

SPACE

The Scramble into Space

Nations continue peppering outer space with satellites and probes, but all eyes are on the moon race in which Russia is taking the widest steps—Compiled by Walter Wingo

► TWO YEARS after President John F. Kennedy's call for "longer strides" in the space race, the United States still was running like a short-dash man compared to the long-distance pacing of the Soviet Union.

Americans took more steps in space in 1963—orbiting three times as many satellites as the Russians. But the long-lingering Soviets drew the most cheers.

Only a month after astronaut L. Gordon Cooper circled the globe 22 times—nearly quadrupling the previous American endurance record—the Soviet Union stole the thunder again.

Russian cosmonaut Valery F. Bykovsky orbited 81 times and Valentina V. Tereshkova, the first woman in space, 48 times. Upon landing, both began telling the world that the first humans to walk on the moon would be Russians.

Undaunted, the U.S. National Aeronautics and Space Administration pushed ahead full-speed with its own man-on-the-moon program, called Project Apollo.

NASA announced that the Cooper flight was the last of the Project Mercury series and that it was ready for the next rung on the moon ladder, the Gemini series.

The Gemini program is aimed at showing that two men can ride together in space and perform the complicated maneuvers required in the Apollo flight.

Amid this furious competition came a proposal that the two nations combine their talents and land both an American and a Russian at the same time. The proposal was made by President Kennedy in a speech before the United Nations.

Response to the idea was divided and little was done immediately by either country to follow it up.

As Project Apollo continued to grow, so did its critics. Several times in 1963 the President made public statements calling the enormous expenditure scientifically, economically and politically sound.

Despite the critics, there was little doubt that America already had geared itself for the scramble into space.

Billions of dollars went into constructing centers for space research and enticing top scientists to staff them. NASA had established a public relations program unrivaled in the history of the U.S. Government to sell the people on the benefits of the space program.

People of all lands already have reaped some benefits from the armada of American satellites sent up as aids in weather reporting, communications and navigation.

The highly successful Mariner probe sent back an abundance of information on our mysterious neighboring planet Venus. Future American probes promise to be even more rewarding.

Meanwhile, circling the globe are hosts of satellites nobody talks much about. These military devices used for spying and testing are launched freely from both sides of the Iron Curtain.

Even a partial listing of the satellites and probes sent into space since Oct. 7, 1957, when the Space Age opened, leaves little doubt that man is on his biggest, most challenging, maybe most expensive, adventure of all time.

See Front Cover

The cover picture shows some space vehicles already put into space and also some of the scientific satellites and probes built for launching by the United States. S-3 studies energetic particles; S-6, atmospheric structures; S-16, the sun; S-30, the ionosphere; P-14, the magnetic field, and P-21, the electron density profile. P-26 is a nuclear emulsion recovery vehicle.

For a space timetable for the future, see SNL, 84:314, Nov. 16, 1963.

1963 Space Calendar

The following are the principal satellites and probes launched in 1963 up to Nov. 21. *Indicates in orbit; **still transmitting in orbit. When available, orbital distances closest to (perigee) and farthest from (apogee) earth, moon or sun are shown in miles. The times represent the durations of the orbits. Unsuccessful launches in general are not listed. See end of list for notes on DISCOVERER and COSMOS satellites.

*SYNCOM I (U.S.) Feb. 14, 1963—Undetermined date. Radio contact with this communications satellite was lost about 20 seconds after the command was given to fire its apogee motor. On March 4, 1963, its orbit was confirmed photographically. 21,375-22,823 miles. 23 hours, 45 minutes.

*LUNIK IV (USSR) April 2, 1963—Permanent solar orbit. The probe passed the moon at a distance of 5,300 miles and produced experimental data to help solve technical problems of the moon's conquest. The instrument-crammed 3,130-pound research vehicle was five times heavier than its 1959 model predecessors. 55,800-434,000 miles.

*EXPLORER XVII (U.S.)—Launched April 2, 1963, this scientific satellite measured the density, composition, pressure and temperature of the earth's atmosphere at its various altitudes. 158-598 miles. 96 minutes.

**TELSTAR II (U.S.)—Launched May 7, 1963 with a functional life of about two years. Used in successful transmissions of black-and-white and color television (live and video tape) as well as voice messages between the United States, France and England. Owned by American Telephone and Telegraph Company and launched by NASA. 604-6,697 miles. 225 minutes.

FAITH 7 (Mercury-Atlas 9) (U.S.) May 15, 1963, 9:04 a.m. EDT—May 16, 1963, 7:24 p.m. EDT. With astronaut L. Gordon Cooper Jr. aboard, the spacecraft left the Atlantic Missile Range, orbited the earth 22 times and splashed down safely about 80 miles southeast of Midway. It was the final flight in Project Mercury. 100-166 miles. 88.7 minutes.

VOSTOK V (USSR) June 14, 1963-June 19, 1963. Lt. Col. Valery F. Bykovsky, 28-year-old cosmonaut, set a new space endurance record by orbiting the earth 81 times, covering two million miles in 119 hours, 6 minutes. 109-138 miles. 88.3 minutes.

VOSTOK VI (USSR) June 16, 1963-June 19, 1963. Valentina V. Tereshkova, 26, became the first woman in space, as she orbited the globe more than 48 times in 70 hours, 50 minutes. Her flight was believed to be an unsuccessful attempt to link up with Vostok V. Like Col. Bykovsky, she parachuted safely to earth. 113.7-144.8 miles. 88.4 minutes.

**TIROS VII (U.S.) June 19, 1963—Undetermined. Carrying two wide-angle television cameras, infrared sensors and an electron temperature probe, the satellite obtained weather data, including measurements of the earth-sun heat balance. 385-401 miles. 97.4 minutes.

**SYNCOM II (U.S.) July 26, 1963—Indefinite. Orbited synchronously with the earth's rotation, the satellite's communication equipment successfully transmitted teletype, telephone and facsimile between the United States and Nigeria. It was the 19th successive successful Delta rocket firing. 22,230.1-22,239.7 miles. 23.9 hours.

**TRANSIT (U.S.) late September 1963-late 1968. The first satellite to be powered wholly by nuclear energy was launched secretly by the U.S. Navy as a man-made star which ships and submarines can use to plot their positions. The power plant, called SNAP 9-A, is a thermoelectric generator fueled by bits of reactor waste. It weighs 27 pounds. Information on the satellite's orbit is secret.

**VELA-HOTEL (U.S.) Oct. 16, 1963—Undisclosed time. Two of a complex system of 485-pound "watch-dog" satellites are orbiting 60,000 miles up to patrol for clandestine nuclear tests in space. Details on their orbits are secret.

FLIGHT-1 (USSR) Nov. 1, 1963—Undisclosed time. Launched on a circular orbit, the satellite performed a series of vertical and horizontal maneuvers controlled from the earth. Although details of the satellite's mission and orbit are secret, it was thought to be designed for learning how to build a platform in space.

DISCOVERER satellites—More than 60 Discoverer launches were made between April 8, 1962 and Nov. 16, 1963 by the United States. Most were for short durations for scientific and military purposes with most data secret.

COSMOS satellites—The Soviet Union announced the launching of 12 Cosmos satellites between May 15, 1962 and Nov. 16, 1963. Like the U.S. Discoverers, Cosmos satellites and their missions are mostly military secrets.

Highlights of Space Age

The Space Age began Oct. 4, 1957, when the first Sputnik went into orbit. Since then, men—and a woman—have gone into orbit, many satellites for many purposes have been launched, probes have hit the moon and traveled near planets, and plans and materials are being made for manned voyages to the moon.

As a record of major achievements of the Space Age up to 1963, this condensed space calendar is presented. Only the major achievements are included, especially those devices still orbiting or of historical significance. *objects still in the sky; **still transmitting. See 1963 calendar continuing this list.

SPUTNIK I (USSR) Oct. 4, 1957-Jan. 4, 1958. Measured atmospheric density, temperatures. 142-558 miles. 96.2 minutes.

SPUTNIK II (USSR) Nov. 3, 1957-April 14, 1958. Biomedical experiments, measured solar influence on upper atmosphere densities, cosmic rays. 140-1,038 miles. 103.7 minutes.

*EXPLORER I (U.S.) Jan. 31, 1958 to 1964. Discovered Van Allen radiation belt (believed most significant find of the International Geophysical Year). 212-1,009 miles. 104.8 minutes.

**VANGUARD I (U.S.) March 17, 1958-2158. Found earth is pear-shaped, tested vehicle and satellite. 404-2,451 miles. 133.9 minutes.

EXPLORER III (U.S.) March 26, 1958-June 27, 1958. Data on radiation belts, micrometeor impacts, temperatures. 117-1,741 miles. 114.7 minutes.

SPUTNIK III (USSR) May 15, 1958-April 6, 1960. For studying atmospheric pressure, composition, concentration of ions, magnetic fields and cosmic rays. 135-1,167 miles. 106 minutes.

EXPLORER IV (U.S.) July 26, 1958-Oct. 23, 1959. Data on radiation belts, spatial relationships and earth's magnetic field. 157-1,388 miles. 110.1 minutes.

PIONEER I (U.S.) Oct. 11, 1958-Oct. 12, 1958. Determined radiation band, first observation of hydromagnetic oscillations of earth's magnetic field. Space probe.

PIONEER III (U.S.) Dec. 6, 1958-Dec. 7, 1958. Discovered second radiation belt around the earth. Space probe.

PROJECT SCORE (U.S.) Dec. 18, 1958-Jan. 21, 1959. First time human voice beamed from space, relayed messages from U.S. ground stations. 110-920 miles. 101.46 minutes.

*LUNIK I (USSR) Jan. 2, 1959—Indefinite. To study interplanetary matter, solar radiation, magnetic fields of earth and moon. Solar orbit: 90.8-122.5 million miles. 450 days.

*VANGUARD II (U.S.) Feb. 17, 1959-1969. For studying cloud cover. 344-2,052 miles. 125.4 minutes.

*PIONEER IV (U.S.) March 3, 1959 in continuing solar orbit. Important data on solar radiation and long-range tracking. 91.8-106.2 million miles from sun. 398 days.

EXPLORER VI (U.S.) Aug. 7, 1959-June, 1961. Televised first pictures of earth's cloud cover, detected electrical ring current, mapped Van Allen belt and earth's magnetic field. Position uncertain.

LUNIK II (USSR) Sept. 12, 1959-Sept. 13, 1959. Hit the moon, studied magnetic fields of earth and moon, and gave data on particles in space, cosmic rays.

VANGUARD III (U.S.) Sept. 18, 1959 to 1989-1999. Surveyed earth's magnetic field, located edge of Van Allen belt, accurate count of micrometeorite impacts. 317-2,320 miles. 129.8 minutes.

LUNIK III (USSR) Oct. 4, 1959 to mid-April, 1960. Photographed moon's far side. Circled moon and earth. 24,840-292,000 miles. 15 days.

*EXPLORER VII (U.S.) Oct. 13, 1959 to 1979-1989. Data on radiation and magnetic storms, first micrometeorite penetration of sensor in flight, detected weather patterns. 344-669 miles. 101.1 minutes.

*PIONEER V (U.S.) March 11, 1960 for 100,000 years. Set long-range communications record (22,500,000 miles), data on solar flare effects, particles and magnetic fields. Solar orbit: 74.9-92.5 million miles. 311.6 days.

*TIROS I (U.S.) April 1, 1960 to 2010-2060. Took more than 22,000 pictures of cloud covers relayed by TV, data for meteorological satellite system. 429-467 miles. 99.1 minutes.

*TRANSIT I-B (U.S.) April 13, 1960-1964. Data for global navigational satellite system. 229-412 miles. 94.9 minutes.

SPUTNIK IV (USSR) May 15, 1960-Sept. 5, 1962. Tested life support systems for manned space flight. 175-305 miles. 92.3 minutes.

*MIDAS II (U.S.) May 24, 1960-1964. Tested infrared scanner system for detection of missile launchings. 297-314 miles. 94.3 minutes.

*TRANSIT II-A—GREB (U.S.) June 22, 1960-2010. Two satellites fired at once, data for navigational satellite system. Transit II-A 389-649 miles. 101.6 minutes. Greb 381-657 miles. 101.6 minutes.

*ECHO I (U.S.) Aug. 12, 1960—Indefinite. First passive communications satellite, voice and telephone transmission. 823-1,095 miles. 116.9 minutes.

*COURIER I-B (U.S.) Oct. 4, 1960 for several years. Data for military communications system. 611-743 miles. 106.8 minutes.

*EXPLORER VIII (U.S.) Nov. 3, 1960-1970. Data on ionosphere composition, micrometeorites. 262-1,409 miles. 112.5 minutes.

*TIROS II (U.S.) Nov. 23, 1960 to 2010-2060. Data for meteorological satellite system. TV pictures of clouds. 378-461 miles. 98.2 minutes.

*SAMOS II (U.S.) Jan. 31, 1961 for undisclosed time. Observed space, earth and its atmosphere. 295-341 miles. 94.9 minutes.

*SPUTNIK VIII—VENUS PROBE (USSR) Feb. 12, 1961. Sputnik VIII decayed Feb. 25, 1961, leaving the Venus probe in solar orbit for indefinite time, having been launched from the satellite toward Venus for long-range communication, observation of space, 66.8-94.7 million miles. 300 days.

DISCOVERER XXI (U.S.) Feb. 18, 1961 to April 20, 1962. For engineering, atmospheric and infrared radiation studies. Agena engine restarted in space for the first time. 154-516 miles. 95.5 minutes.

*EXPLORER X (U.S.) March 25, 1961 for uncertain time. Data on interplanetary magnetic fields. Original orbit: 100-145,000 miles.

VOSTOK I (USSR) April 12, 1961-April 12, 1961. Manned spaceship recovered after one orbit, tested man's reactions in space. First man in outer space was Yuri Gagarin. 108.76-187.66 miles. 89.1 minutes.

*EXPLORER XI (U.S.) April 27, 1961 to 1964. Orbited a special telescope for mapping gamma rays from cosmic sources. 308-1,103 miles. 107.8 minutes.

*TRANSIT IV-A—GREB III AND INJUN (U.S.) June 29, 1961-June 16, 1962 (Transit); indefinite (Greb and Injun). Three satellites, two not separated, gathered data on navigational satellite system, solar X-rays and cosmic rays. Transit, 547-620 miles. Greb and Injun, 548-619 miles. 103.8 minutes.

*TIROS III (U.S.) July 12, 1961—Indefinite. Data for meteorological satellite system, TV pictures of clouds. 457-510 miles. 100.3 minutes.

*MIDAS III (U.S.) July 12, 1961 for indefinite time. Tested system for detection of missile launchings. 2,084-2,197 miles. 161.5 minutes.

*EXPLORER XII (U.S.) Aug. 16, 1961—Indefinite. Data on solar wind, interplanetary magnetic fields, particles in space, Van Allen belts. 165-47,858 miles. 26 hours and 24 minutes.

*MIDAS IV (U.S.) Oct. 21, 1961—Indefinite time. Polar orbit achieved and West Ford dipoles ejected. 3,507-3,745 miles. 166 minutes.

DISCOVERER XXXIV (U.S.) Nov. 5, 1961-Dec. 12, 1961. Polar orbit achieved but capsule not recovered due to on-orbit malfunction. 134-637 miles. 97.2 minutes.

*TRANSIT IV-B (U.S.) Nov. 15, 1961—5 years estimated lifetime. Two satellites orbited: Transit, to develop all-weather navigation system, investigate earth's shape; *TRAAC, to test gravity system for attitude control and obtain data on inner Van Allen belt. SNAP nuclear non-fissionable power supply furnished current for two Transit transmitters. Transit: 582-700 miles; 105.6 minutes.

MERCURY-ATLAS V (MA-5) (U.S.) Nov. 29, 1961-Nov. 29, 1961. Provided two-orbit ride for space chimpanzee Enos to test all Mercury systems. 99.6-147.5 miles. 88.5 minutes.

*RANGER III (U.S.) Jan. 26, 1962—Permanent orbit around sun. Objective of lunar impact not achieved due to excessive injection velocity from parking orbit. 91,503,314-108,133,854 miles. 406.4 days.

*TIROS IV (U.S.) Feb. 8, 1962-1964. Placed in circular earth orbit. Data from TV cameras were used to study cloud formations for operational weather analysis and forecasting for distribution over domestic and international weather circuits. 471-525 miles. 100.4 minutes.

MERCURY ATLAS VI, "Friendship 7," (U.S.) Feb. 20, 1962-Feb. 20, 1962. After three orbits, spacecraft was recovered in Atlantic. Flight provided first test of Mercury systems in orbit with an astronaut, John H. Glenn Jr., aboard. 100.3-162.7 miles. 88.2 minutes.

*OSO-I (Orbiting Solar Observatory) (U.S.) March 7, 1962. Satellite placed in near-circular earth orbit with devices to conduct 13 different experiments for study of solar electromagnetic radiations, investigate dust particles in space and thermal radiation characteristics of spacecraft surface. 343.5-369.8 miles. 96.15 minutes.

RANGER IV (U.S.) April 23, 1962-April 26, 1962. Impacted moon at a point estimated at 229.3 degrees east longitude and 15.5 degrees south latitude. No scientific data obtained.

**ARIEL (U.S. and U.K.) April 26, 1962—No estimate given. First international satellite. Contains six British-designed experiments launched by American Delta booster in elliptical earth orbit to investigate the ionosphere and its relationships with the sun. 242.1-754.2 miles. 100.9 minutes.

MERCURY ATLAS VII, "Aurora-7," (U.S.) May 24, 1962-May 24, 1962. Piloted by Astronaut M. Scott Carpenter for three orbits around the earth. Spacecraft with pilot was recovered. Pilot obtained data on behavior of liquid under weightless conditions and made important observations on aurora and airglow. 100-166.8 miles. 88.3 minutes.

*TIROS V (U.S.) June 19, 1962—Indefinite. Excellent photos for hurricane research transmitted. 367-604 miles. 100.5 minutes.

*TELSTAR I (U.S.) July 10, 1962. Used successfully to test broadband communications in space and revealed effects of artificial radiation belt on semiconductors. 593-3,503 miles. 157-8 minutes.

VOSTOK III (USSR) Aug. 11, 1962-Aug. 15, 1962. During more than 64 orbits, the longest manned space flight up until that time, Cosmonaut Andrian Nikolayev floated in a weightless condition for over three hours without restraints, transmitted live television to Soviet ground stations and after leaving spacecraft via ejection capsule parachuted to earth near Karaganda, Kazakhstan. 105.6, later 107.4-156, later 137.2 miles. 88.5 minutes after launch; later 88.13 minutes.

VOSTOK IV (USSR) Aug. 12, 1962-Aug. 15, 1962. Placed manned satellite in orbit 4.03 miles from orbiting Vostok III. During more than 48 orbits, Cosmonaut Pavel Popovich was in close visual and radio contact with Vostok III and also tried free floating for three hours in weightlessness. Precision recovery made near recovery area six minutes after landing of Vostok III. 111-158 miles. 88.5 minutes.

*MARINER II (U.S.) Aug. 27, 1962—Permanent orbit around the sun. On Dec. 14, 1962, the spacecraft flew past Venus at a distance of 21,648 miles, giving man his first relatively close-up observation of the planet. The 447-pound gold- and silver-plated probe sent back an abundance of information about Venus and interplanetary space. On Jan. 3, 1963, when radio contact was lost, Mariner was nearly 6 million miles beyond Venus and almost 54 million miles from earth. The probe completed its first orbit of the sun on Aug. 1, 1963.

*TIROS VI (U.S.) Sept. 18, 1962—Indefinite. The weather satellite took pictures of such earth conditions as Hurricane Flora and Saudi Arabian sandstorms. It developed a malfunctioning in its focus current regulator, ending its transmission on Oct. 17, 1963. 423.4-444.4 miles. 98.7 minutes.

**ALOUETTE (U.S. and Canada) Sept. 29, 1962-1964. A 280-pound satellite to study communication phenomena in the ionosphere. 620-638 miles. 105.4 minutes.

*EXPLORER XIV (U.S.) Oct. 2, 1962-1964. Launched in highly elliptical orbit to measure energetic particles in magnetosphere and outer space, and to determine their relation to magnetic fields in earth and interplanetary space. 1,280-60,220 miles. 37 hours.

MERCURY-ATLAS VIII, "Sigma 7," (U.S.) Oct. 3, 1962-Oct. 3, 1962. Six-orbital ride of Astronaut Walter Schirra demonstrated ability of pilot to resume controlled flying after a period of drifting and was a further check of life-support systems for prolonged manned space flight planned for future. 100-176 miles. 89 minutes.

RANGER V (U.S.) Oct. 18, 1962-permanent solar orbit. Failed in attempt to impact moon apparently because of defect in panels of solar cells to power maneuvers in space and transmit information to earth. 88,100,000-92,800,000 miles. 366 days.

*EXPLORER XV (U.S.) Oct. 27, 1962-1964. To study artificial radiation belt created by U.S. nuclear bomb explosion in the upper atmosphere on July 9, 1962. 193.7-10,760 miles. 5.2 hours.

**ANNA (U.S.) Oct. 31, 1962—Unknown. Blinking Army, Navy, NASA and Air Force satellite launched in near-circular orbit to gain geographic information and improve mapping capabilities for better navigation. 668.98-732.22 miles. 107.8 minutes.

*MARS I (USSR) Nov. 1, 1962—Permanent solar orbit. Launched from a heavy satellite which had been placed in a parking orbit, the probe had been expected to pass within 6,800 miles of Mars in June 1963 sending back photographs of the planet. It was last heard from on March 21 when a signal brought a faulty response from it. Later efforts to reach it by radio failed.

**RELAY I (U.S.) launched Dec. 13, 1962 with a one year's communication life. The first launching with a revised Delta rocket, the satellite was used successfully to transmit telephone, television, teletype and facsimile signals between the U.S. and England, Italy and Brazil. 818-4,611 miles. 185 minutes.

*EXPLORER XVI (U.S.) launched Dec. 16, 1962 with an expected orbital lifetime of three years. The scientific satellite measured micrometeoroid impact hazard on satellite skin samples, investigated particles with differing amounts of momentum and compared performance of protected and unprotected solar cells in space. 469-728 miles. 104 minutes.

*TRANSIT V-A (U.S.) Dec. 19, 1962—Unannounced date. U.S. Navy satellite which is part of a string of navigation aids. Power supply failed after one day. 432-455 miles. 99 minutes.