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House Report No. 2710

THE UNITED STATES AND OUTER SPACE

(Final) REPORT

OF THE
SELECT COMMITTEE

McCormack
Committee

ON
ASTRONAUTICS AND SPACE EXPLORATION



Missile + Spad
Chronology

Oct 1957
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**SELECT COMMITTEE ON ASTRONAUTICS AND SPACE
EXPLORATION**

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LETTER OF TRANSMITTAL

**HOUSE OF REPRESENTATIVES,
Washington, D. C., January 3, 1959.**

**HON. SAM RAYBURN,
Speaker of the House of Representatives,
Washington, D. C.**

DEAR MR. SPEAKER: By direction of the Select Committee on Astronautics and Space Exploration, I submit herewith the committee's final report to the 85th Congress.

This letter would not be complete without reference to the dedication shown by every member of the committee in extensive and continuing participation in all the activities undertaken by the committee in pursuit of its duties. The spirit of complete cooperation and unanimity in so serious and so new a matter as space development is almost without parallel. I express my heartfelt thanks for what they have done, and for the helpful and loyal service to all of us rendered by the staff.

**JOHN W. MCCORMACK,
Chairman.**

**PERMANENT ASSIGNMENTS OF MEMBERS OF THE SELECT
COMMITTEE ON ASTRONAUTICS AND SPACE EXPLORA-
TION**

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|---|--|
| JOHN W. MCCORMACK, Chairman | Majority leader. |
| OVINGTON BROOKS | Committee on Government Operations. Committee on Armed Services. |
| BROOKS HAYS | Committee on Government Operations. |
| LEO W. O'BRIEN | Joint Committee on Smithsonian Institution Museum of History and Technology Building. |
| LEE METCALF | Committee on Foreign Affairs. Committee on Interior and Insular Affairs. Committee on Interstate and Foreign Commerce. |
| WILLIAM H. NATHAN | Committee on Education and Labor. |
| B. F. SISK | Committee on Interior and Insular Affairs. |
| JOSEPH W. MARTIN, Jr., Vice Chairman | Committee on Appropriations. |
| LESLIE C. ABERNETHY | Committee on Interior and Insular Affairs. Committee on Veterans' Affairs. |
| GORDON L. McDONOUGH | Minority floor leader. Minority whip. |
| JAMES G. FULTON | Committee on Armed Services. |
| KENNETH B. KEATING | Committee on Banking and Currency. Joint Committee on Defense Production. |
| GERALD R. FORD | Committee on Foreign Affairs. Committee on the Judiciary. Joint Committee on Immigration and Nationality Policy. Committee on Appropriations. |

APPENDIX

CHRONOLOGY

The report of this committee entitled *The National Space Program* (H. Rept. No. 1758, May 21, 1958) contained a chronology running from 1948 to mid-May 1958. The notes which follow are somewhat similarly arranged, and cover the time from October 1957 through December 1958.

1957

- October 4:** The Soviet Union launched the first Earth satellite, Sputnik I. Spherical in shape, it weighed 184 pounds and was 23.8 inches in diameter. Four whip antennas 7 feet 10.5 inches to 9 feet 6 inches in length protruded from the satellite skin which was constructed of aluminum alloys. The satellite carried instruments (their weight was not announced) to measure internal temperatures, pressures "and other data." Two radio transmitters, radiating on frequencies of 20.005 and 40.002 megacycles, were carried; both ceased operating on October 27, 1957. The radios were powered by chemical batteries. The satellite's initial perigee was 148 miles, its apogee 588 miles, and its period 96.17 minutes. It was launched with an inclination to the Equator of 64.8°. The satellite's perigee speed was about 18,000 miles per hour; its speed at apogee was about 16,900 miles per hour. The satellite reentered the atmosphere and presumably disintegrated on January 4, 1958.
- October 5:** Resolutions of an international conference on rockets and satellites provided for continuation of internationally coordinated research in these fields beyond the International Geophysical Year. Both American and Russian scientists were present at the conference.
- October 9:** President Eisenhower in a White House press release congratulated the Soviet scientists on Sputnik I. He gave a brief history of the development of the United States satellite program and pointed to the separation of Project Vanguard from work on ballistic missiles.
- October 13:** Aviation Week reported that Lockheed has been working since 1956 on a project called Pied Piper, or unofficially Big Brother. The report was officially denied. The magazine said the satellite would have television or regular photographic capabilities, and use infrared and radar scanners. Orbits would lie between 300 and 1000 miles.
- October 14:** The American Rocket Society presented to President Eisenhower a program for outer space development formulated after months of study. It proposed establishment of an Astronautical Research and Development Agency similar to the National Advisory Committee for Aeronautics and the Atomic Energy Commission, which would have responsibility for all space

projects except those directly related to the military. The report contained a schedule of proposed space projects and pointed out the benefits which would accrue from them. The annual budget of the agency was estimated at \$100 million.

- October 16:** The United States Air Force fired an Aerobee rocket at Holloman Air Force Base fitted with three shaped charges in the nose. At 95 miles, these were fired, and it is believed that they sent small pellets of a few grams each at speeds sufficiently high that at least two attained escape velocity and left the Earth. Measurements were made by photographing the meteorlike trail.
- October 21:** Aviation Week revealed that the United States had been monitoring Soviet ballistic missile launchings for over 2 years from a large radar installation near Samsun, Turkey.
- October 28:** The United States Air Force, as part of Project Farside, launched a sounding rocket from a balloon 100,000 feet over Eniwetok in mid-Pacific. A four-stage rocket of 1,900 pounds was used. Although the attained altitude was first reported as 4,000 miles, this was in doubt, as contact by radio was lost, and the altitude attained may have been about 2,500 miles.
- November 3:** Sputnik II, carrying a dog, Laika, was launched by the Soviet Union. According to the Tass announcements, the "containers with apparatus" of this rocket-shaped satellite weighed 1,190 pounds, and it contained "instruments for studying solar radiation in the short wave ultraviolet and X-ray regions of the spectrum, instruments for cosmic ray studies, instruments for studying the temperature and pressure, an airtight container with an experimental animal (a dog), an air conditioning system, food and instruments for studying life processes in the conditions of cosmic space, measuring instruments for transmitting the results of scientific measurements to the Earth, two radio transmitters operating on frequencies of 20,008 and 40,008 megacycles, both of which ceased operating on November 10, 1957. The radios were powered by chemical batteries. The satellite's initial perigee was 140 miles, its apogee 1,088 miles, and its period 108.75 minutes. Its inclination to the Equator when launched was 68.4°. Its perigee speed was 18,000 miles per hour; its apogee speed 15,100 miles per hour. The satellite reentered the atmosphere and presumably disintegrated on April 18, 1958.
- November 7:** President Eisenhower in a radio and television address on science and security announced that scientists had solved the problem of re-entry and showed the nose cone of a missile which was intact after a flight through outer space. He announced the creation of the office of Special Assistant to the President for Science and Technology and the appointment of Dr. James R. Killian, president of the Massachusetts Institute of Technology to the new post.
- November 8:** Secretary of Defense McElroy directed the Department of the Army to make preparations for launching a satellite with the Jupiter-C test rocket and thus supplement the existing Vanguard program. William M. Holaday, Assistant to the Secretary of Defense for Guided Missiles, was given authority for coordinating this project with the overall satellite program.

November 12: President Eisenhower, in a speech on future security, proposed adoption of a formula for decisions on undertaking space projects, which would include the following criteria:

"If the project is designed solely for scientific purposes, its size and its cost must be tailored to the scientific job it is going to do."

"If the project has some ultimate defense value, its urgency for this purpose is to be judged in comparison with the probable value of competing defense projects."

November 15: William M. Holaday, special assistant to the Secretary of Defense, was named Director of Guided Missiles by Secretary of Defense McElroy. Under terms of the Defense Department directive: "The Director of Guided Missiles will direct all activities in the Department of Defense relating to research, development, engineering, production, and procurement of guided missiles." In his press conference Secretary McElroy disclosed that the Department of Defense was thinking of establishing a centralized organization which would handle both outer space and anti-missile-missile projects.

November 21: The Rocket and Satellite Research Panel proposed the creation of a National Space Establishment in the executive branch of the Government. Under civilian leadership but cognizant of defense requirements, this establishment would carry out a unified program of space research in its own facilities and by contract. An annual budget of \$1 billion for ten years was recommended.

The board of directors of the National Advisory Committee for Aeronautics authorized establishment of a special committee on space technology. This committee would both supervise and help formulate a space research program and would be assisted by specialized subcommittees.

November 25: The Preparedness Investigating Subcommittee of the Senate Committee on Armed Services began extensive hearings on the Nation's satellite and missile programs. Approximately 70 experts appeared before the Subcommittee during the course of these hearings, and written testimony was submitted by about 200 others.

December 4: The American Rocket Society's proposal for an Astronautical Research and Development Agency, which was presented to President Eisenhower on October 14, 1957, was announced. Commander Robert C. Truax, president of the Society, stated that he felt \$100,000,000 a year would be required at first for the astronautical agency.

December 5: The Advanced Research Projects Agency, ARPA, is to be created in the Department of Defense to direct Defense space projects.

December 6: A mechanical failure in the propulsion system of the Vanguard rocket, TV3, caused it to burst into flames two seconds after it was fired in an attempt by the Navy to launch a 6.4 inch, 3.25 pound, test satellite.

December 10: A Directorate of Astronautics was established by the Air Force to manage and coordinate astronautical research programs, including work on satellites and anti-missile weapons. Brig. Gen. Homer Boushey was named to head the board.

December 13: The order creating a Directorate of Astronautics was suspended by William H. Douglas, Secretary of the Air Force, as creation of such a group before establishment of the proposed Advanced Research Projects Agency was felt to be premature.

December 14: Maj. Gen. John B. Medaris, Commander of the Army Ballistic Missile Agency, in testifying before the Senate Preparedness Investigating Subcommittee stated: "Because I have no responsibility to carry this out, I think I can say in open meeting that it is my personal opinion unless this country can command 1 million pounds of thrust by 1961, we will not be in space . . . we will not be in the race."

December 24: The Soviet Union reported that a dog, Albina, had twice ridden in rockets, most recently parachuting safely after an ascent to 135 miles.

1958

January 4: Sputnik I disintegrated.

The American Rocket Society and the Rocket and Satellite Research Panel issued a summary of their proposals for a National Space Establishment. Preferably independent of the Department of Defense, but in any event not under one of the military services, this establishment would be responsible for the "broad cultural, scientific, and commercial objectives" of outer space development. A timetable of the achievements necessary for attaining United States leadership in space technology was included in the document.

January 8: In his State of the Union Message, President Eisenhower reported: "In recognition of the need for single control in some of our most advanced development projects, the Secretary of Defense has already decided to concentrate into one organization all antinuclear and satellite technology undertaken within the Department of Defense."

January 19: President Eisenhower, in answering the December 10, 1957, letter of Soviet Premier Nikolai A. Bulganin regarding a summit conference and disarmament, proposed that the Soviet Union and the United States "agree that outer space should be used only for peaceful purposes." This proposal was compared with the 1948 offer of the United States to cease production of nuclear weapons and dedicate atomic energy to peaceful uses, an offer which was not accepted by the Soviet Union.

James H. Doolittle, chairman of the National Advisory Committee for Aeronautics, announced the authorization of a special committee on space technology on November 21, 1957. Dr. H. Guyford Stever was to head the committee.

January 18: In his Budget Message to Congress, President Eisenhower stated that in his request: "Funds are provided for an expanded research and development effort on military satellites and other outer space vehicles and on antinuclear missile systems, to be carried out directly under the Secretary of Defense." The budget for fiscal year 1959 showed that \$240,000,000 in new obligatory authority was being asked for the Advanced Research Projects Agency. No new authorizations were sought for the International Geophysical Year, but estimated obligations for

earth satellite exploration of the upper atmosphere under this program were \$8,130,884 for the fiscal year 1958 and \$21,000,000 for fiscal year 1959.

Secretary of Defense Neil H. McElroy, in testifying before the House Armed Services Committee, stated:

"Such long-range programs as the antimissile missile and the military satellite programs are in the research and exploratory development stages. They are important and must be pursued, but they must not distract us from the speedy development of our other missile systems. To handle them, I am establishing within the Department of Defense an Advanced Research Projects Agency, which will be responsible to the Secretary of Defense for the unified direction and management of the antimissile missile program and for outer space projects. I would expect to assign other special projects of this general nature to this agency from time to time in the future."

January 14: Censored Air Force testimony made public that a reconnaissance satellite with a recoverable capsule was expected to be launched in the spring of 1959, with a Thor-launched test vehicle by October 1958. Purposes of the capsule were not officially revealed.

Senator Lyndon B. Johnson in an address before Columbia Broadcasting System affiliates in Washington, D. C., urged the United States "to demonstrate its initiative before the United Nations by inviting all member nations to join in this adventure into outer space together." Growth of America's space research program and establishment of a government agency for its direction were also demanded by Johnson as part of the Nation's answer to the Soviet challenge.

January 16: Representative Carl T. Durham, chairman of the Joint Committee on Atomic Energy, announced the establishment of a Special Subcommittee on Outer Space Propulsion with Senator Clinton P. Anderson as chairman.

January 22: Nikita S. Khrushchev in a speech at Minsk, Byelorussia, stated that the Eisenhower proposal to dedicate outer space to peaceful purposes was an attempt of the United States to ban weapons it did not possess and to protect itself from those weapons which would harm its own territory.

January 23: Membership of the Special Subcommittee on Outer Space Propulsion of the Joint Committee on Atomic Energy was announced:

Senators: Clinton P. Anderson, chairman, Henry M. Jackson, Albert Gore, Bourke B. Hickenlooper, John W. Bricker.

Representatives: Chet Holifield, Melvin Price, James E. Van Zandt, James T. Patterson.

Senator Clinton P. Anderson in a speech before Congress explaining his bill, S. 3117, proposed that control of the Nation's outer space program for the "peaceful conquest of space" be given to the Atomic Energy Commission. He stressed that such a decision would save needed time and would give control to an established civilian agency with extensive laboratories. Senator Anderson pointed out that nuclear propulsion should play an essential part in space technology.

— Senator Lyndon B. Johnson read a statement unanimously adopted by the Senate Preparedness Investigating Subcommittee at the conclusion of its hearings. Largely concerned with guided-missile development, it stated that the Russian satellite program "demonstrates beyond question that the Soviet Union has the propulsive force to hurl a missile from one continent to another." The American program since the launching of Sputnik I was reviewed, and the report made 17 recommendations for American security, including:

"Start work at once on the development of a rocket motor with a million-pound thrust."

"Accelerate and expand research and development programs, provide funding on a long-term basis, and improve control and administration within the Department of Defense or through the establishment of an independent agency."

January 27: Hugh L. Dryden, Director of the National Advisory Committee for Aeronautics, delivered a speech, Space Technology and the NACA, to the Institute of the Aeronautical Sciences. Stressing the importance of a well-planned and logical space program embracing both civilian and military uses, Dryden pointed to the organization of the NACA for both military and nonmilitary aeronautical research and reviewed the Committee's work in space research since World War II. He related the view expressed by the NACA at its January 16, 1958, meeting that the national space program should be under the joint control of the Department of Defense, the NACA, the National Academy of Sciences, and the National Science Foundation; in addition to research flights, the NACA would "coordinate and conduct research in space technology in its own laboratories and by contract in support of both military and nonmilitary projects."

January 31: The first American satellite, Explorer I, was launched under the IGY program. The launching of these and succeeding Explorer satellites was accomplished by the Army Ballistic Missile Agency and the Jet Propulsion Laboratory of the California Institute of Technology. Cylindrical in shape, the satellite was 80 inches long, 6 inches in diameter, and weighed 30.8 pounds. It was constructed of steel, with eight aluminum oxide stripes painted on its surface to control temperatures. The satellite had 2 antennas: A turnstile type with 4 whip elements each 22.5 inches long and a dipole antenna using the skin of the satellite itself. Instrumentation weighing 10.63 pounds was designed to measure cosmic rays, micrometeors, and temperatures within and on the skin of the satellite. One radio transmitter, operating on a frequency of 108 megacycles at 10 milliwatts of power, telemetered data on cosmic rays, micrometeor erosion, and front-skin and nose-cone temperatures. The second radio transmitter, operating on a frequency of 108.03 megacycles at 60 milliwatts of power, telemetered data on cosmic rays, micrometeor impact, and internal and rear-skin temperatures. The low-power transmitter ceased operating on May 23, 1958. The high-power transmitter first stopped transmitting on February 11, 1958; it began again on February 24, and ceased operating finally on February 28, 1958. The radios were powered by mercury batteries. The satellite's initial perigee was 224 miles, its apogee 1,573 miles, its period 114.8

- minutes. It was launched at an inclination to the Equator of 33.5°. Its perigee speed was 18,400, its apogee speed 13,700 miles per hour. The satellite is still in orbit, and is expected to remain there for from 3 to 5 years.
- February 1: The Army has proposed a plan for a 500-pound reconnaissance satellite.
- February 2: Senator Jackson predicted the United States could launch a Moon rocket with just a few months' preparation.
- February 3: The Army reconnaissance plan might run as high as 700 pounds, for a television carrying unit to be launched late in 1968, based on the Jupiter C launching device.
- Soviet Premier Nikolai A. Bulganin in a letter to President Eisenhower stated that the Soviet Union "is ready to examine also the question of the intercontinental rockets if the Western Powers are willing to reach agreement to ban atomic and hydrogen weapons, to end tests thereof, and to liquidate foreign military bases in other nations' territories. In that case, an agreement on the use of outer space for peaceful purposes only would unquestionably meet no difficulties."
- Scientists at the California Institute of Technology reported that initial data from Explorer I showed that cosmic radiation on its orbit did not exceed 13 times the amount on earth and thus appeared to pose no great threat to travel in this region. In addition, no positive evidence of encounter with meteoritic particles had been found.
- February 4: Republican Congressional leaders were informed that President Eisenhower had directed James R. Killian, Jr., to study and make recommendations on the governmental organization of the Nation's space and missile program.
- February 5: The second trial firing of a Vanguard test satellite failed as defects in the first-stage engine control system caused the rocket to veer to the right and break in two about 60 seconds after launching, 4 miles up. The rocket was destroyed by the range safety officer at the Air Force Missile Test Center, Cape Canaveral, Fla. The satellite weighed 3.25 pounds, was 6.4 inches in diameter. The payload included yeast.
- February 6: The Senate passed S. Res. 253 by a vote of 78 to 1, creating a Special Committee on Space and Astronautics to frame legislation for a national program of space exploration and development.
- February 7: The Advanced Research Projects Agency was established by the Department of Defense, and Roy W. Johnson, a vice president of General Electric Co., was appointed by Secretary of Defense McElroy as its director. ARPA was placed in charge of the Nation's outer space program including the development of military space weapons and was made responsible for antimissile missile projects. William H. Holaday, Director of Guided Missiles, was to transfer responsibilities in these fields to Mr. Johnson.
- February 10: The following Senators were named to the Senate Special Committee on Space and Astronautics: Lyndon B. Johnson, Styles Bridges, Richard B. Russell, Leverett Saltonstall, Clinton P. Anderson, Bourke B. Hickenlooper, Theodore Francis Green, Alexander Wiley, John L. McClellan, Karl E. Mundt, Warren G. Magnuson, John W. Bricker, Stuart Symington.

— Senator Michael J. Mansfield urged the members of the North Atlantic Treaty Organization to take the initiative in exploring space on a cooperative basis. Other nations who wished "to participate in good faith" would be included in this international undertaking. Senator Mansfield also recommended that the United States should propose extending the International Geophysical Year "into a decade of worldwide scientific cooperation."

February 11: The Supplemental Defense Appropriation Act, 1958, stated: "The Secretary of Defense is authorized to transfer not exceeding \$10,000,000, to remain available until expended, from any appropriations available to the Department of Defense for the current fiscal year for such advanced research projects as he may designate and determine. * * *". It was provided that current fiscal year appropriations for related programs might be transferred to and merged with this appropriation, and that amounts of this appropriation might be transferred to other appropriations for advanced research under the Department of Defense.

February 12: Public Law 325 gave the Department of Defense authority to participate in advanced research projects, including space projects. Section 7 read in part:

"The Secretary of Defense or his designee is authorized to engage in such advanced projects essential to the Defense Department's responsibilities in the field of basic and applied research and development which pertain to weapons systems and military requirements as the Secretary of Defense may determine after consultation with the Joint Chiefs of Staff; and for a period of one year from the effective date of this Act, the Secretary of Defense or his designee is further authorized to engage in such advanced space projects as may be designated by the President."

February 13: The National Society of Professional Engineers proposed establishment of a Federal Space Exploration Commission to undertake and have unified responsibility for a program of space exploration. The commissioners would be appointed by the President, and the civilian commission "would be able to give the military services adequate opportunity for rocket and missile development—as consistent with the defining of service roles at the highest policy level."

February 14: Basic Objectives of a Continuing Program of Scientific Research in Outer Space, a report by the Technical Panel on the Earth Satellite Program of the United States National Committee for the International Geophysical Year was published. The report proposed a program of space research extending beyond the International Geophysical Year. It outlined the technical investigations which should be made by sounding rockets, lightweight and advanced satellites, lunar probes, planetary and interplanetary research, and manned space flight, and gave a detailed description of the scientific information which could be gained from these experiments.

February 16: Airman Donald G. Farrell completed a week's isolation in a sealed space cabin at Randolph Air Force Base in an experiment testing atmospheric equipment for space flight on a simulated trip to the Moon, and the effects of this artificial environ-

ment on man's working ability. The small cabin was comparable in dimensions and equipment to what might go into a future spaceship. Air and liquids were recycled to simulate an actual space flight. During the course of the week Farrell was given various tasks to perform, and emergencies to meet.

— Rocketdyne was assigned an Air Force study contract to develop a nuclear rocket.

February 17: In a letter to Soviet Premier Nikolai A. Bulganin, President Eisenhower repeated his plea for the dedication of outer space to peaceful uses. Denying that this proposal was intended "to gain strategic advantages for the United States," he stressed the urgency of dealing with outer space before its use for military purposes had, like nuclear weapons, advanced to the point where complete international control was almost impossible.

— Vice President Nixon asked that space development be put into civilian hands.

February 18: The Air Force expects to launch a 3,000-pound satellite by October 1968, based on the Atlas. This would be part of the Lockheed Pied Piper system. Photographic, television, and infrared scanning systems are under consideration.

February 20: Senator Lyndon B. Johnson was elected chairman of the Senate Special Committee on Space and Astronautics.

February 21: According to the Soviet Geophysical Year Committee, the Russians fired to a 294-mile altitude a rocket containing 1 1/4 tons of instruments for measuring the ion composition of the atmosphere, electronic temperature, air pressure, encounters with micrometeorite particles, the ultraviolet sector of the spectrum, and the concentrations of free electrons in the ionosphere and of positive ions.

February 25: Lieutenant General Putt requested permission to send a rocket to the Moon, to get there ahead of the Soviets.

February 27: The Air Force announced that plans were well advanced for a reconnaissance satellite weighing in excess of 1,300 pounds.

March 5: Pentagon sources expected the Army would be given a Moon assignment while the Air Force concentrated on manned vehicles.

— Explorer II was launched but did not go into orbit because of failure of the final rocket to ignite. Unable to achieve the required velocity, it re-entered the atmosphere and was probably burned up before falling into the Atlantic Ocean 1900 miles southeast near Trinidad. The satellite weighed 31 pounds, was 80 inches long.

— H. Res. 496, passed by the House of Representatives, established a Select Committee on Astronautics and Space Exploration to investigate the problems of outer space and to submit recommendations for the control and development of astronomical resources. Congressmen appointed to the Committee were: Majority Leader John W. McCormack, chairman, Overton Brooks, Brooks Hays, Leo W. O'Brien, Lee Metcalf, William H. Natcher, B. F. Sisk, Minority Leader Joseph W. Martin, Jr., vice chairman, Leslie C. Arends, Gordon L. McDonough, James G. Fulton, Kenneth B. Keating, Gerald R. Ford, Jr.

— The following appointments to the Advanced Research Projects Agency were announced by the Department of Defense: Rear Admiral John E. Clark, USN, Deputy Director; Lawrence P.

- Giss, Director, Program Control and Administration; Lambert L. Lind, Special Assistant to the Director.
- March 7: George J. Feldman, New York attorney, was appointed director and chief counsel of the House Select Committee on Astronautics and Space Exploration.
- March 9: Harold E. Stassen, in an address on foreign policy, urged the United States "to express willingness to join in a United Nations Space Development Agency which would endeavor as a United Nations project to send the first man into space and to send the first inspection photographic satellite around the earth."
- March 14: General Medaris said that only the military services had the experience to run a successful space program.
- March 15: In a Foreign Ministry statement the Soviet Union proposed that banning the use of outer space for military purposes, as suggested by President Eisenhower, be coupled with the liquidation of foreign military bases on the territories of other countries, especially in Europe, the Middle East, and North Africa. An international program for space research would be established under the control of the United Nations and each country would pledge to launch rockets only under this program. A new United Nations agency for international cooperation in research on cosmic space would develop this space program, continue the International Geophysical Year research program on a permanent basis, and serve as a clearing house and coordinator for national research.
- March 16: Secretary of the Army Brucker said a rocket would be launched to the Moon "right soon," in a matter of a few months.
- March 17: Vanguard I, a test sphere weighing 3.95 pounds, was launched at Cape Canaveral as the second United States IGY satellite by the Naval Research Laboratory. Spherical in shape, the satellite is 6.4 inches in diameter and weighs 3.95 pounds. It was constructed of aluminum and has one turnstile antenna and one dipole antenna with a total of six 12-inch rod elements. Although the satellite is not actually instrumented, temperatures can be deduced from changes in its radio frequencies. Two radio transmitters are carried: one operated on a frequency of 103.00 megacycles at a power of 10 milliwatts; the other radiates at 103.08 at 5 milliwatts of power. The higher power transmitter, powered by mercury batteries, ceased operating on April 5, 1958. The lower power transmitter, powered by six groups of solar converters, may operate indefinitely. The satellite's initial perigee was 404 miles, its apogee 2,465 miles, its period 124.89 minutes. It was launched at an inclination to the equator of 34.95°. The satellite's perigee speed was 18,400 miles per hour; its apogee speed was 12,400 miles per hour. The satellite is still in orbit, and is expected to remain there for perhaps 900 years.
- An experiment testing the behavior of crews under conditions of long confinement was concluded at Wright Air Development Center, as 5 Air Force officers ended a 5-day simulated space flight.
- March 18: The Institute for Defense Analysis, a nonprofit corporation serving the Department of Defense, announced the formation of an Advanced Research Projects Division and the appointment of Dr. Herbert F. York as its head. In this capacity Dr.

- York would serve as Chief Scientist for the Defense Department's Advanced Research Projects Agency. He had been director of the University of California Radiation Laboratory at Livermore, California.
- March 19: The House of Representatives voted \$100,000 for expenses of its new space committee. (H. Res. 500, Report 1523.)
- March 21: Richard P. Hines was appointed clerk of the House Select Committee on Astronautics and Space Exploration.
- March 24: Senator Lyndon B. Johnson, chairman of the Senate Special Committee on Space and Astronautics, made the following staff appointments: Glen P. Wilson, coordinator of technical information; Eilene Galloway, special consultant.
- March 25: Senator Lyndon B. Johnson announced the following appointments to the Senate Special Committee on Space and Astronautics: Edwin L. Weial, consulting counsel; Cyrus R. Vance, consulting counsel; Homer Joe Stewart, scientific consultant.
- March 26: President Eisenhower in a brief statement made public the President's Science Advisory Committee's report, Introduction to Outer Space; an Explanatory Statement. This report set forth the basic factors making the advancement of space technology a national necessity and explained to the nontechnical reader the principles and potentialities of space travel. The many uses of space technology for scientific and military purposes were summarized, and a timetable for carrying out these objectives was included.
- Explorer III, the third United States IGY satellite, was launched by the Army. Cylindrical in shape, it was 80 inches long, 6 inches in diameter, and weighed 21.0 pounds. The satellite had two dipole antennas, using the skin of the satellite itself which was constructed of steel. Instrumentation weighing 10.83 pounds was designed to measure cosmic rays, employing a tape recorder feature; micrometeor erosion; and temperatures within and on the skin of the satellite. One radio transmitter, operating on a frequency of 108.00 megacycles at 10 milliwatts of power, telemetered data on all of the experiments; the other transmitter, radiating on a frequency of 108.03 at 60 milliwatts of power, telemetered data on cosmic rays only. The 108.00 transmitter first ceased operating on May 10, 1958; its beacon feature only functioned again from May 15 to June 16, 1958. The 108.03 transmitter first ceased operating on May 14, 1958; it responded again erratically from May 23 to June 5, 1958. Both transmitters were powered by mercury batteries. The satellite's initial perigee was 118 miles, its apogee 1,740 miles, and its period 115.9 minutes. It was launched at an inclination to the equator of 33.37°. Its perigee speed was 18,860 miles per hour, and its apogee speed was 12,450 miles per hour. It reentered the atmosphere sometime between June 27-29, 1958, and presumably disintegrated.
- March 27: President Eisenhower gave his approval to the plans for outer space exploration announced by Secretary of Defense Neil H. McElroy. The Advanced Research Projects Agency was to undertake several space projects including the launching of earth satellites and lunar probes. The Air Force Ballistic Missile Division was authorized by ARPA to carry out three lunar probes

with a Thor-Vanguard system, and one or two lunar probes utilizing the Jupiter-C rocket were assigned to the Army Ballistic Missile Agency. Eight million dollars is initially allocated. A mechanical ground scanning system for lunar investigations was to be developed by the Naval Ordnance Test Station, China Lake, Calif.

- Dr. Charles S. Sheldon II was named assistant director of the House Select Committee on Astronautics and Space Exploration.
- March 28: Some military leaders were said to think the probe plan was too limited in scope and imagination.
- March 31: General John B. Medaris was made head of the Army Ordnance Missile Command, with direct access to the Secretary and the Chief of Staff. General Toftoy is his deputy, and General John A. Barclay is the head of the Army Ballistic Missile Agency.
- April 2: President Eisenhower in a message to Congress proposed the establishment of a National Aeronautics and Space Agency into which the National Advisory Committee for Aeronautics would be absorbed. This agency was to have responsibility for civilian space science and aeronautical research. It would conduct research in these fields in its own facilities or by contract and would also perform military research required by the military departments. Interim projects pertaining to the civilian program which were under the direction of the Advanced Research Projects Agency would be transferred to the civilian space agency. A National Aeronautics and Space Board, appointed by the President and composed of eminent persons outside the Government and representatives of interested Government agencies (with at least one member from the Department of Defense), was to assist the President and the director of the National Aeronautics and Space Agency.
- The original budget request of \$340,000,000 in new obligational authority for the Advanced Research Projects Agency for fiscal year 1959 was raised to \$520,000,000 for advanced research projects in a letter from the Director of the Bureau of the Budget, Maurice H. Stans, which was transmitted to Congress by President Eisenhower.
- April 3: In a message to Congress on the organization of the Nation's Defense Establishment, President Eisenhower recommended creation of the position of Director of Defense Research and Engineering, which would have a higher rank and replace the present Assistant Secretary of Defense for Research and Engineering. Among his other responsibilities, the Director would supervise the research activities of the Advanced Research Projects Agency.
- April 5: S. Fred Singer, physics professor at the University of Maryland, was named head, scientific evaluation consultants of the House Select Committee on Astronautics and Space Exploration.
- April 13: Sputnik II plunged to earth.
- April 14: The proposal for a National Aeronautics and Space Agency drafted by the Bureau of the Budget was contained in the following congressional bills:
- S. 8606, Senator Lyndon B. Johnson and Senator Styles Bridges
- H. R. 11881, Representative John W. McCormack

H. R. 11882, Representative Leslie C. Arends
 H. R. 11887, Representative Harry G. Haskell, Jr.
 H. R. 11888, Representative Kenneth B. Keating
 H. R. 11946, Representative William H. Natcher
 H. R. 11961, Representative Peter Frelinghuysen, Jr.
 H. R. 11964, Representative James G. Fulton
 H. R. 11966, Representative Gordon L. McDonough

- April 15: The Select Committee on Astronautics and Space Exploration of the House of Representatives opened hearings on outer space as a step toward formulating a national space program. During the hearings, which continued for three weeks, military and scientific experts discussed the scientific development of outer space and offered recommendations on the establishment of a civilian space agency.
- April 17: Lieutenant General Gavin and Major General Medaris testified that appearance of a reconnaissance satellite over the United States should be treated as invasion, but urged the early development of a capability to operate such devices ourselves.
- Six Navy men began a 7-day simulated trip to the Moon in a compression chamber at the Philadelphia Naval Base. The experiment met expectations, and the men stepped out afterward alert and healthy.
- April 21: A naval flier began a 24-hour experiment wearing a space suit in a chamber evacuated to the equivalent of 80,000 feet altitude. He emerged tired but hungry.
- April 22: Hearings on proposed reorganization of the Department of Defense opened before the House Committee on Armed Services.
- Dr. Hugh Dryden testified that large aluminized balloons might be put in orbit around the Moon, after being carried to that vicinity in a small rocket, and then inflated.
- April 23: A Thor-Able test vehicle was launched at Cape Canaveral in a reentry test. The nose cone contained the mouse Mia I. The Vanguard second stage failed to fire, and the mouse and cone were not recovered, as the shot fell short of the 5,000-mile goal.
- April 24: Major General Schriever testified that Pied Piper has been assigned a priority equal to ballistic missiles.
- April 25: Spencer M. Berensford was appointed special counsel of the House Select Committee on Astronautics and Space Exploration.
- April 27: An article in Pravda on Soviet satellite findings reported that Laika's heartbeat had taken three times as long as expected to return to normal, once its acceleration due to the satellite's speed had ceased. Weightlessness affecting the nerve centers was suggested as the cause. The Soviet report disclosed that the density and temperature of the atmosphere at a given altitude were not uniform, and that cosmic ray intensity was 40 percent greater at 400 miles than at 135 miles. The article also contained information on the density of electrons and reported 1 mysterious 50-percent increase in radiation intensity.
- April 28: An instrumented Vanguard satellite was launched by the Navy at Cape Canaveral, but due to failure of the third-stage rocket, did not attain the speed required to orbit around the earth. It burned up on reentry 1,500 miles away. The satellite was 21.5

- pounds, 20 inches in diameter. Instruments were to record X-rays, temperatures, and meteor data. The fault was blamed on wiring.
- April 29:** General Doolittle opposed a Moon shot stunt of hitting the surface with a thermonuclear warhead.
- April —:** Maj. Gen. F. A. Bogart testified that by late fall the Air Force could launch 5 to 7 Moon rockets, with a 70 percent chance of success of impact for each one.
- May 1:** Scientific findings from the 2 Explorer satellites disclosed an unexpected band of high-intensity radiation extending from 600 miles above Earth to possibly an 8,000-mile altitude. The radiation, which was described by Dr. James A. Van Allen as "1,000 times as intense as could be attributed to cosmic rays," was believed to come from ionized gas; Dr. Van Allen felt lead shielding 1 millimeter thick would reduce this radiation about 90 percent. The Explorers also showed that the atmosphere at 290 miles was denser than predicted, that satellite temperatures would not be too great for humans, and that cosmic dust was only a small hazard to space travel. The radiation was totally unexpected, and raised many questions about manned flight into space because of the shielding which might be required. Future satellites will be instrumented to learn more of the characteristics of this band which were first reported from the original Explorer satellites.
- May 6:** The Senate Special Committee on Space and Astronautics opened hearings on the administration's proposal for a National Aeronautics and Space Agency.
- May —:** NACA shot a balloon to 50 miles, at Wallops Island. At that altitude, it was inflated. A 4-stage rocket launched the 9-pound balloon.
- May 12:** Scientists at an ICSU meeting in The Hague warned against any nuclear explosion on the surface of the Moon which would endanger later scientific measurements of its surface.
- May 13:** Majority Leader John W. McCormack introduced, at the direction of the House Space Committee, House Concurrent Resolution 396 calling for the peaceful use of space.
- May 14:** American scientists indicated in Washington that future Moon rockets would be sterilized to forestall any biological contamination of the Moon which would endanger later scientific studies of that body.
- May 15:** Sputnik III was launched by the Soviet Union. Conical in shape, it was reported to be 11 feet 9 inches long, 5 feet 8 inches wide at the base, and weighed 2,925 pounds. It had folded dipole and trailing rod antennas, and its shell composition was mainly of aluminum alloys. Instrumentation weighing 2,134 pounds was designed to measure atmospheric pressure and composition; concentration of positive ions; the satellite's electrical charge and the tension of the Earth's electrostatic field; tension of the Earth's magnetic field; intensity of the Sun's corpuscular radiation; composition and variations of primary cosmic radiation; distribution of photons and heavy nuclei in cosmic rays; and micrometeor and temperature measurements. The satellite carried 1 radio transmitter, powered by chemical and solar batteries, operating on a

- frequency of 20,005 megacycles; a second transmission at 40.01 megacycles is a harmonic of the first. The satellite's initial perigee was 180 miles, its apogee 1,167 miles, its period 106 minutes. It was launched with an inclination to the Equator of 85°. Its perigee speed was 18,337 miles per hour, its apogee speed 14,657 miles per hour. It is still in orbit.
- May 18: A Jupiter missile fired from Cape Canaveral traveled 1,800 miles, and for the first time a full-scale nose cone was recovered intact.
- May 21: The House Select Committee issued its first report to the House on "The National Space Program". (House Report No. 1755.)
- May 23: The House Foreign Affairs Committee approved House Concurrent Resolution 332 (revision of 326). (House Report 1769.)
- May 24: Capt. E. L. Breeding at Holloman Air Force Base withstood a gravity load of 83 g's for a small fraction of a second in the arresting of the rocket sled on which he was riding. He went into a state of shock, but recovered from this in about 10 minutes.
- The House select committee reported out a clean bill calling for the creation of a civilian space agency. (H. R. 12576, House Report 1770.)
- May 27: Vanguard II (SLV-1) launched at Cape Canaveral. Takeoff was normal, all stages fired. Satellite was 21.5 pounds, 90 inches diameter. Instruments included meteor detectors, solar radiation measurers, and thermometers. Incorrect angle carried it to 2,000 miles, then it burned on reentry between Antigua and Africa. Radio returned data.
- June 2: The House of Representatives adopted House Concurrent Resolution 332, the outer space peace resolution.
- The House of Representatives passed unanimously its Select Committee bill H. R. 12575 to create a civilian space agency.
- June 5: Dr. Walter Dornberger opposed any early rocket shot at the moon as a stunt, stating weapons development was more important.
- June 10: Lt. Gen. Samuel E. Anderson stated the Air Force would launch moon probes in August, September, and October. Air Force Secretary Douglas and ARPA Director Johnson denounced the report as unauthorized, premature, and inaccurate; suggested launching dates should be wholly disregarded.
- June 11: The Senate Special Committee on Space and Astronautics reported out S. 3609 as amended. (Senate Report 1701.)
- June 16: The Senate passed H. R. 12575 with the text of S. 3609, as amended, substituted for the House text, and the bill was sent to conference.
- June 22: Aviation Week in an article termed speculative by ARPA officials predicted that the first Pied Piper satellite would be launched from Camp Cooke, California, using the Thor at the end of 1958 or in early 1959. A variety of scanning instruments are to be used, and the vehicle is to be stabilized in orbit. It is called WS 117L.
- June 26: A Vanguard was launched at Cape Canaveral. Takeoff was normal, but second stage failed to fire. The satellite was 21.5