rocket engine to Pratt and Whitney Aircraft.

January 9: RELAY communications satellite transmitted its first transatlantic television programs, sending British and French viewers clear pictures of ceremonial unveiling of Mona Lisa in Washington and 10 min. of network program "Today."

January 10: EXPLORER XIV energetic particles satellite developed radio transmission difficulty, not repairable by remote control.

. NASA announced MARINER II Venus probe had been so successful that repeat flight scheduled for 1964 had been canceled. Interplanetary efforts would be concentrated instead on such projects as sending probe towards Mars in 1964 and later flight to Venus with advanced Mariner probe in 1965.

. Dr. Robert C. Seamans, NASA Associate Administrator, told Washington Representatives Chapter of National Security Industrial Association, "The goals of this /accelerated national/ program and of our Nation in space are to achieve a position of pre-eminence in every aspect of space science and technology for the benefit of all mankind. . . ."

January 13: NASA Goddard Space Flight Center announced its two-year-long rocket experiments with sodium-vapor clouds had produced a better understanding of wind layers and patterns up to 105-mi. altitude; up to 44-50 miles, winds followed global pattern, reversing with seasons; at 44-50 mi., winds became erratic; at 56-68 mi. there were "remarkable wind sheers" with increases of as much as 250 mph; immediately above this was a quiet band of almost zero winds; above 70 mi. were strong, steady winds of about 200 mph.

January 14: NASA signed Memorandum of Understanding with India's Dept. of Atomic Energy providing for cooperative U.S.-India space program.

January 17: President Kennedy sent FY 1964 Budget Request to Congress, recommending NASA appropriation of $5.712 billion.

. NASA LaRC selected Boeing Co.'s Transport Div. and Lockheed-California Co. to negotiate two nine-month studies evaluating four concepts of supersonic commercial transport.

. NASA Administrator James E. Webb announced U.S. and U.S.S.R. delegates would meet in March in Rome to work out "detailed arrangements to carry out proposals for cooperation in space."

January 18: NASA Flight Research Center awarded contract to Bell Aerosystems Co. for design and construction of two manned lunar-landing research vehicles to be used in Project Apollo.

January 21: Soviet scientist Anatoli A. Blagonravov said in Izvestia article that dual flights of Cosmonauts Nikolayev and Popovich in August 1962 proved that, from a medical point of view, manned flight to the moon is now possible.

January 22: NASA and DOD established a joint Gemini Program Planning Board and delineated management responsibilities for operations in Cape Canaveral area.

. George von Tiesenhausen, chief of future studies for NASA Launch Operations Center, told IAS meeting in New York that by 1970 U.S. would need an orbiting space station to launch and repair spacecraft; space station could double as a mannned scientific laboratory.

January 26: NASA Manned Spacecraft Center announced assignment of areas of specialization for NASA astronauts.

January 29: EXPLORER XIV, silent since Jan. 10, resumed normal transmission.

January 30-31: Representatives of Canadian Defence Research Board and representatives of NASA met for preliminary exploration of scientific and technical aspects involved in proposed joint ionospheric research program.

January 31: Fifth anniversary of first U.S. satellite, EXPLORER I. Also fifth anniversary of activation of U.S. tracking network.

February 1: Launch responsibility for Agena and Centaur space vehicle programs was transferred from NASA Launch Operations Center to NASA Goddard Space Flight Center's Field Project Branch at Cape Canaveral, with Lewis Research Center providing technical direction.

. NASA announced first contract to study over-all systems requirements for Synchronous Meteorological Satellite (SMS) had been awarded to Republic Aviation Corp.

February 1: Morton J. Stoller, Director of NASA Office of Applications, was awarded NASA Medal for Outstanding Leadership.

February 8: First meeting of NASA-USAF board to coordinate joint participation in Project Gemini.

February 11: First series of tests of Gemini spacecraft backup parachute recovery system was successfully completed at El Centro, Calif.

. NASA Argo D8 (Journeyman) rocket launched from Pt. Arguello, Calif., the four-stage sounding rocket carrying 104-lb. instrumented payload to probe hazards of the radiation belts.

February 13: Herbert D. Rochen's appointment as NASA Deputy to Program Manager of joint AEC-DOD-NASA Snap-50 Program Office was announced by NASA.

. EXPLORER XVI meteoroid-detector satellite recorded 16 punctures by meteoroids during its first 29 days in orbit, NASA reported. Other spacecraft had reported hits by cosmic debris, but this was first time actual punctures were recorded.

. Reorganization of Apollo Spacecraft Project Office of NASA Manned Spacecraft Center was announced with Robert O. Piland named as Deputy Project Manager for the Lunar Excursion Module and James L. Decker as Deputy Project Manager for the Command and Service Modules.

February 14: SYNCOM I synchronous-orbit communications satellite was launched from Cape Canaveral. Ground stations lost radio contact with the satellite but success of the first synchronous orbit attempt was confirmed by photographs. The launch marked the 15th consecutive success (out of 16 attempts) by the Thor-Delta booster.

February 16: Instruments onboard MARS I interplanetary probe confirmed existence of a third radiation belt, Soviet news agency Tass announced.

February 20: On first anniversary of first U.S. manned orbital space flight, Astronaut John H. Glenn's Mercury spacecraft Friendship 7 was presented to Smithsonian Institution by Dr. Hugh L. Dryden, NASA Deputy Administrator.

February 20: On anniversary of first U.S. manned orbital space flight, Kenneth S. Kleinknecht, Mercury Project Manager at NASA Manned Spacecraft Center, pointed out that the "benefits derived from the Mercury Project are directly applicable to future manned space flight programs and provide a solid foundation on which to base the Gemini and Apollo programs."

. NASA Manned Spacecraft Center announced award of formal contract to General Dynamics/Convair for four Little Joe II vehicles, two launchers, and launch support for testing boilerplate models of Apollo spacecraft in unmanned, suborbital flights from White Sands Missile Range, N.M.

. NASA outlined plans for its new Electronics Research Center.

February 21: Jet Propulsion Laboratory said that Goldstone Tracking Station had made first radar contact Jan. 21 with planet Mars in a 12-hour per day experiment which would end early in March.

February 22: NASA announced Albert F. Siepert, Director of Administration since formation of NASA in October 1958, had been appointed to new post of Deputy Director, NASA Launch Operations Center, effective about April 1.

February 25: Testifying before House Committee on Science and Astronautics, NASA Administrator James E. Webb suggested that if Congress did not appropriate NASA's proposed FY 1964 budget request of $5.7 billion, the U.S. could not meet its goal of landing a man on the moon in this decade.

. NASA signed $418,820,967 contract with Boeing Co. for development and production of Saturn V first stage, largest rocket unit under development in the U.S.

February 26: NASA announced appointment of Capt. Robert F. Freitag (USN) as Director of Launch Vehicles in Office of Manned Space Flight.

February 28: Harvard College Observatory reported that astronomers at Boyden Observatory at Bloemfontein, South Africa, had photographed SYNCOM satellite missing since February 14.

March 1: NASA ordered 14 more Delta space vehicles from Douglas Aircraft Co., for use in launching NASA communications, meteorological, and scientific satellites.

March 1: Thomas F. Dixon resigned as NASA Deputy Associate Administrator.

. Delta Day at Cape Canaveral, the NASA Group Achievement Award presented to Delta Project Group of Goddard Space Flight Center, manager of Delta space vehicle for NASA. Directing remarks to Delta Launch Team at Cape Canaveral, Dr. Homer E. Newell, NASA Director of Space Sciences, said: "You have turned out the most cost-effective launch vehicle in the NASA stable. It has given us the highest return on the investment of any vehicle we have, and that is of fundamental interest to us.

. NASA announced Ames Research Center had requested industry proposals for six-week study contract to determine feasibility of using early satellites as orbital, recoverable biological laboratories.

March 4: Walter L. Lingle appointed to newly created position of NASA Deputy Administrator for Industrial Affairs.

March 5: NASA announced agreement with Australian Government for establishment of deep space tracking facility about 11 mi. southwest of Canberra; a manned space flight and scientific satellite tracking station at Carnarvea; and a smaller station at Darwin.

March 7: OSO I solar observatory satellite completed its first year in orbit, exceeding its estimated operating life by six months. Eleven of its 13 scientific experiments were still operating, having provided more data on behavior and composition of the sun than any single ground-based observatory and all previous rocket, balloon, and satellite flights combined. Preliminary results from OSO I would be presented at symposium March 14.

March 11: U.S.-U.S.S.R. negotiations began in Rome on technical details of a three-year agreement signed at Geneva in June 1962, for exchange of data to be gained from separate satellite launchings. Dr. Hugh L. Dryden, Deputy Administrator of NASA, headed U.S. scientific delegation, and Prof. Anatoli A. Blagonravov of the Soviet Academy of Sciences headed the Russian delegation. Joint space research program would include coordination on meteorology and communications studies, and charting of the earth's magnetic field.

. NASA and French National Center for Space Studies (CNES) jointly announced signing of Memorandum of Understanding for a cooperative U.S.-France program to investigate propagation of VLF electromagnetic waves.

March 11: NASA announced signing of $387,900,000 contract with Grumman Aircraft Engineering Corp. for development of lunar excursion module (LEM) of the Apollo spacecraft.

March 14: Preliminary results from OSO I indicated solar flares may be preceded by predictable series of microflares.

. NASA and FAA announced they were completing plans for joint study of supersonic transport operation.

March 17: Fifth anniversary of orbiting of VANGUARD I, still orbiting the earth and still transmitting data. The satellite had made more than 19,700 orbits and had slowed about $\frac{1}{4}$ sec. from original 134 min. 27 sec. period. Present apogee: 2,447 mi.; perigee: 403 mi. Scientists estimated VANGUARD I might have an orbital lifetime of 2,000 years.

. NASA announced it would sponsor study to determine interest in system of "practical" satellites to collect data from remote areas of the earth.

March 19: NASA Administrator James E. Webb and Council of New York City President Paul R. Screvane conferred in Washington on plans for NASA exhibit at 1964 World's Fair.

. NASA Goddard Space Flight Center, in cooperation with NBC and RCA, accomplished first known transmission of television in color via RELAY communications satellite. 15-min. sequence of move Kidnapped was relayed by RELAY from 4,000-mi. high orbit, and was scheduled to be shown on Walt Disney's program on March 24.

March 20: NASA Deputy Administrator Dryden and Dr. Anatoli A. Blagonravov of the Soviet Academy of Sciences announced signing of an accord for a joint weather satellite program between the U.S. and U.S.S.R.

March 21: NASA announced establishment of Office of Assistant Administrator for Technology Utilization and Policy Planning, with Dr. George L. Simpson, NASA Assistant Administrator for Public Affairs, filling the post. Dr. Simpson's deputy, Julian Scheer, would become Deputy Assistant Administrator for Technology Utilization and Policy Planning. Louis B. Fong, head of Industrial Applications Div., would become Director of Technology Utilization.

March 22: NASA announced RELAY I communications satellite had achieved all of its experiments and missions.

March 27: D. Brainerd Holmes, NASA Deputy Associate Administrator and Director of Manned Space Flight, told Manned Space Flight Subcommittee of House Committee on Science and Astronautics that current cost estimate of Project Apollo was $20 billion or less.

March 31: Reported that Boeing Co., North American Aviation, and Lockheed Missiles and Space Co., had won study contracts on the proposed supersonic transport airplane.

April 2: NASA announced signing of $456.6 million contract for Project Gemini spacecraft with McDonnell Aircraft Corp.

. NASA launched EXPLORER XVII atmospheric structure satellite from Cape Canaveral.

April 3: MSC Director Dr. Robert R. Gilruth appointed Robert O. Piland as Acting Project Manager of Apollo Project.

April 9: In its first few days of operation, EXPLORER XVII satellite had obtained data that more than tripled all previous direct measurements of the neutral gases in earth's upper atmosphere.

April 11: X-15 (No. 1), piloted by Maj. Robert Rushworth (USAF), flew at speed of 2,500 mph and altitude of 70,000 ft. in its first test as an aerial mapping plane, a camera having been installed into the underside of the craft's nose.

April 12: U.S.-Australian experiment to obtain data on the ionosphere conducted at NASA Wallops Station with Aerobee 150A sounding rocket.

April 17: NASA Administrator James E. Webb said in address before Milwaukee Press Club Gridiron Dinner: "From the results of the past five years of effort, it is apparent that, if we are to achieve mastery of space, we must add substantially to our scientific knowledge and to our utilization of technology. The NASA program is moving forward on both of these fronts. Essentially, our efforts in the Gemini and Apollo programs, leading to exploration of the moon, will provide us with an understanding of the limiting factors in space utilization, and the skills which will be needed to meet such future requirements in the space environment as our nation decides to undertake...."

April 18: NASA launched 85-lb. scientific payload to 208-mi. altitude at exact moment EXPLORER XVII atmospheric structure satellite passed over the Wallops Island, Va., launch site, an unusual "first" in NASA sounding rocket program.

April 19: TIROS V meteorological satellite, launched June 19, 1962, entered its eleventh month of operation, surpassing previous longevity production record of TIROS II.

April 23: Dr. Hugh L. Dryden, NASA Deputy Administrator, was elected to third four-year term as Home Secretary of National Academy of Sciences.

April 26: NASA announced formation of Research Advisory Committee on Biotechnology and Human Research, chaired by Dr. Charles I. Barron, flight surgeon and president of Aerospace Medical Association.

. World Meteorological Organization, meeting in Geneva, agreed to establish "world weather watch" using U.S. and Soviet meteorological satellites and a network of meteorological centers, in attempt to make possible long-range weather predictions on global scale.

April 30: NASA launched two Deacon-Judi meteorological sounding rockets from Coopers Island, Bermuda, first in series of tests "to measure atmospheric winds and density at altitudes above conventional balloon level up to about 300,000 feet."

During April: NASA awarded four-month study contracts for Synchronous Meteorological Satellite to Radio Corp. of America and Hughes Aircraft.

May 1: NASA Launch Operations Center reorganization announced. LOC now had 14 offices and divisions reporting directly to Office of the Director, Dr. Kurt H. Debus.

May 2: U.S. and Brazil signed Memorandum of Understanding for cooperation in satellite studies of the ionosphere.

May 3: First drop -test of Project Apollo earth landing system was successfully accomplished by Northrop Corp. for NASA Manned Spacecraft Center.

May 5: TIROS V ceased transmitting photographs after record 10 1/2 months of operation. Through orbit 4,579 on May 4, TIROS V had sent more than 57,857 cloud-cover pictures, 80% of which were usable for meteorological purposes.

May 6: NASA Administrator James E. Webb, in keynote address at Third National Conference on the Peaceful Uses of Space, cited recommendation by Iowa Summer Study that one or more scientists be included in Project Apollo lunar flights: "...it is apparent that the view of the scientists that trained scientific personnel should participate is valid, and that at the earliest appropriate stage in the program scientists will be included on Apollo missions."

May 7: TELSTAR II communications satellite was placed in elliptical orbit from AMR.

. NASA Ames Research Center awarded contracts to NAA Space and Information Div. and Space Technology Laboratories for studies of manned Mars landing-and-return missions.

May 11: NASA Manned Spacecraft Center announced first drop-test to qualify parachute-recovery system for two-man Gemini spacecraft was successfully completed at El Centro, Calif. Test series was scheduled for completion in 1964.

May 14: First flight test of inflatable meteoroid probe (paraglider) using Aerobee 150 launch vehicle, was conducted from White Sands Missile Range. Objective of experiment was to develop technique for determining penetration rates in thin structural materials. Preliminary results indicated Aerobee 150 followed nominal flight trajectory, but paraglider did not accomplish flight because canister in which it was contained failed to eject. Experiment was joint project of NASA Langley Research Center (paraglider) and Goddard Space Flight Center (vehicle) under direction of NASA Office of Advanced Research and Technology.

ay 15: NASA announced from Cape Canaveral that recruiting 9-12 new astronauts would begin next month.

NASA announced award of $10,687,000 contract to Chance Vought Corp. for 23 Scout launch vehicles.

U.K. and France were calling conference of European Postal and Telecommunications Administrations to discuss possibility of European communications satellite system.

May 15-16: Mercury spacecraft FAITH 7, with Astronaut Leroy Gordon Cooper (Maj. USAF) as pilot, made successful one-day orbital flight, the longest U.S. manned space flight to date (22 orbits; 34 hrs. 20 min.).

May 16: U.S.-U.S.S.R. negotiations on space cooperation resumed in Geneva with NASA Deputy Administrator Dr. Hugh L. Dryden and Soviet space expert A. A. Blagonravov heading respective delegations.

. Tass reported Soviet scientists had lost contact with MARS I interplanetary probe on March 21, when it was about 66,000,000 mi. from earth.

May 19: With publication of first NASA Applications Note ("Welding Tips"), NASA inaugurated new phase of its technology utilization program--disseminating information on results of NASA technological research in Applications Notes (containing innovations not thoroughly documented and evaluated) and Applications Reports (presenting comprehensive descriptions of single developments of significant industrial potential).

May 22: NASA launched Scout rocket from Wallops Station, Va., with AEC's RFD-1 payload to obtain data for designing space nuclear reactors that disintegrate upon atmospheric re-entry.

May 24: NASA Deputy Administrator Dryden and Dr. Anatoli A. Blagonravov of Soviet Academy of Sciences announced U.S.-U.S.S.R. agreement on coordinated launching of satellites for measuring earth's magnetic field.

May 26: Dr. Wernher von Braun, Director of NASA Marshall Space Flight Center, was awarded 1963 American Citizenship Award at 11th annual German American Day festival, North Bergen, N.J.

During May: NASA awarded $115-million contract to Rocketdyne Div. of North American Aviation, Inc., for continued development of F-1 engine. New contract was follow-on to letter contract which had initiated F-1 development.

June 3: In Wells College (Aurora, N.Y.), commencement address, NASA Director of Manned Space Flight D. Brainerd Holmes said: "How about women in space? The answer is yes, but not immediately. At the moment, however, all of the qualified pilots are men."

June 5: President Kennedy proposed that the U.S. Government join with private industry " to develop at the earliest possible practical date the prototype of a commercially successful supersonic transport superior to that being built in any other country of the world."

. NASA announced selection of Boeing Co. and Douglas Aircraft Co. for final negotiations leading to manned orbital research laboratory study contracts.

. NASA awarded contract for designing and fabricating advanced four-man, six-month life-support system to General Dynamics Corp.'s Astronautics Div.

June 6: Unnamed NASA spokesman quoted as saying ECHO I's orbit was "holding up fine" and could last another year or more. Although partially crumpled, balloon satellite launched Aug. 12, 1960, was still visible to naked eye.

June 10: NASA announced selection of Space Technology Laboratories, Inc., for negotiation of contract for design and fabrication of four Pioneer interplanetary space probes. First launching in series was scheduled for early 1965 with Delta launch vehicle.

. Selection of two new X-15 pilots, Capt. Joe H. Engle (USAF) and Milton O. Thompson (NASA) was announced by Paul F. Bikle, Director of NASA Flight Research Center, and Brig. Gen. Irving L. Branch (USAF), Commander of AF Flight Test Center. Pilots would fill vacancies left by NASA research pilot Neil Armstrong, now a NASA astronaut, and Maj. Robert White (USAF), recently assigned other USAF duties.

June 12: Project Mercury was officially ended, having achieved its goals of placing manned spacecraft in orbital flight around earth, investigating man's survival ability and performance capabilities in space, and recovering man and spacecraft.

. D. Brainerd Holmes resigned as NASA Deputy Associate Administrator and Director of Manned Space Flight.

. At breakfast meeting of Republic Congressmen in Washington. Former President Dwight D. Eisenhower said that anyone who would be willing to spend $40 billion to get to the moon was "nuts."

June 13: Morton D. Stoller, Director of NASA Office of Applications, died at 46 in Bethesda, Md.

June 14-19: Manned orbital space flight of VOSTOK V conducted by U.S.S.R. with Cosmonaut Valery F. Bykovsky onboard. Launched from Baikonur, VOSTOK V completed 81 earth orbits in 119 hrs. 6 min.

June 16-19: Flight of VOSTOK VI with Lt. Valentina V. Tereshkova, first woman in space, conducted by U.S.S.R. Launched from Baikonur, VOSTOK VI completed 48 earth orbits in 70 hrs. 50 min.

June 16: Addressing Washington, D.C., meeting of American Red Cross, NASA Administrator James E. Webb said, "Project Apollo offers us our greatest opportunity to overcome the lead in manned space exploration now held by the Soviet Union. It gives us assurance that if an American is not first on the Moon, he certainly will not be far behind. And most important of all, it demonstrates to all the world that we in the United States have the capability and the determination to carry on those things which we have declared seriously that we intend to do."

June 19: TIROS VII meteorological satellite launched from Cape Canaveral, marking 18th straight successful launch by Thor-Delta booster.

June 23: NASA Daytona Beach Operation established as integral part of NASA Launch Operations Center (LOC), Cape Beach, Fla.

June 26: Reorganization of NASA Marshall Space Flight Center's Michoud Operations was announced by Michoud General Manager Dr. George N. Constan.

June 27: NASA announced three personnel appointments to Headquarters: Earl D. Hilburn, Vice President and General Manager of Curtiss-Wright Corp. Electronics Div., as Deputy Associate Administrator (for non-manned space flight centers); Robert F. Garbarini, Chief Engineer of Sperry Gyroscope Co., Air Armament Div., as Director of NASA Office of Applications; and Robert W. Long, President of Long Construction Co., as consultant on construction matters to Dr. Robert C. Seamans, Jr., NASA Associate Administrator.

During June: Study of Soviet astronautics from 1957 through 1962 (RM-3595-PR) by F. J. Krieger of the RAND Corp., under USAF contract, concluded that the Soviet space program is an integral part of the Soviet military program. Krieger listed four main categories of Soviet effort: (1) earth-orbiting man in space; (2) lunar scientific exploration; (3) interplanetary exploration; and (4) Cosmos earth satellites, paramilitary in nature.

July 1: NASA announced selection of Boeing Aircraft Co. to negotiate contract for four-month study of lunar base concept.

July 3: Selection of Republic Aviation Corp. for negotiation of Advanced Orbiting Solar Observatory (Aoso) contract announced by NASA.

. NASA Manned Spacecraft Center announced ejection seat escape system for Gemini two-man spacecraft had successfully undergone first high-speed rocket-sled test, at Naval Ordnance Test Station, China Lake, Calif.

July 4: Manned Spacecraft Center let two contracts for study of two types of 24-man orbital space station, to orbit at 200-300 miles for about three years, with resupply and crew changes every three months.

July 7: Successful U.S.-Japan radio communications via TELSTAR II communications satellite, first in series of communications test to prove feasibility of intercontinental television via satellite for 1964 Olympic Games.

July 10: "Town Meeting of the World" featured simultaneous three-nation transatlantic telecast via TELSTAR II Communications satellite.

July 13: Whirlpool Corp. was awarded NASA contract for development of food supply, personal hygiene items, and waste disposal system for Project Gemini manned space flights.

July 15: By this deadline, NASA Manned Spacecraft Center received 271 applications for astronaut openings. 71 applicants were military pilots recommended for possible astronaut duty; remaining 200 were civilians, including three women.

July 16: TELSTAR II communications satellite went dead during its 450th orbit, and subsequent efforts to reactivate the satellite by radio signal were not successful.

July 19: X-15 (No. 3) piloted by NASA's Joseph A. Walker, attained record altitude of 350,000 feet.

July 23: Dr. George E. Mueller, Vice President for R&D of Space Technology Laboratories, named to new position of NASA Deputy Associate Administrator for Manned Space Flight, succeeding D. Brainerd Holmes who would resign Sept. 1 as Director of Office of Manned Space Flight and Deputy Associate Administrator for Manned Space Flight Centers.

July 24: Paul Bikle, Director of NASA Flight Research Center, piloted glider from Hailey, Idaho, to Swift Current, Saskatchewan, Canada, for a national soaring distance record of 545 miles.

July 26: SYNCOM II communications satellite was launched into synchronous orbit, providing telephone, teletype, and photo facsimile communications between U.S. and Africa.

July 29: NASA announced SYNCOM II communications satellite was performing "extremely well," drifting westward at rate of 4.5° per day.

. RCA announced RELAY I communications satellite had operated successfully for 203 days, setting record for performance and durability by a communications satellite.

During July: NASA Manned Spacecraft Center awarded $100,000 contract to Boeing Co. for six-month study of logistics spacecraft to be used for ferrying men and equipment to and from orbiting space station.

August 1: MARINER II interplanetary space probe completed its first orbit of the sun, after traveling approximately 540,000,000 miles.

. House passed bill to authorize $5,203,719,400 for NASA in FY 1964.

August 2: Second Shotput suborbital sounding rocket flight in U.S.-Italian San Marco Project was launched from NASA Wallops Station, the 177.5-lb. payload reaching 183-mile altitude in flight to test instrumentation for San Marco satellite.

. After 10 months of satisfactory operation in orbit, EXPLORER XIV scientific satellite, with its six experiments to measure energetic particles and magnetic fields in space, was still functioning.

August 5: TIROS VI, still orbiting the earth and still providing excellent quality photographs, exceeded durability record of 302 days set by its predecessor TIROS V.

. Some historic achievements of NASA Langley Research Center, NASA's installation specializing in basic aeronautical and space research, were reported in press: invention of world's first transonic wind tunnels; discovery of the "area rule," a design principle regarded as key to practical supersonic flight; invention of automatically inflatable satellites, leading to development of world's first communications satellite (Echo); development of first all-solid-fuel launch vehicle (Scout) to place U.S. satellite in orbit.

August 6: Tracking and data acquisition operations ceased for OSO I (Orbiting Solar Observatory), launched March 7, 1962.

. NASA announced preparations for dual launching of satellites with Scout launch vehicle late this year.

August 8: With launching of Nike-Cajun sounding rocket from Kronogård Range, Sweden and U.S. completed series of sounding rocket experiments to study noctilucent clouds near Arctic Circle.

. Urging Senate passage of $5.5 billion NASA FY 1964 authorization bill, Sen. Stuart Symington said: "It should be made clear that the United States is not committed to an all-out race, a crash program, so as to be first to the moon.

"The moon is no finish line in a race. It is but a proving ground, where we will test and demonstrate that competence in space technology which our security should insure...."

August 9: Voice and teletype messages exchanged via SYNCOM II communications satellite between ground station at Paso Robles, Calif., and communications ship Kingsport in Lagos Harbor, Nigeria. The test spanned 7,700 miles, greatest surface distance ever spanned between two points on earth via a communications satellite.

August 12: TELSTAR II communications satellite resumed operating for first time since July 16.

. Third birthday of ECHO I balloon satellite, launched into orbit August 12, 1960.

August 15: SYNCOM II communications satellite was successfully maneuvered into synchronous position 55° west longitude over Brazil and South Atlantic Ocean.

. Dr. Wernher von Braun, Director of NASA Marshall Space Flight Center, announced appointment of Robert B. Young as MSFC Director of Projects and Industry Operations.

August 16: NASA announced it and Soviet Academy of Sciences had approved Memorandum of Understanding providing for implementation of cooperative space agreement reached June 1962 in Geneva.

August 17: Centaur stage was test-fired for first time with both RL-10 engines equipped with flight-type propellant supply systems.

August 22: X-15 (No. 3) flown by NASA pilot Joseph A. Walker to record 351,000-foot altitude.

August 23: SYNCOM II communications satellite relayed its first live telephone conversations, a transmission between President Kennedy and Nigerian Prime Minister Sir Abubaker Tafawa Balewa and other messages between U.S., Nigerian, and U.N. officials.

. U.S.-Canada agreement for cooperative testing of communications satellites launched by NASA was announced by NASA and Canada's Dept. of Transport.

. NASA Manned Spacecraft Center announced the 271 applicants for astronauts had been screened to 30. Of these, 10-15 would be selected in late October.

August 26: Office of Construction established in NASA Hq., with nationally recognized construction contractor Robert W. Long as Director.

August 28: NASA launched Little Joe II booster rocket with dummy payload simulating size and weight of Apollo command module and escape tower in flight test at White Sands Missile Range, N.M.

August 31: NASA Marshall Space Flight Center Director Dr. Wernher von Braun announced reorganization of MSFC designed to strengthen Center's dual function of performing in-house R&D and monitoring industrial contracts.

During August: NASA Director of Aeronautical Research Programs Charles H. Zimmerman resigned to accept position with Army Material Command's research and development directorate.

September 1: Dr. George E. Mueller, Vice President for R&D of Space Technology Laboratories, succeeded D. Brainerd Holmes as NASA Deputy Associate Administrator for Manned Space Flight.

. Paul Haney, Public Affairs Officer for NASA Office of Manned Space Flight, replaced Lt. Col. John A. Powers, MSC Public Affairs Officer, effective Sept. 1.

September 2: Two flight tests of M-2 wingless lifting body conducted by NASA Flight Research Center, with Milton O. Thompson as test pilot--the sixth and seventh air-tow flight-tests of M-2 in series to investigate man's ability to control M-2 during low-speed operations, particularly during landing phase.

. Results of Harvard Business School pool of U.S. industrialists on how they viewed America's space program, published in the Harvard Business Review, indicated that industrialists expect a considerable payoff from space in terms of tangible benefits to our planet, and think that the space program is "a great energizing force on our society."

September 6: NASA and DOD announced new agreement for NASA use of USAF-developed Agena launch vehicles. USAF would continue to be responsible for design, engineering, and acceptance testing of basic Atlas and Thor vehicles and Agena D stages; NASA would take over technical and administrative control of its 11 remaining Agena B stages.

September 12: NASA launched an Aerobee 150-A rocket from Wallops Island to an altitude of 102 miles in a test of the behavior of liquid hydrogen when exposed to radiant heating and weightlessness.

September 13: NASA announced plans to prevent contamination of other planets by planetary landing vehicles through complete sterilization of the vehicle by heat and any other necessary methods. NASA said its policy "continues to be that under no circumstances will an unmanned spacecraft destined for landing on the planets be launched until sterility has been assured.

September 20: President Kennedy addressed the U.N. General Assembly, proposed U.S.-U.S.S.R. cooperation in manned lunar landing: "Surely we should explore whether the scientists and astronauts of our two countries--indeed, of all the world--cannot work together in the conquest of space, sending someday in this decade to the moon, not the representatives of a single nation, but the representatives of all humanity."

September 28: One year after launching, ALOUETTE I, built by Canada and launched by NASA, was still transmitting excellent ionospheric data to 13 telemetry stations around the world.

In its fifth year of space operations, NASA launched 12 orbital, deep space, and manned space flights, of which 10 were successful, 1 partially successful, and one unsuccessful. The X-15 rocket research aircraft set a new altitude record of 350,000 ft. and began its follow-on flights involving space research. The Mercury program added a 6-orbit flight and was concluded with a 22-orbit flight. Among the successful flights were four scientific satellites, two communications satellites, the first and second synchronous-orbit communications satellites, and another weather satellite. The fifth scientific lunar probe (RANGER V) was unsuccessful and led to a reworking of the remaining Ranger probes. Project Apollo flight testing was begun.

NASA's SIXTH YEAR

October 1963 - October 1964

October 1: Fifth anniversary of NASA. Ceremonies throughout the week included open house at Wallops Station, Va., Sept. 29 and 30; Fifth Anniversary Honor Awards Ceremony in Washington; Project Mercury Summary Report Conference at Manned Spacecraft Center, Houston, Tex., October 3 and 4; and NASA Fifth Anniversary Banquet in Washington, October 5.

October 2: GAO released report on NASA's Centaur booster which was sharply critical of both Government management and contractor performance. The report charged that poor management and program slippage had added $100 million to the cost of the program. Most serious charge in the report was that NASA and the contractor--General Dynamics/Astronautics--had in their possession in 1960 data from which the failure of the first test flight in 1962 could have been predicted.

October 4: First flight-rated model of Gemini spacecraft (No. 1) delivered by contractor to MSC Test Conductor at AMR.

October 6: Construction of new NASA Manned Spacecraft Center at Houston, Tex., was 75% complete. First contingent of 80 people were to move in this week, with general occupancy scheduled for June 1964.

October 7: House Appropriations Committee voted $5.1 billion FY 1964 appropriation for NASA, $612 million less than Administration request and $250 million less than previously authorized by Congress.

October 8: EXPLORER XIV energetic particles satellite ceased useful transmission after almost 10 months of successful operation. Some 6,500 hours of data had been received.

. NASA announced that Dr. Joseph F. Shea, Deputy Director (Systems), Office of Manned Space Flight, NASA Hq., had been named Program Manager, Apollo Spacecraft, at MSC.

October 10: House passed Independent Offices Appropriations for FY 1964, which included the $5.1 billion for NASA recommended by the Appropriations Committee.

. The Collier Trophy for 1962 presented to the seven Project Mercury astronauts by President Kennedy.

October 17: NASA and DOD announced joint agreement to coordinate activities involving a manned orbital research and development station.

. U.S.-France Aerobee 150A sounding rocket was launched from Wallops Station, Va., in cooperative program between NASA and French National Center for Space Studies (CNES) to study very low frequency (VLF) radio wave propagation in the ionosphere. This flight was part of a program of development of a satellite payload carrying similar experiments.

October 18: NASA announced at MSC the selection of 14 astronauts for the Gemini and Apollo projects, bringing the total number of NASA astronauts to 30.

October 23: Dr. Walter C. Williams, Deputy Director for Mission Requirements and Flight Operations, MSC, was named NASA's Deputy Associate Administrator for Manned Space Flight Operations.

October 24: NASA announced scientific results from EXPLORER XVI meteoroid detection satellite. Results from $7\frac{1}{2}$ months of transmission showed most meteoroids in space were "fluff" rather than solid rock and not serious threat to satellites.

October 26: The Rosman, N.C., tracking and data acquisition facility was dedicated by NASA. A key station in the NASA STADAN network, the 85-ft. diameter parabolic antenna at Rosman would track advanced satellites and receive the large flow of telemetered data from the large orbiting observatories and would relay the data by telephone and radio to GSFC for processing and analysis.

October 30: NASA and DOD announced the addition of the USAF's Thrust-Augmented Thor (TAT) to the National Launch Vehicle program as a booster for Agena and Delta vehicles. TAT would use strap-on solid-propellant rockets to raise Thor's total thrust to 330,000 lbs.

. NASA announced it was dropping four manned Apollo orbital flights employing the Saturn I booster and accelerating the all-systems Apollo flights employing the Saturn I-B booster. Saturn I would have been able to orbit only the command and service modules of Apollo.

November 1: Major reorganization of NASA Hq., designed to consolidate authority and responsibility for major program management and for direction of field centers and to realign headquarters management of agency-wide supporting services. Associate Administrator for Manned Space Flight (Dr. George Mueller) would direct the manned space flight program and the related centers MSFC, MSC, and LOC; Associate

November 1 (Continued)
Administrator for Advanced Research and Technology (Dr. Raymond Bisplinghoff) would direct the advanced research and technology program and the related centers, ARC, FRC, and LRC; and the Associate Administrator for Space Sciences and Applications (Dr. Homer Newell) would direct the scientific explorations of space and peaceful applications program and the related centers, GSFC, Wallops Station, PLOO, and administering the contact for JPL. All program managers would report to Associate Administrator Dr. Robert C. Seamans.

November 4: Partial results announced by Univ. of Stockholm scientists from the U.S.-Swedish series of sounding rocket experiments made in July and August 1963 showed extremely low temperatures to be associated with the presence of noctilucent clouds.

November 5: MSC announced a reorganization designed to strengthen Apollo and Gemini management structure and to assimilate Project Mercury personnel into these programs. Under Dr. Robert R. Gilruth, MSC Director and James C. Elms Deputy Director, would be four assistant directors, managers of major programs, and a manager of MSC Florida Operations.

November 6: MSC successfully conducted the first off-the-pad abort test of the Apollo launch escape system at White Sands Missile Range, N.M.

November 13: The Senate Appropriations Committee completed action on NASA's FY 1964 appropriation by approving a $5.19 billion NASA budget. This was only $90 million more than approved by the House. The Senate Committee retained its version of the Pelly amendment, forbidding a joint lunar program with the U.S.S.R. without consent of Congress.

November 14: X-15 (No. 1) was flown to 3,205 mph (mach 4.75) and 90,800 ft. altitude by Capt. Joseph Engle (USAF). The X-15 was put through two sharp rolling turns to test aircraft stability at high speeds.

November 15: NASA's Flight Research Center, USN, and FAA announced completion of series of test flights simulating a supersonic transport aircraft flying in the U.S. air traffic control network.

November 16: LOC was visited by President Kennedy, where he was briefed on Projects Gemini and Apollo.

November 19: NASA announced it had solved the combustion instability that had plagued the giant F-1 liquid-propellant engine being developed for use in the Saturn V rocket.

November 20: The Senate passed (72-1) and sent to a joint conference committee the appropriations bill for Independent Offices, which included a NASA FY 1964 appropriation of $5.1 billion. This figure was the same as that appropriated by the House.

November 23: First live transmission of television signals across the Pacific Ocean was accomplished by RELAY I.

November 25: RELAY I communications satellite transmitted TV of President Kennedy's funeral to Europe, including U.S.S.R. and Japan.

November 26: NASA successfully launched EXPLORER XVIII, the Interplanetary Monitoring Probe (IMP) from AMR aboard a Thor-Delta booster. The satellite was designed to measure the major magnetic field phenomena in space, interactions of the streaming solar plasma, and the geomagnetic field.

November 27: The big J-2 liquid-hydrogen engine being developed by NASA for use in upper stages of Saturn IB and Saturn V booster, successfully underwent first extended duration (510 sec.) static test firing.

. NASA launched the first successful Atlas-Centaur space booster from AMR. The booster performed perfectly and the Centaur second stage ignited its liquid-hydrogen engines in space and went into orbit. Abe Silverstein, Director of the Lewis Research Center, called the flight "the first test of our ability to successfully ignite hydrogen on time in space."

November 28: In a Thanksgiving Message to the American people, President Johnson said that he had ordered that Station No. 1 of the Atlantic Missile Range and NASA launch operations center in Florida should be called the John F. Kennedy Space Center in honor of the recently assasinated President.

December 5: Addressing the National Association of Manufacturers 68th Annual Congress, NASA Administrator James E. Webb said: "Although our decision to launch a vigorous effort in space was, in part, a response to a threat to our security, it also stemmed from recognition of the changing requirements for industrial and economic growth, and the fact that to maintain leadership in the new age of science and technology, our resources must be organized on a national scale.

December 5 (continued)

Thus the technological advances which it produces will not come as the mere by-product of an effort launched to satisfy other needs, but as the fruit of an effort deliberately undertaken to stimulate advances in the forces that make for economic growth, and meet the demands of a nation immersed in a new flood of scientific discovery and technical progress..."

December 5: X-15 (No. 1) flown by Maj. Robert Rushworth (USAF) to 4,023 mph speed (mach 5.94), just 81 mph slower than record speed of 4,104 mph reached in June 1962 flight of X-15.

December 10: Both Houses of Congress approved the Independent Offices Appropriation bill worked out by a conference committee. The bill included a FY 1964 NASA appropriation of $5.1 billion, $612 million less than had been requested. The bill also included an amendment forbidding a joint venture to land a man on the moon with any other nation without the consent of Congress. Another amendment provided that no part of NASA's appropriation could be transferred to any other Government agency for research without approval of the Bureau of the Budget.

December 19: EXPLORER XIX was launched by NASA from PMR on a Scout booster. The 17.8-lb. balloon satellite was designed to gather data on atmospheric density.

. President Johnson signed the Independent Offices Appropriations act (P.L. 88-215). The President issued a special statement criticizing Congressional amendment prohibiting U.S. participation in manned lunar landing program with any other country without the consent of Congress, calling the restriction unnecessary and undesirable.

December 21: TIROS VIII meteorological satellite was placed into orbit by NASA, using a Thor-Delta booster from AMR. In addition to the usual wide-angle TV camera transmitting cloud-cover pictures to sophisticated receiving stations, TIROS VIII carried the automatic picture transmission system (APT) designed to provide real-time local weather information to any area in the world by means of a single, inexpensive ground station.

December 24: NASA and AEC announced revision in Project Rover, canceling development of Rift (Reactor-In-Flight-Test) stage and deferring flight objectives of Nerva (Nuclear Engine for Rocket Vehicle Application). Rover's Kiwi ground reactor program was unchanged.

1964

January 8: NASA Administrator James E. Webb told the University Club in New York that NASA's last 25 attempts to place satellites in orbit were all successful. Of the 25, only one payload failed to function.

January 13: Management changes in propulsion programs in NASA's Office of Advanced Research and Technology were introduced. John L. Sloop, head of OART Div. of Chemical Propulsion and Power Generation, was appointed to new position of Assistant Associate Administrator for Advanced Research and Technology. Propulsion division was redesignated Div. of Chemical Propulsion, with Adelbert O. Tischler of NASA Office of Manned Space Flight as Director.

January 14: NASA and the Canadian Defence Research Board announced agreement for a joint multi-satellite ionosphere-monitoring research program, designated Isis (International Satellites for Ionospheric Studies). Agreement called for orbiting of a second Alouette and Isis A, B, and C satellites at intervals between 1965 and 1970.

January 15: President Johnson sent to Congress his proposed $5.304 billion authorization for NASA in FY 1965, $600 million less than NASA had earlier requested. At a press conference on the budget, NASA said it would request $141 million supplemental appropriation for FY 1964, to restore some of the Apollo money cut by Congress.

January 15-16: Series of four sodium-vapor experiments was launched on Nike-Apache sounding rockets from NASA Wallops Station in sunset-to-sunrise comparative measurements of winds and turbulence in the upper atmosphere.

January 16: U.S. Army Corps of Engineers awarded $63,366,378 contract for NASA to joint bidders Paul Hardeman, Inc., Morrison-Knudsen Co., Inc., and the Perini Corp., for construction of Saturn V-Apollo assembly building at Cape Kennedy.

January 16: X-15 (No. 3) flown by NASA pilot Milton O. Thompson to 3,170 mph (mach 4.80) and 70,000 ft. altitude in test to investigate heat-transfer rates with sharp-leading-edged vertical tail.

January 17: Astronaut John H. Glenn, Jr. announced that he would be a candidate for the Ohio Democratic nomination for U.S. Senator in the May 5 primary and that he was retiring from the Marine Corps.

. James C. Elms, Deputy Director of the NASA MSC, resigned to accept a position with industry.

January 19: George M. Low, NASA Deputy Associate Administrator for Manned Space Flight, was named Deputy Director of NASA MSC in Houston, replacing James C. Elms.

January 20: NASA Deputy Administrator Hugh L. Dryden announced that the U.S.S.R. had notified the U.S. that it would participate in space communications experiments using the Echo II passive communications satellite which NASA would orbit in the coming week. This cooperative experiment would be based on the 1963 agreement reached by Dr. Dryden and Soviet Academician A. A. Blagonravov.

January 21: RELAY II active communications satellite was launched into orbit from AMR. The 172-lb. satellite was to continue communications tests of RELAY I and provide evaluation of improvements in the new comsat.

. Dr. Abe Silverstein, Director of NASA Lewis Research Center, was presented Sylvanus Albert Reed Award for 1963 at AIAA dinner in New York.

January 22: First intercontinental communications tests conducted with RELAY II communications satellite were successful. The transmission between Nutley, N.J. and Raisting, West Germany, was termed "excellent."

January 23: Rep. Thomas M. Pelly (R.-Wash.) introduced in the House a concurrent resolution to change the goal of the manned lunar landing to before 1975 instead of before 1970.

January 25: NASA's ECHO II passive communications satellite was placed in near-polar orbit by Thor-Agena B vehicle launched from PMR. The 535-lb. balloon satellite inflated to its full 135-ft. diameter.

January 28: 100th flight of the X-15 rocket-powered aircraft was conducted near Edwards AFB, Calif., with Maj. Robert Rushworth (USAF) as pilot. X-15 (No. 1) reached 3,682 mph (mach 5.4) and 107,000-ft. altitude.

January 29: NASA launched the Saturn I SA-5 from AMR in its first successful flight test of both stages of the rocket. The orbited body weighed 37,700 lbs., nearly 20,000 lbs. of which was payload.

January 30: NASA launched RANGER VI lunar probe with Atlas-Agena B launch vehicle from AMR in lunar landing mission designed to photograph the moon's surface.

February 3: Nike-Cajun sounding rocket launched from Wallops Island, Va., in coordination with Nike-Apache launch from Ascension Island in an experiment designed to gather data on high-altitude winds and atmospheric temperatures. Correlated launch from Fort Churchill, Canada, was postponed because of sound interference problems.

. NASA and the U.S. Department of Commerce announced agreement for development of National Operational Meteorological Satellite System (NOMSS). The agreement provided that NOMSS would be based on NASA-developed Tiros technology and would become operational in 1965. NASA would orbit the satellites and the Weather Bureau would operate and control the system and analyze, process, and distribute the meteorological data gathered by the satellites.

February 6: The John F. Kennedy Space Center, NASA, announced a major reorganization. KSC Director, Dr. Kurt H. Debus said objectives were to: (1) realign Apollo management to conform to the organization of Manned Space Flight in NASA Hq.; (2) separate and strengthen administrative and technical support functions; (3) reduce number of offices reporting to Dr. Debus.

. In testimony before House Committee on Science and Astronautics, NASA Associate Administrator for Manned Space Flight, Dr. George Mueller said that "1963 was a milestone year. It was the year of transition to hardware--not we can fill the pipeline and move forward to a manned lunar landing in this decade..."

February 7: NASA announced it would join with the Norwegian Space Research Committee and the Ionospheric Research Laboratory of the Royal Technical Univ. of Denmark in three sounding rocket launches from Andoeya, Norway, during February and March. The Nike-Apache sounding rockets would carry experiments to test theories of how D-region of the ionosphere is formed.

February 9: NASA announced FAA-NASA Memorandum of Understanding specifying NASA's role in the development of the U.S. supersonic transport aircraft, under overall responsibility of FAA. NASA would furnish facilities, background research, technical advice, and resources to FAA and would conduct advanced flight research.

February 19: NASA and the Indian Dept. of Atomic Energy announced signing memorandum of understanding for U.S.-Indian cooperation in meteorological sounding rocket program. Data gathered in the program would contribute to International Indian Ocean Expedition, a continuation of research begun during the IGY, concentrating on weather and atmospheric conditions related to the Indian Ocean area.

February 22: The first Soviet-American space communications experiment, with British cooperation, was conducted. A radio signal sent from Jodrell Bank observatory bounced off the NASA-launched ECHO II satellite and was received by the Zimenski Observatory near Gorki.

February 24: Analysis of NASA FY 1965 budget request revealed that NASA construction had passed its peak. FY 1964 funding for construction was $637.5 million, and FY 1965 request was for $281 million. Accentuating the trend was the fact that funding of major new facilities for Project Apollo--at Cape Kennedy, MSC, and Mississippi Test Facility--would be completed in FY 1965.

March 2: NASA and DOD established the National Space Station Planning Sub-Panel of the NASA-DOD Aeronautics and Astronautics Coordinating Board (AACB), charged with recommending to AACB the best configuration for follow-on manned space station to the MOL.

. Dr. Charles A. Berry (M.D.) was appointed Chief of Medical Programs at MSC.

March 4: NASA and French National Center for Space Studies (CNES) agreed to proceed with cooperative space project of launching satellite to investigate VLF electromagnetic wave propagation in the ionosphere. The French-built satellite would be launched from PMR aboard a Scout booster supplied by NASA.

March 7: NASA announced that the TIROS VIII meteorological satellite, launched December 21, 1963, was performing highly successfully in automatic transmission of cloud pictures to ground stations around the world.

March 13: X-15 (No. 3) flown by NASA pilot John B. McKay near Edwards AFB with microphone embedded in the X-15's side to record noise of turbulent air sweeping over the surface, to help in prediction of metal fatigue.

March 18: First in series of 16 Judi-Dart meteorological sounding rockets was launched by Pakistan Space and Upper Atmosphere Committee under cooperative arrangement with NASA.

March 19: Attempt to orbit NASA Explorer Beacon satellite (S-66) failed when third stage of Delta launch vehicle shut down prematurely. This was first Delta failure in last 23 launches.

March 20: Dr. Hugh L. Dryden, Deputy Administrator of NASA, was presented the Robert H. Goddard Memorial Trophy for 1964.

March 25: NASA awarded two contracts to Aerojet-General Corp. for development of the M-1 1.5-million-lb. thrust rocket engine. One contract provided $190,075,635 for R&D work; the other provided $48,550,074 for necessary test facilities.

. First TV transmission from Japan to the U.S. was made, using NASA's RELAY II communications satellite. Quality of picture and sound was excellent.

. House of Representatives voted (283-73) to approve NASA FY 1965 budget authorization of $5,193,810,500.

March 27: ARIEL II (UK-C) scientific satellite, the second in series of three U.S.-U.K. satellites, was orbited by NASA Scout booster launched from Wallops Island, Va. The satellite was designed to gather data on the vertical distribution of ozone in the upper atmosphere, measure galactic radio noise, and to detect micrometeoroids.

March 30: NASA awarded $158,466,800 contract to North American Aviation's Rocketdyne Div. for production of 76 F-1 rocket engines for the Saturn V launch vehicle.

April 7: President Johnson ordered prompt removal of NASA tracking station from Zanzibar shortly after President Abeid Karume requested its removal.

April 8: Titan II launched unmanned Gemini spacecraft into orbit in first Project Gemini flight (GT-1), a test of Titan II launch vehicle system, Gemini spacecraft structural integrity, and spacecraft-launch vehicle compatibility.

April 10: NASA launched 250-lb. instrumented Ram (Radio Attenuation Measurement) spacecraft on a ballistic trajectory from Wallops Island, Va. Experiment was one of series to investigate the problem of communications through the ionized plasmas created when a spacecraft reenters earth's atmosphere.

April 13: MSC Director Dr. Robert Gilruth announced astronauts Gus Grissom and John Young would be prime pilots for the first Gemini flight, with astronauts Walter Schirra and Tom Stafford as backup pilots.

April 14: Atlas D launch vehicle sent NASA's 200-lb. Project Fire spacecraft more than 500 miles into space from Cape Kennedy in test to provide data on reentry heating of spacecraft returning from the moon.

. Dr. Smith J. DeFrance, Director of NASA Ames Research Center, was one of 10 recipients of 1964 Career Service Award of the National Civil Service League.

April 15: NASA announced selection of 23 scientific and technological experiments--8 scientific and 15 technological--to be flown aboard Gemini spacecraft.

April 21: NASA announced that Walter L. Lingle, Jr., Deputy Associate Administrator, was leaving NASA May 15 to return to private industry. Lingle would be succeeded by Earl D. Hilburn, Dep. Associate Administrator for Industry Affairs.

April 29: X-15 (No. 1) was flown by Maj. Robert Rushworth (USAF) to altitude of 102,000 ft. and speed of 3,903 mph (mach 5.72) in test to determine the effect of shock waves on photography.

May 8: NASA signed $80-million incentive contract with Boeing Co. to build five Lunar Orbiter spacecraft.

May 11: NASA announced Dr. Alfred J. Eggers, Jr., would be Deputy Associate Administrator for Advanced Research and Technology. Dr. Eggers had been Assistant Director of Ames Research Center.

May 13: Successful test of Apollo escape system was conducted at White Sands Missile Range by NASA MSC. Apollo spacecraft was boosted by Little Joe II rocket, and was propelled away from the booster by its escape system when the Little Joe was exploded.

May 18: House Appropriations Committee approved $5.2 billion appropriation for NASA in FY 1965. This was $245 million less than that requested by NASA.

May 21: X-15 (No. 3) flown by NASA pilot Milton O. Thompson to 63,000-ft. altitude and 2,045 mph (mach 3.10). Engine unexpectedly cut off during flight and Thompson could not restart it. He made emergency landing on Cuddeback Dry Lake, the fourth forced landing in 107 X-15 flights.

May 28: Saturn I SA-6 flight conducted successfully from Cape Kennedy, the two-stage launch vehicle boosting into orbit an Apollo boilerplate spacecraft attached to the S-IV second stage. The one malfunction in the flight was premature shutdown of one of the eight first-stage engines. However, the other seven engines burned longer in order to compensate for this shutdown.

. NASA signed $237 million contract with General Dynamics/Astronautics for development of Centaur launch vehicle stages.

. NASA announced that it would negotiate with Douglas Aircraft Co. for purchase of eight additional S-IVB stages for Saturn IB launch vehicle. Contract was estimated to be worth about $110 million.

June 5: NASA and the Swedish Space Committee agreed to extend for another year their cooperative sounding rocket studies of the upper atmosphere and noctilucent clouds.

June 8: NASA Deputy Administrator Hugh L. Dryden announced that the bilateral agreement negotiated between U.S. and U.S.S.R. in June 1962 by which the two countries would cooperate in space programs for communications, meteorology, and geophysics, was discussed by

June 8 (Continued)
himself and Blagonravov at Geneva. Cooperation in Soviet-Americans communications for global meteorology was to be implemented by the two countries's sharing costs equally, each supporting the program in alternate months; a bilaterally financed communications link between Moscow and Washington was to be established solely for the purpose of exchanging cloud pictures. In addition, Dryden announced, the Soviets had proposed cooperation in biology and medicine.

June 16: House Subcommittee on NASA Oversight of the House Committee on Science and Astronautics issued a report on its hearings on the repeated failures in the Ranger program. The committee concluded that NASA provided too little direction on Ranger, while JPL was too resistant to following NASA orders. The committee recommended that a general manager with industrial experience be appointed as deputy to JPL director to be in charge of Ranger program and similar complicated projects, and also that JPL should do the work of a center rather than that of an industrial contractor.

June 22: Senate passed NASA FY 1965 authorization, totaling $5,246,293,250. This included restoration of $52,482,750 of the $110,189,500 cut by the House from NASA request.

June 25: Maj. Robert Rushworth (USAF) flew X-15 (No. 2) to 83,000-ft. altitude and 2,966-mph speed (mach 4.49). This was first flight of the rebuilt No. 2 aircraft, and performance was successful.

June 29: George Friedl, Jr. was appointed NASA Deputy Associate Administrator for Industry Affairs, succeeding Earl D. Hilburn, who was recently named Deputy Associate Administrator. Friedl had been a management consultant in Santa Anna, Calif.

June 30: Atlas-Centaur (AC-3) was launched from ETR in partially successful development test. The Centaur stage's two RL-10A3 liquid-hydrogen engines cut off prematurely after successful ignition, so that orbit was not achieved, though 5 of 6 test objectives were achieved.

July 1: Dr. Hugh L. Dryden, NASA Deputy Administrator, received the AIAA premiere award, the Louis W. Hill Award for 1964, for the Outstanding Contribution to Space Transportation.

July 2: House adopted by voice vote the conference report on NASA FY 1965 authorization bill and sent the bill to the Senate. The bill provided a NASA authorization of $5,227,506,000. The bill was also passed by the Senate, clearing it for the President's signature.

July 8: X-15 (No. 3), piloted by Capt. Joe Engle (USAF), flew 3,511 mph (mach 4.94) and gained altitude of 170,000 ft. in first test of infrared horizon scanner designed to give sharper outline of earth to astronauts reentering the earth's atmosphere.

July 14-15: NASA's Wallops Station launched seven scientific experiments in a period of less than 10 hours. All were carried aloft by Nike-Apache rockets. Four were sodium vapor experiments; the remaining three were ionosphere experiments.

July 15: NASA announced that it had selected 22 scientific experiments for the fifth Orbiting Geophysical Observatory (Ogo-E) scheduled for launch in 1966. 54 scientists from four countries (U.S., U.K., France, and the Netherlands) designed the experiments.

July 20: Space flight of NASA's Sert I (Space Electric Rocket Test) spacecraft marked first successful operation in space of an electric rocket engine. The experiment, launched aboard a Scout booster from Wallops Station, Va., was designed to verify that electrostatic (ion) engines could produce thrust in space; all technical objectives were achieved.

. NASA Administrator James E. Webb reported to the President that NASA had accomplished cost reductions totaling $128,783,000 in FY 1964. This greatly exceeded the agency's target of $81,780,000.

July 21: NASA invited scientists to propose research experiments and studies for manned and unmanned space flights during the last half of the 1960's. The request, aimed at scientists both in the U.S. and abroad, gave the world scientific community detailed descriptions and timetables covering a wide range of space research opportunities, including placing scientific experiments in available space on Gemini and Apollo manned flights, weather satellites, sounding rockets, the X-15 research plane, orbiting observatory satellites, and balloons.

July 22: NASA and ESRO announced signing Memorandum of Understanding for project involving two scientific satellites. Under the agreement, NASA would launch into orbit two satellites, Esro 1 and Esro 2, for the nine-nation West European organization. Launches were tentatively scheduled during 1967 from the Western Test Range.

July 27: NASA announced mocifications to X-15 (No. 1) rocket-powered aircraft that would enable it to carry on scientific experiments much above the earth's atmosphere. The aircraft would have new inertial guidance system and streamlined compartments for experiments at each wing tip.

July 28: NASA's RANGER VII spacecraft was launched from Cape Kennedy on its flight to the moon.

July 31: RANGER VII successfully completed its mission of taking and relaying to earth close-up pictures of the lunar surface. The spacecraft sent back 4,316 high-quality photographs of the moon before it crashed on the surface of the moon. All six cameras aboard the spacecraft worked properly, sending back photographs of the moon that improved the resolution of lunar detail as seen with earth telescopes by a factor of 2,000.

August 1: After receiving a briefing by Ranger project scientists, President Johnson said: "I want to say that all Americans are very proud of you today. We are proud of this historic extension of man's knowledge. We are proud of our scientists, our engineers and all the great team under the leadership of one of the greatest of all Americans, Jim Webb, who are responsible for this success. We can be duly proud of our free and open society, our system of government."

. Two foreign political leaders congratulated the U.S. on the Ranger success. Chancellor Ludwig Erhard of West Germany said in a telegram to President Johnson: "We are happy with the American people over this tremendous technical and scientific achievement." President of Mexico Adolfo Lopez Mateos issued a statement saying that RANGER VII was "without doubt, up to the present moment, the most brilliant page registered in the scientific history of modern times."

August 3: NASA announced Col. Lawrence W. Vogel (U.S. Army) replaced Col. R. P. Young as NASA Executive Officer. Col. Vogel was detailed to NASA from the U.S. Army Corps of Engineers.

August 4: NASA announced appointment of Dr. Albert J. Kelley, Director of Electronics and Control Div. of NASA OART, as Deputy Director of the new NASA Electronics Center in Boston.

August 6: Nike-Cajun sounding rocket with upper atmosphere grenade experiment was launched from Wallops Island. The experiment was coordinated with a similar grenade shot from Sweden's Kronogård Range, and with another experiment launched there on a Nike-Apache rocket to measure noctilucent clouds. These launchings marked beginning of third series of grenade experiments conducted by NASA GSFC from Wallops Island, Fort Churchill Research Range, and Ascension Island, with Sweden joining the group for this series.

August 12: Fourth birthday of ECHO I passive communications satellite, still visibly orbiting the earth.

August 13: House passed Independent Offices Appropriation bill with $5,250,000,000 appropriation for NASA.

August 14: Senate passed Independent Offices Authorization bill with NASA appropriation of $5,250,000,000.

August 16: President Johnson announced that he was sending a set of lunar photographs taken by RANGER VII to leaders of 110 nations. "The success of the Ranger 7 exploration has been greeted with enthusiasm and interest around the world. Men of all nations recognize this is one of the greatest extensions of human knowledge about the lunar surface to occur in many centuries."

August 17: Lightning damaged certain electrical systems in Titan II launch vehicle and ground checkout equipment at Cape Kennedy, where the booster rocket was being prepared for launching of unmanned Gemini spacecraft (GT-2). "The over-all effect of this condition may result in a delay of the first manned flight (GT-3) into next year" NASA spokesman was reported to have said.

August 18: NASA launched a reentry heating experiment aboard a Scout booster from Wallops Island, Va., in a test of low-density charring ablator materials' ability to withstand intense heat during spacecraft reentry into earth's atmosphere.

August 19-20: Syncom 3 communications satellite was launched from Cape Kennedy aboard a Thrust-Augmented Delta (TAD) booster. The satellite was injected into a transfer orbit, from which it was to be boosted into its synchronous orbit. On August 20, the rocket aboard the satellite was fired to move the satellite out of its elliptical transfer orbit and place it in a stationary orbit 22,300 mi. above the equator. During the following days, small gas jets were fired to move the satellite to a station east of the Gilbert Islands in the Pacific where it would be in a

August 19-20 (Continued)
position to relay Olympic Game telecasts from Japan to North America in October.

August 20: NASA Administrator James E. Webb informed Mayor Edward A. Crane of Cambridge, Mass., that a 29-acre site offered by Cambridge had been selected for NASA's new Electronics Research Center.

August 21: NASA announced revision of its patent policy and regulations for waivers of commercial rights to inventions resulting from space program work, effective Sept. 28. Revised patent waiver and related procurement regulations implemented Presidential patent policy statement of last October which established guidelines for a more unified approach among federal agencies.

August 24: NASA announced that it would purchase 102 additional J-2 rocket engines for the Saturn IB and Saturn V launch vehicle programs. Cost of the rockets, to be purchased from Rocketdyne Division of North American Aviation, Inc., Canoga Park, Calif., would be about $165 million.

August 25: NASA EXPLORER XX scientific satellite was launched into orbit from Western Test Range with Scout booster rocket. The Ionosphere Explorer satellite immediately began mapping the ionosphere and sending back data to earth.

August 28: The advanced meteorological satellite NIMBUS I was placed into orbit by a Thor-Agena booster fired from Vandenberg AFB. Premature shut-down by the Agena upper stage put the satellite into an elliptical orbit. But NIMBUS I began almost immediately to send back cloud-cover pictures which were described as "remarkably clear" by Dr. Morris Tepper, Director of Meteorological Satellite Programs for NASA.

. NASA released 200 more lunar photographs taken by RANGER VII and announced refined data on the historic flight. RANGER VII impacted on the moon within 19 sec. of the planned flight time and 6 mi. of the planned target. The photographs resolved objects down to 10-15 inches, and the resolution was considered 1,000 times better than that of the very best earth-based observation and 5,000 times better than routine earth-based observation.

August 30: FY 1965 Independent Offices Appropriation Bill, including $5.250 billion appropriation for NASA, was signed into law by President Johnson. In statement on the effect of this reduced amount on attaining goal of landing a man on the moon in this decade, NASA Administrator James E. Webb said: "The target date is only five years away. Our assurance that it can be met is less than under President Johnson's budget, but we still hope that with hard work, dedication, continued successes, and continued support we can meet it. We are going to make a hard try...."

September 1: NASA Electronics Research Center was formally activated in Cambridge, Mass., and Dr. Winton E. Kock took the oath of office as Director. Franklyn W. Phillips was named Assistant Director for Administrative Operations at the new Electronics Research Center. Phillips had been serving as Director of the NASA North Eastern Office, which would be absorbed within the Electronics Center.

. General William F. McKee (USAF-Ret.), former Vice Chief of Staff of the U.S. Air Force, was sworn in as Assistant Administrator for Management Development of NASA.

. NASA Marshall Space Flight Center's Michoud Operations began mass movement of some 5,000 contractor personnel into Michoud's new Engineer and Office Building and existing administration and engineering buildings.

September 4: OGO I satellite (Orbiting Geophysical Observatory) was launched into orbit by an Atlas-Agena B rocket booster from Cape Kennedy into highly elliptical orbit. The huge satellite contained 20 onboard experiments, inaugurating new "space bus" series of standardized observatories in space. Two of its antenna booms failed to deploy, preventing the satellite from locking onto the earth and thus traveling without spinning. By Sept. 7 scientists reported successful operation of 14 of the experiments.

. NASA announced signing nine-month extension of Project Apollo spacecraft contract with North American Aviation's Space and Information Div. The $496-million contract extension called for five additional Apollo command and service modules, ~~One~~ three additional flight boilerplate spacecraft, one more full-scale mockup, plus building nine adapters to house Apollo Lems aboard Saturn V launch vehicles.

September 11: SYNCOM III communications satellite was halted in position over the Equator and the International Date Line.

September 15: President Johnson said at John F. Kennedy Space Center, NASA: "As long as I am permitted to lead this country, I will never accept a place second to any nation in /space/.... We cannot be second in space and first in the world."

September 18: Saturn SA-7 launched from Cape Kennedy in successful flight test, orbiting boilerplate Apollo spacecraft command and service modules.

September 23: NIMBUS I meteorological satellite stopped operating, after 380 orbits, having produced more than 27,000 remarkably sharp weather photos, including the first nighttime cloud-cover pictures from a satellite.

In its sixth year of space operations, NASA launched 22 major flights, of which 19 were orbital and deep space flights. Of these 19, 15 were successful, 3 partially successful, and 1 unsuccessful. The X-15 rocket research aircraft continued the follow-on flights involving space research and conducted checkout flights of the rebuilt, uprated No. 2 aircraft. The manned space flight program moved out of the design and construction stage toward manned flight with the orbital flight testing of boilerplate versions of both the Gemini and Apollo spacecraft. Among the successful flights were 5 scientific satellites, 3 communications satellites, and two weather satellites. One of the communications satellites was the first to achieve true synchronous orbit; the second of the weather satellites marked the beginning of the advanced Nimbus series. Perseverance paid off in the scientific lunar probe series as RANGER VI scored a guidance triumph by crashing on the moon 20 miles from its target, and RANGER VII was both a guidance and payload success, transmitting 4,300 close-up photos of the moon back to earth.

In its six years of space operations, NASA launched a total of 87 orbital, deep space, and manned space flights, of which 54 were successful, 12 partially successful, and 21 unsuccessful, for an overall average of almost 3 successes for every failure. The rate of improvement ranged from 1 success per failure in 1958-59 and 1959-60, to 2 to 1 in 1960-61, to 5 to 1 in 1961-62, to 12 to 1 in 1962-63, to 16 to 1 in 1963-64.