Biographical Appendix

A

William A. Anders (1933–) was a career United States Air Force officer, although a graduate of the U.S. Naval Academy. Chosen with the third group of astronauts in 1963, he was the backup pilot for Gemini 9 and lunar module pilot for Apollo 8. Anders resigned from NASA and the Air Force (active duty) in September 1969 and became Executive Secretary of the National Aeronautics and Space Council. He joined the Atomic Energy Commission in 1973, and became chairman of the Nuclear Regulatory Commission in 1974. He was named U.S. Ambassador to Norway in 1976. Later he worked as a Vice-President of General Electric and then as Senior Executive Vice President-Operations, Textron, Inc. Anders retired as Chief Executive Officer of General Dynamics in 1993, but remained Chairman of the Board. See "Anders, W. A.," biographical file 000082, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC and (*http://www.jsc.nasa.gov/Bios/htmlbios/anders-wa.html*).

Neil A. Armstrong (1930–) was the first person to set foot on the Moon on 20 July, 1969. He became an astronaut in 1962 after having served as a test pilot with the National Advisory Committee for Aeronautics (1955-1958) and NASA (1958–1962). He flew as command pilot on Gemini 8 in March 1966 and commander of Apollo 11 in July 1969. In 1970 and 1971 he was Deputy Associate Administrator for the office of Advanced Research and Technology, NASA Headquarters. In 1971 he left NASA to become a professor of aerospace engineering at the University of Cincinnati and to work as a private consultant. See Neil A. Armstrong, *et al.*, *First on the Moon: A Voyage with Neil Armstrong, Michael Collins and Edwin E. Aldrin, Jr.* (Boston: Little, Brown, 1970); Neil A. Armstrong, *et al.*, *The First Lunar Landing: 20th Anniversary/as Told by the Astronauts, Neil Armstrong, Edwin Aldrin, Michael Collins* (Washington, DC: National Aeronautics and Space Administration EP-73, 1989); (*http://www.jsc.nasa.gov/Bios/htmlbios/armstrong-na.html*).

William S. Augerson (1929–) was assigned to the Human Factors Section of the NASA Space Task Group in 1958 where he worked on the development of Life Systems for Project Mercury. In 1945 he joined the U.S. Navy to serve as an electronics technician and the next year entered Bowdoin College where he majored in physics and English, graduating with honors in 1949. He continued his education at Cornell University where he earned his M.D. in 1955. Dr. Augerson then entered active duty in the U.S. Army, interning at Brooke Army Hospital, San Antonio, Texas. His other posts included Division Surgeon for the 4th Infantry in 1957–58 and Army Liaison Officer for Bioastronautics Research at the U.S. Air Force Aeromedical Laboratory at Wright-Patterson Air Force Base in 1958. He would eventually retire from the Army with the rank of general. See "Gen. Augerson, William S.," biographical file 000118, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

B

McGeorge Bundy (1919–1996) was a professor of government before serving as the national security adviser to Presidents Kennedy and Johnson from 1961-1966. See *Who's Who in America, 1996* (New Providence, NJ: Marquis Who's Who, 1995).

C

Richard L. Callaghan (1925–) served as NASA's Assistant Administrator for Legislative Affairs from 1963-1967. An Army veteran of the World War II European Theatre, he received a B.S. from Georgetown University Foreign Service School in 1950 and an LL.B. from the George Washington University Law School in 1957. While attending law school, Callaghan worked in various legislative offices in Washington, DC, including that of Montana Senator James E. Murray. He also served as the staff director of the Senate Committee on Interior and Insular Affairs from 1955 until he joined NASA in 1962 as Special Assistant to Administrator James E. Webb. In 1968 he received the NASA Exceptional Service Medal for his work in the organization. See "Callaghan, R. L.," biographical file 000279, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

M. Scott Carpenter (1925–) piloted the Mercury 7 mission in 1962, making him the second American to orbit Earth. He earned his bachelor's degree in aeronautical engineering from the University of Colorado in 1949, after which he was commissioned in the U.S. Navy. Carpenter served in the Korean War as a Naval aviator and then served as a test pilot for the Navy from 1954 to 1957. Two years later he was selected as one of the original seven astronauts to serve in the Mercury program. Upon completion of his mission, Carpenter took a leave of absence from NASA and participated in the Navy's SEALAB II program, thus making him the first person to hold both the titles of astronaut and aquanaut. After retiring from the Navy in 1969, he finished his distinguished career working in the private sector. Carpenter's awards include the Navy's Legion of Merit, the Distinguished Flying Cross, the NASA Distinguished Service Medal, and the Collier Trophy. (*http://www.jsc.nasa.gov/Bios/htmlbios/carpenter-ms.html*) accessed 27 September 2006.

Michael Collins (1930–) served as command module pilot on Apollo 11 in 1969, remaining in lunar orbit while Neil Armstrong and Buzz Aldrin became the first two people to walk on the Moon. Born in Rome, Italy, Collins graduated from high school in Washington, DC and went on to earn a bachelor of science degree from the United States Military Academy at West Point in 1952. Collins chose an Air Force career upon graduation from West Point and served as an experimental flight test officer at Edwards Air Force Base in California. He also piloted the Gemini 10 mission in 1966 during which he successfully rendezvoused and docked with separately launched target vehicles. His awards include the Presidential Medal for Freedom in 1969 as well as the NASA Exceptional Service medal. (*http://www.jsc.nasa.gov/Bios/htmlbios/collins-m.html*) accessed 2 October 2006.

L. Gordon Cooper Jr. (1927–2004) piloted the Mercury 9 mission in 1963, which concluded the operational phase of Project Mercury. He was commissioned into the Air Force after attending three years at the University of Hawaii. After serving four years in Munich, Germany, Carpenter came back to the U.S. and earned a bachelor of science in aeronautical engineering in 1956 from the Air Force Institute of Technology. He spent the next three years as a test pilot at Edwards Air Force Base and was then selected as one of the original seven Mercury astronauts. After Mercury, Carpenter also served as command pilot of the Gemini 5 mission, thus becoming the first person to make two orbital flights

and in the process setting a new space endurance record. He retired from the Air Force and NASA in 1970 to finish his career working in private industry. His awards include the Air Force Legion of Merit, the Air Force Distinguished Flying Cross Cluster, the NASA Distinguished Service Medal, and the 1962 Collier Trophy for pioneering piloted spaceflight in the USA. See "*Cooper, L. Gordon, Jr.*," biographical file 376, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC and (*http://www.jsc.nasa.gov/Bios/htmlbios/cooper-lg.html*) accessed 2 October 2006.

Walter Cunningham (1932–) was in the third group of astronauts selected by NASA in October 1963 and served as the lunar module pilot in the Apollo 7 mission, the first piloted flight test of the third generation United States spacecraft. After graduating from Venice High School in California, he joined the Navy in 1951 and began flight training the following year. In 1953, Cunningham joined a Marine squadron where he served on active duty until 1956. He then went on to earn both a bachelor's and a master's degree in physics at UCLA in 1960 and 1961, respectively. After receiving his master's, Cunningham was employed as a physicist by the Rand Corporation where he worked on problems with Earth's magnetosphere as well as projects for the Department of Defense. As an astronaut, he played a key role in all aspects of piloted space flight including training, planning, system design, public relations, and program management. Cunningham then completed the Advanced Management Program at Harvard Graduate School of Business in 1974 and attained senior executive positions in several highly successful businesses over the course of the following decades. (*http://www.jsc.nasa.gov/Bios/htmlbios/cunningham-w.html*) accessed 2 October 2006.

D

Kurt H. Debus (1908–1983) earned a B.S. in mechanical engineering (1933), an M.S. (1935) and Ph.D. (1939) in electrical engineering, all from the Technical University of Darmstadt in Germany. He became an assistant professor at the university after receiving his degree. During the course of World War II he became an experimental engineer at the A-4 (V-2) test stand at Peenemünde (see entry for Wernher von Braun), rising to become superintendent of the test stand and test firing stand for the rocket. In 1945 he came to the United States with a group of engineers and scientists headed by von Braun. From 1945-1950 the group worked at Fort Bliss, Texas, and then moved to the Redstone Arsenal in Huntsville, Alabama. From 1952-1960 Debus was chief of the missile firing laboratory of the Army Ballistic Missile Agency. In this position, he was located at Cape Canaveral, Florida, where he supervised the launching of the first ballistic missile fired from there, an Army Redstone. When ABMA became part of NASA, Debus continued to supervise missile and space vehicle launchings, first as director of the Launch Operations Center and then of the Kennedy Space Center as it was renamed in December 1963. He retired from that position in 1974 See "Debus, Kurt H.," biographical file 000443, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Charles J. Donlan (1916–) served the United States government for nearly 38 years in NACA and NASA. After graduating with a bachelor of science in aeronautical engineering from MIT in 1938, he joined the research staff of NACA's Langley Aeronautical Laboratory where he worked to improve aircraft

design, stability, and control. In 1958 Donlan was appointed Associate Director of the NASA Space Task Group at Langley to conduct Project Mercury. Three years later he became Associate Director of Langley until 1967 when he was made Deputy Director of the facility. The following year he was transferred to NASA Headquarters to become the Deputy Associate Administrator for Manned Space Flight. In addition to this, he was Acting Director of the Space Shuttle Program from 1970 until 1973. Donlan retired from NASA in 1976 and then worked as a consultant for the Institute for Defense Analysis where he studied military uses for the Shuttle for the next twelve years. His awards include the NASA Distinguished Service Medal and the NASA Medal for Outstanding Leadership. See "Donlan, Charles J.," biographical file 000481, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Hugh L. Dryden (1898–1965) was a career civil servant and an aerodynamicist by discipline who had also begun life as something of a child prodigy. He graduated at age 14 from high school and went on to earn an A.B. in three years from Johns Hopkins (1916). Three further years later (1919) he earned his Ph.D. in physics and mathematics from the same institution even though he had been employed full-time in the National Bureau of Standards since June 1918. His career at the Bureau of Standards, which lasted until 1947, was devoted to studying airflow, turbulence, and particularly the problems of the boundary layer--the thin layer of air next to an airfoil that causes drag. In 1920 he became chief of the aerodynamics section in the bureau. His work in the 1920s on measuring turbulence in wind tunnels facilitated research in the NACA that produced the laminar flow wings used in the P-51 Mustang and other World War II aircraft. From the mid-1920s to 1947, his publications became essential reading for aerodynamicists around the world. During World War II, his work on a glide bomb named "the bat" won him a Presidential Certificate of Merit. He capped his career at the bureau by becoming its Assistant Director and then Associate Director during his final two years there. He then served as Director of the NACA from 1947-1958, after which he became Deputy Administrator of NASA under T. Keith Glennan and James E. Webb. See Richard K. Smith, *The Hugh L. Dryden Papers, 1898-1965* [Baltimore, MD: The Johns Hopkins University Library, 1974] and "Dr. Hugh L. Dryden" (*http://www.hq.nasa.gov/office/pao/History/Biographies/dryden.html*) accessed 23 October 2006.

E

Donn F. Eisele (1930–1987) served as the command module pilot during the Apollo 7 mission in 1968. He earned a bachelor of science degree from the United States Naval Academy in 1952 and a master of science degree in astronautics from the Air Force Institute of Technology in 1960. Prior to his selection as an Apollo astronaut, Eisele served as a project engineer and experimental test pilot at the Air Force Special Weapons Center at Kirtland Air Force Base, New Mexico. After he retired from both the Air Force and the space program in 1972 he became the Director of the U.S. Peace Corps in Thailand. Eisele finished his career working in private industry back in the United States. (*http://www.jsc.nasa.gov/Bios/htmlbios/eisele-df.html*) accessed 3 October 2006.

F

Maxime A. Faget (1921–2004) was an aeronautical engineer with a B.S. from LSU (1943), joined the staff at Langley Aeronautical Laboratory in 1946 and soon became head of the performance aerodynamics branch of the pilotless aircraft research division. There, he conducted research on the heat shield of the Mercury spacecraft. In 1958 he joined the Space Task Group in NASA, forerunner of the NASA Manned Spacecraft Center that became the Johnson Space Center, and he became its assistant director for engineering and development in 1962 and later its director. He contributed many of the original design concepts for Project Mercury's piloted spacecraft and played a major role in designing virtually every U.S.-crewed spacecraft since that time, including the Space Shuttle. He retired from NASA in 1981 and became an executive for Eagle Engineering, Inc. In 1982 he was one of the founders of Space Industries, Inc. and became its president and chief executive officer. See "Maxime A. Faget," biographical file 000602, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

G

Yuri Gagarin (1934–1968) was the Soviet cosmonaut who became the first human in space with a one-orbit mission aboard the spacecraft *Vostok 1* on April 12, 1961. The great success of that feat made the gregarious Gagarin a global hero, and he was an effective spokesman for the Soviet Union until his death in an unfortunate aircraft accident. "Gagarin Vostok 1 (1961)," biographical file 745, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

John H. Gibbons (1929–) headed the Office of Technology Assessment under Congress for fourteen years before becoming President Clinton's science advisor and head of the White House Office of Science and Technology Policy in 1993. He received a Ph.D. in physics from Duke University in 1954. See "Gibbons, John," biographical file 5237, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Robert R. Gilruth (1913–2000) was a longtime NACA engineer working at the Langley Aeronautical Laboratory from 1937–1946, then as chief of the pilotless aircraft research division at Wallops Island from 1946–1952, who had been exploring the possibility of human spaceflight before the creation of NASA. He served as Assistant Director at Langley from 1952–1959 and as Assistant Director (piloted satellites) and head of Project Mercury from 1959–1961, technically assigned to the Goddard Spaceflight Center but physically located at Langley. In early 1961 Glennan established an independent Space Task Group (already the group's name as an independent subdivision of the Goddard Center) under Gilruth at Langley to supervise the Mercury program. This group moved to the Manned Spacecraft Center, Houston, Texas, in 1962. Gilruth was then director of the Houston operation from 1962–1972. See, Henry C. Dethloff, *"Suddenly Tomorrow Came . . .": A History of the Johnson Space Center* (Washington, DC: NASA SP-4307, 1993); James R. Hansen, *Engineer in Charge: A History of the Langley Aeronautical Laboratory, 1917-1958* (Washington, DC: NASA SP-4305, 1987), pp. 386-88.

John H. Glenn, Jr. (1921–) was chosen with the first group of astronauts in 1959. He was the pilot for the 20 February 1962 Mercury-Atlas 6 (*Friendship 7*) mission, the first American orbital flight. He made three orbits on this mission. He left the NASA astronaut corps in 1964 and later entered politics as a senator from Ohio. See Lloyd S. Swenson, Jr., James M. Grimwood, and Charles C. Alexander, *This New Ocean: A History of Project Mercury* (Washington, DC: NASA SP-4201, 1966) and (*http://www.jsc.nasa.gov/Bios/htmlbios/glenn-j.html*) accessed 23 October 2006.

Nicholas Golovin (1912–1969) served on the staff of the White House Office of Science and Technology from 1962 to 1968, during which time he played an antagonistic role towards NASA and the decision to use the lunar orbit rendezvous mode to achieve a piloted lunar landing. Born in Odessa, Russia, but educated in this country (Ph.D. in physics, George Washington University, 1955) he worked in various capacities for the government during and after World War II, including for the Naval Research Laboratory, 1946–1948. He held several administrative positions with the National Bureau of Standards from 1949 to 1958. In 1958 he was chief scientist for the White Sands Missile Range and then worked for the Advanced Research Projects Agency in 1959 as director of technical operations. He became a Deputy Associate Administrator of NASA in 1960. He joined private industry before becoming, in 1961, the director of the NASA-DOD large launch vehicle planning group. He joined the Office of Science and Technology at the White House in 1962 as a technical advisor for aviation and space and remained there until 1968 when he took a leave of absence as a research associate at Harvard and as a fellow at the Brookings Institution. Obituaries, *Washington Star*, 30 Apr. 1969, p. B-6, and *Washington Post*, 30 Apr. 1969, p. B14.

A. J. Goodpaster (1915–2005) was a career Army officer who served as defense liaison officer and secretary of the White House staff from 1954 to 1961, being promoted to brigadier general during that period. He later was deputy commander, U.S. forces in Vietnam, 1968–1969, and commander-in-chief, U.S. Forces in Europe, 1969–1974. He retired in 1974 as a four-star general but returned to active duty in 1977 and served as superintendent of the U.S. Military Academy, a post he held until his second retirement in 1981.

Edward Z. Gray (1915–) worked for Boeing Co. from 1943–1963 as a design engineer for the Boeing jet aircraft series as well as the DynaSoar and Minuteman programs. He held a number of positions in systems engineering management, the last one being as development program manager of advanced space systems. He served on numerous committees for the government and aerospace industry, including the NASA research advisory committee on structural loads in 1958–1959, of which he was chairman. In 1963 NASA appointed him to the directorship of its advanced piloted missions programs. He worked in that position through 1967, transferred to a position as assistant to the president of Grumman Aircraft Engineering Corp. from 1967–1973, and then returned to NASA as Assistant Administrator for industry affairs and technology utilization. By 1978 he had assumed a position as director of government/industry affairs. In 1979 he joined Bendix Corp.'s aerospace-electronics group as director of systems development. See "Edward Z. Gray," biographical file 000871, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Virgil I. "Gus" Grissom (1927–1967) was chosen with the first group of astronauts in 1959. He was the pilot for the 1961 Mercury-Redstone 4 (*Liberty Bell 7*) mission, a suborbital flight; command pilot for Gemini 3; backup command pilot for Gemini 6; and had been selected as commander of the first Apollo flight carrying three crew members at the time of his death in the Apollo 1 fire in January 1967. See Betty Grissom and Henry Still, *Starfall* (New York: Thomas Y. Crowell, 1974); The Astronauts Themselves, *We Seven* (New York: Simon and Schuster, 1962); (*http://www.jsc.nasa.gov/Bios/htmlbios/grissom-vi.html*) accessed 23 October 2006.

H

James C. Hagerty (1909–1981) was on the staff of the *New York Times* from 1934 to 1942, the last four years as legislative correspondent in the paper's Albany bureau. He served as executive assistant to New York Governor Thomas Dewey from 1943 to 1950 and then as Dewey's secretary for the next two years before becoming press secretary for President Eisenhower from 1953 to 1961.

D. Brainard Holmes (1921–) was involved in the management of high technology efforts in private industry and the federal government. He was on the staff of Bell Telephone Labs, 1945–1953, and at RCA, 1953–1961. He then became Associate Administrator for Manned Space Flight at NASA, 1961–1963. Thereafter he assumed a series of increasingly senior positions with Raytheon Corp., and since 1982 chairman of Beech Aircraft. See "D. Brainard Holmes" biographical file 001048, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC; "Holmes, D(yer) Brainerd," *Current Biography 1963*, pp. 191–92.

Donald F. Hornig (1920–), a chemist, was a research associate at the Woods Hole Oceanographic Lab, 1943–1944, and a scientist and group leader at the Los Alamos Scientific Laboratory, 1944–1946. He taught chemistry at Brown University starting in 1946, rising to the directorship of Metcalf Research Lab, 1949–1957, and also serving as associate dean and acting dean of the graduate school from 1952–1954. He was Donner Professor of Science at Princeton from 1957–1964 as well as chairman of the chemistry department from 1958–1964. He was a special assistant to the president of the U.S. for science and technology from 1964–1969 and president of Brown University from 1970–1976. See Gregg Herken, *Cardinal Choices: Science Advice to the President from Hiroshima to SDI* (New York: Oxford University Press, 1992).

John C. Houbolt (1919–) was an aeronautical engineer who helped conceptualize and was the primary advocate for the idea of lunar orbit rendezvous. He received both bachelor and master of science degrees in civil engineering from the University of Illinois in 1940 and 1942, and a doctorate in technical sciences from the Swiss Federal Institute of Technology in 1957. He first joined NACA as an aeronautical engineer in 1942 before serving in the Army Corps of Engineers from 1944 to 1946. In 1949, back at Langley, he was appointed Assistant Chief of the Dynamic Loads Division where he pursued research problems in aeroelasticity in application to aircraft and space vehicles. In 1961 Houbolt was named Chief of the Theoretical Mechanics Division at Langley where he successfully argued the case of lunar orbit rendezvous to the NASA Administration. He left NASA in 1963 to work as a senior vice president and consultant for a private research firm,

but then returned to Langley in 1976 as Chief Aeronautical Scientist. Houbolt officially retired from NASA in 1985. See James R. Hansen, *Enchanted Rendezvous: John C. Houbolt and the Genesis of the Lunar-Orbit Rendezvous Concept* (Washington, DC: National Aeronautics and Space Administration Monographs in Aerospace History No. 4, 1995) and "Houbolt, John C.," biographical file 001100, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

J

Lyndon B. Johnson (1908–1973) was President of the United States from 1963–1969. Johnson was elected to the House of Representatives in 1937 and served until 1949. He was a senator from 1949-1961 and then Vice President of the U.S. from 1960–1963 under Kennedy. Best known for the social legislation he passed during his presidency and for his escalation of the war in Vietnam, he was also highly instrumental in revising and passing the legislation that created NASA and in supporting the U.S. space program as chairman of the Committee on Aeronautical and Space Sciences and of the preparedness subcommittee of the Senate Armed Services Committee, then later as chairman of the National Aeronautics and Space Council when he was vice president. (On his role in support of the space program, Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," in *The Johnson Years: Vietnam, the Environment, and Science*, Robert A. Divine, ed. [Lawrence: University of Kansas Press, 1987], pp. 217-53; and Robert Dallek, "Johnson, Project Apollo, and the Politics of Space Program Planning," unpublished paper delivered at a symposium on "Presidential Leadership, Congress, and the U.S. Space Program," sponsored by NASA and American University, March 25, 1993.)

K

John F. Kennedy (1916–1963) was President of the United States, 1961–1963. In 1960 John F. Kennedy, a Senator from Massachusetts between 1953 and 1960, ran for president as the Democratic candidate with Lyndon B. Johnson as his running mate. Using the slogan, "Let's get this country moving again," Kennedy charged the Republican Eisenhower administration with doing nothing about the myriad social, economic, and international problems that festered in the 1950s. He was especially hard on Eisenhower's record in international relations, taking a cold warrior position on a supposed "missile gap" (which turned out not to be the case) wherein the United States lagged far behind the Soviet Union in ICBM technology. On 25 May, 1961, President Kennedy announced to the nation a goal of sending an American to the Moon before the end of the decade. The human spaceflight imperative was a direct outgrowth of it; Projects Mercury (at least in its latter stages), Gemini, and Apollo were each designed to execute it. On this subject see, Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985); John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, MA: MIT Press, 1970).

George Kistiakowsky (1900–1982) was a pioneering chemist at Harvard University, associated with the development of the atomic bomb, and later an advocate of banning nuclear weapons. He served as science advisor to President Eisenhower from July 1959 to the end of the Eisenhower administration. He later served on

the advisory board to the United States Arms Control and Disarmament Agency from 1962 to 1969. See *New York Times*, December 9, 1982, p. B21 and "George B. Kistiakowsky," biographical file 001200, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

James R. Killian (1904–1988) was president of the Massachusetts Institute of Technology between 1949 and 1959, on leave between November 1957 and July 1959 when he served as the first presidential science advisor. President Dwight D. Eisenhower established the President's Science Advisory Committee (PSAC), which Killian chaired, following the Sputnik crisis. After leaving the White House staff in 1959, Killian continued his work at MIT but in 1965 began working with the Corporation for Public Broadcasting to develop public television. Killian described his experiences as a presidential advisor in *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, MA: MIT Press, 1977). For a discussion of the PSAC see Gregg Herken, *Cardinal Choices: Science Advice to the President from Hiroshima to SDI* (New York: Oxford University Press, 1992).

Kenneth Kleinknecht started his career in 1942 at the Lewis Research Center after graduating from Purdue University with a B.S. in mechanical engineering. In 1951, Kleinknecht transferred to the Flight Research Center in Edwards, CA. After NASA formed, he then transferred to the Manned Spacecraft Center in Houston in 1959. Before being named the manager of the Mercury project, Kleinknecht was active in the National Air Races, served as supervisor for a number of avionics tests at Lewis, and was the head of the Project Engineering Station for the X-1E. Additionally, Kleinknecht served as the Advanced Projects Management Officer on the X-15 project and as the Technical Assistant to the Director of the Manned Spacecraft Center. Source: "Kenneth Kleinknecht" biographical file 001205, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Christopher C. Kraft, Jr. (1924–) was a long-standing official with NASA throughout the Apollo program. He received as B.S. in aeronautical engineering from Virginia Polytechnic Institute in 1944 and joined the Langley Aeronautical Laboratory of the National Advisory Committee for Aeronautics (NACA) the next year. In 1958, still at Langley, he became a member of the Space Task Group developing Project Mercury and moved with the Group to Houston in 1962. He was flight director for all of the Mercury and many of the Gemini missions and directed the design of Mission Control at the Manned Spacecraft Center (MSC), redesignated the Johnson Space Center in 1973. He was named the MSC Deputy Director in 1970 and its Director two years later, a position he held until his retirement in 1982. Since then he has remained active as an aerospace consultant. See "Kraft, Christopher C., Jr.," biographical file 001237, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Nikita Khrushchev (1894–1971) was premier of the USSR from 1958 to 1964 and first secretary of the Communist party from 1953 to 1964. He was noted for an astonishing speech in 1956 denouncing the crimes and blunders of Joseph Stalin and for gestures of reconciliation with the West in 1959–1960, ending with the breakdown of a Paris summit with President Eisenhower and the leaders of

France and Great Britain in the wake of Khrushchev's announcement that the Soviets had shot down an American U-2 reconnaissance aircraft over the Urals on 1 May 1960. Then in 1962 Khrushchev attempted to place Soviet medium range-missiles in Cuba. This led to an intense crisis in October, after which Khrushchev agreed to remove the missiles if the U.S. promised to make no more attempts to overthrow Cuba's Communist government. Although he could be charming at times, Khrushchev was also given to bluster (extending even to shoe-pounding at the U.N.) and was a tough negotiator, although he believed, unlike his predecessors, in the possibility of Communist victory over the West without war. See his *Khrushchev Remembers: The Last Testament* (Boston: Little, Brown, 1974); Edward Crankshaw, *Khrushchev: A Career* (New York: Viking, 1966); Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev and The U-2 Affair* (New York: Harper and Row, 1986); and Robert A. Divine, *Eisenhower and the Cold War* (New York: Oxford University Press, 1981) for further information about him.

Joachin P. Kuettner (1909–) served as Chief of the Mercury-Redstone project at NASA's Marshall Space Flight Center. Born and raised in Germany, he earned a doctorate in law from the University of Breslau at the age of 21 and a doctorate in physics and meteorology from the University of Hamburg in 1939. During World War II, Dr. Kuettner served as a test pilot and later as the head of a flight test department for advanced airplanes such as the piloted version of the German V-1. He came to the United States in December 1948 and joined the Air Force Cambridge Research Center. Here he was in charge of geophysical flight research using jet aircraft and high-altitude sailplanes. He then worked for the Army Ballistic Missile Agency as Director of the agency's efforts in Project Mercury from 1958 until he transferred to NASA and Marshall Space Flight Center two years later. After Mercury-Redstone, he was put in charge of the Saturn-Apollo Systems Integration at Marshall. Over his long career, Dr. Kuettner published many papers in the fields of aeronautics, meteorology, and astronautics and holds numerous awards from several different countries.

L

James A. Lovell, Jr. (1928–) flew on four space flights and was a member of the first crew to circle the Moon. He was selected in the second group of astronauts in 1962 and flew in the Gemini 7, Gemini 12, Apollo 8, and Apollo 13 missions, thus making him the first person to fly twice to the Moon. Following his graduation with a bachelor of science degree from the U.S. Naval Academy in 1952, Lovell received his flight training and was later assigned as a test pilot at the Naval Air Test Center in Maryland. A graduate of the Aviation Safety School of the University of Southern California, he also served as a flight instructor and safety engineer with Fighter Squadron 101 at the Naval Air Station, Oceana, Virginia. In addition to the four missions in which Captain Lovell flew, he also served as backup pilot for Gemini 4, backup Commander for both Gemini 9 and Apollo 11. In 1971, he was named Deputy Director of Science and Applications at NASA's Manned Spacecraft Center in Houston. In addition to these duties, he was appointed by President Lyndon B. Johnson to serve as a consultant for Physical Fitness and Sports and was later made Chairman of the Council by President Nixon. Lovell retired from the Navy and NASA in1973 to accept a position as Senior Executive Vice President in the Bay Houston Towing Company. Among his many honors are the Presidential Medal for Freedom, the NASA Distinguished Service Medal,

and two Navy Distinguished Flying Crosses. See "Lovell, James A., Jr. Apollo flights," biographical file 001350, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC and "James A. Lovell" (*http://www.jsc.nasa.gov/Bios/htmlbios/lovell-ja.html*) accessed 31 October 2006.

George M. Low (1926–1984), a native of Vienna, Austria, came to the U.S. in 1940 and received an aeronautical engineering degree from Rensselaer Polytechnic Institute (RPI) in 1948 and an M.S. in the same field from the same school in 1950. He joined the NACA in 1949 and at Lewis Flight Propulsion Laboratory he specialized in experimental and theoretical research in several fields. He became chief of piloted space flight at NASA Headquarters in 1958. In 1960, he chaired a special committee that formulated the original plans for the Apollo lunar landings. In 1964 he became deputy director of the Manned Spacecraft Center in Houston, the forerunner of the Johnson Space Center. He became Deputy Administrator of NASA in 1969 and served as Acting Administrator in 1970–1971. He retired from NASA in 1976 to become president of RPI, a position he held until his death. In 1990 NASA renamed its quality and excellence award after him. See "Low, George M.," Deputy Administrator file 004133, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC and "George M. Low" (*http://www.hq.nasa.gov/office/pao/History/Biographies/low.html*) accessed 23 October 2006.

M

Charles W. Mathews (1921–2001) was NASA's Associate Administrator for Applications from 1971 until 1976. After earning a B.S. in aerospace engineering from Rensselaer Polytechnic Institute in 1943, he immediately joined the engineering staff at the National Advisory Committee for Aeronautics Langley Research Center. Here he conducted research on supersonic flight, automatic control devices and systems for use in the interception of enemy bombers, and piloted spacecraft studies. In 1958, Mathews became chief of the NASA Space Task Group Operations Division and was responsible for the overall operations of Project Mercury. Upon the successful completion of the Mercury program, he was named Gemini Program Manager at the Manned Spacecraft Center in 1963. Following Gemini's success, Mathews was made the Director of the Skylab Program in 1966 and moved to NASA Headquarters. Two years later he became the Deputy Associate Administrator for Manned Space Flight. He retired from the organization in 1976 after thirty-three years of government service. See "Mathews, Charles W.," biographical file 001443, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Owen E. Maynard (1924–2000) was responsible for the conceptualization and design of the lunar module used in the Apollo program. After serving in the Royal Canadian Air Force in World War II, Maynard earned a degree in aeronautical engineering from the University of Toronto while working on and eventually designing aircraft at Avro Canada. He joined NASA in 1959 to work on the Mercury program and first became involved with Apollo the following year. Maynard was one of the early supporters of the lunar orbit rendezvous method and became the chief of engineering for the lunar module in 1963. He served as chief of the systems engineering division in the Apollo Spacecraft Program Office from 1964 to 1970, at which time he left NASA to work in the private sector

for the remainder of his career. See (*http://history.nasa.gov/maynard.html*) accessed 27 September 2006.

James A. McDivitt (1929–) commanded the Gemini 4 and Apollo 9 missions and was the program manager for Apollo 12 through Apollo 16. He earned a bachelor of science in aeronautical engineering from the University of Michigan in 1959, graduating first in his class. Before he was selected by NASA as an astronaut in 1962, McDivitt served in the U.S. Air Force and flew 145 combat missions during the Korean War. He is a graduate of both the USAF Experimental Test Pilot School and the USAF Aerospace Pilot Research course, after which he served as an experimental test pilot at Edwards Air Force Base, California. He left NASA and retired from the Air Force with the rank of Brigadier General in 1972 to work in leading executive positions in various private firms. McDivitt's awards include two NASA Distinguished Service Medals, four Distinguished Flying Crosses, and four Honorary Doctorates in science and law. See (*http://www.jsc.nasa.gov/Bios/htmlbios/mcdivitt-ja.html*) accessed 2 October 2006.

George E. Mueller (1918–) was Associate Administrator for the Office of Manned Space Flight at NASA Headquarters, 1963–1969, where he was responsible for overseeing the completion of Project Apollo and of beginning the development of the Space Shuttle. He moved to the General Dynamics Corp., as senior vice president in 1969, and remained until 1971. He then became president of the Systems Development Corporation, 1971–1980, and its chairman and CEO, 1981-1983. He was for a number of years the President of the International Academy of Astronautics and a founder of Kistler Aerospace. See "Mueller, George E.," biographical file 001520, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

N

Homer Newell (1915–1983) earned his Ph.D. in mathematics at the University of Wisconsin in 1940 and served as a theoretical physicist and mathematician at the Naval Research Laboratory from 1944–1958. During part of that period, he was science program coordinator for Project Vanguard and was acting superintendent of the atmosphere and astrophysics division. In 1958 he transferred to NASA to assume responsibility for planning and development of the new Agency's space science program. He soon became deputy director of space flight programs. In 1961 he assumed directorship of the office of space sciences; in 1963, he became associate administrator for space science and applications. Over the course of his career, he became an internationally known authority in the field of atmospheric and space sciences as well as the author of numerous scientific articles and seven books, including *Beyond the Atmosphere: Early Years of Space Science* (Washington, DC: NASA SP-4211, 1980). He retired from NASA at the end of 1973. "Newell General," Deputy Administrator file 4493, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Richard M. Nixon (1913–1994) was president of the United States when the first man landed on the Moon, serving between January 1969 and August 1974. Early in his presidency, Nixon appointed a Space Task Group under the direction of Vice President Spiro T. Agnew to assess the future of spaceflight in the nation. Its report recommended a vigorous post-Apollo exploration program culminating

in a human expedition to Mars. Nixon did not approve this plan, but did decide in favor of building one element of it, the Space Shuttle, which was approved on January 5, 1972. See Roger D. Launius, "NASA and the Decision to Build the Space Shuttle, 1969-72," *The Historian* 57 (Autumn 1994): 17–34.

Warren North (1922–) earned a B.S. from the University of Illinois in 1947. From then until 1955 he was an engineer and test pilot for the Lewis Laboratory. From 1956-1959 he served as assistant chief of the aerodynamics branch at Lewis. He then transferred to NASA Headquarters, where he took part in early planning for Project Mercury, including the selection and training of the seven Mercury astronauts. He moved in 1962 to the Manned Spacecraft Center (later the Johnson Space Center), where he headed the division responsible for training the astronauts for the Gemini rendezvous and docking operations and the Apollo lunar landings. He continued to work in the fields of astronaut selection and training until he retired in 1985 as special assistant to the director of flight operations in planning space shuttle crew training. ("Warren North," biographical file 001608, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.)

P

Thomas O. Paine (1921–1992) was appointed Deputy Administrator of NASA on January 31, 1968. Upon the retirement of James E. Webb on October 8, 1968, he was named Acting Administrator of NASA. He was nominated as NASA's third Administrator March 5, 1969, and confirmed by the Senate on March 20, 1969. During his leadership the first seven piloted Apollo missions were flown, in which 20 astronauts orbited Earth, 14 traveled to the Moon and four walked upon its surface. Paine resigned from NASA on September 15, 1970 to return to the General Electric Co. in New York City as Vice President and Group Executive, Power Generation Group, where he remained until 1976. In 1985 the White House chose Paine as chair of a National Commission on Space to prepare a report on the future of space exploration. Since leaving NASA fifteen years earlier, Paine had been a tireless spokesman for an expansive view of what should be done in space. The Paine Commission took most of a year to prepare its report, largely because it solicited public input in hearings throughout the United States. The Commission report, *Pioneering the Space Frontier*, was published in a lavishly illustrated, glossy format in May 1986. It espoused a "pioneering mission for 21st-century America"—"to lead the exploration and development of the space frontier, advancing science, technology, and enterprise, and building institutions and systems that make accessible vast new resources and support human settlements beyond Earth orbit, from the highlands of the Moon to the plains of Mars." The report also contained a "Declaration for Space" that included a rationale for exploring and settling the solar system and outlined a long-range space program for the United States. See Roger D. Launius, "NASA and the Decision to Build the Space Shuttle, 1969–72," *The Historian* 57 (Autumn 1994): 17-34 and "Thomas O. Paine" (*http://www.hq.nasa.gov/office/pao/History/Biographies/paine.html*) accessed 23 October 2006.

Samuel C. Phillips (1921–1990), was trained as an electrical engineer at the University of Wyoming, but he also participated in the Civilian Pilot Training Program during World War II. Upon his graduation in 1942 Phillips entered

the Army infantry but soon transferred to the air component. As a young pilot he served with distinction in the Eighth Air Force in England—earning two distinguished flying crosses, eight air medals, and the French croix de guerre—but he quickly became interested in aeronautical research and development. He became involved both in the development of the incredibly successful B-52 bomber in the early 1950s and headed the Minuteman intercontinental ballistic missile program in the latter part of the decade. In 1964 Phillips, by this time an Air Force general, was lent to NASA to head the Apollo Moon landing program. He went back to the Air Force in the 1970s and commanded Air Force Systems Command prior to this retirement in 1975. See "Gen. Samuel C. Phillips of Wyoming," *Congressional Record*, 3 August 1973, S-15689; Rep. John Wold, "Gen. Sarah H. Turner, "Sam Phillips: One Who Led Us to the Moon," *NASA Activities*, May/June 1990, pp. 18-19; obituary in *New York Times*, 1 February 1990, p. D1.

R

Milton Rosen (1915–), an electrical engineer by training, joined the staff of the Naval Research Laboratory in 1940, where he worked on guidance systems for missiles during World War II. From 1947 to 1955, he was in charge of Viking rocket development. He was technical director of Project Vanguard, the scientific earth satellite program, until he joined NASA in October 1958 as Director of Launch Vehicles and Propulsion in the Office of Manned Space Flight. In 1963 he became senior scientist in NASA's Office of the Deputy Associate Administrator for Defense Affairs. He later became Deputy Associate Administrator for Space Science (engineering). In 1974 he retired from NASA to become executive secretary of the National Academy of Science's Space Science Board. ("Milton W. Rosen," biographical file 001835, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC; see also his *The Viking Rocket Story* [New York: Harper, 1955].)

S

Julian Scheer (1926–2001) served as NASA's Assistant Administrator for Public Affairs from 1963 until 1971. He began his career in 1939 as an apprentice for a chain of weekly newspapers in his native Richmond, VA and went on to serve in the Merchant Marines during World War II and later in the U.S. Naval Reserve. Scheer earned a bachelor's degree from the University of North Carolina in 1950 and worked as the university's Assistant Director of Sports Information until he joined NASA in 1962 as a consultant. As NASA's missions progressed in the 1960s they attracted unprecedented public and press attention, creating ever-increasing demands for instantaneous information in every form. Under Scheer's direction, NASA anticipated and planned for the press needs in connection with Apollo piloted flights, including a worldwide communications network for disseminating television pictures live from the Moon on Apollo 11. His Public Affairs program received several national awards, including the 1970 University of Missouri School of Journalism Special Achievement Award which cited the NASA program "for its outstanding, almost inconceivable, contributions to journalism technology." His personal awards include NASA's Exceptional Service Medal in 1968 and the Distinguished Service Medal in 1969. See "Scheer, Julian," biographical file 001902, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Walter M. Schirra, Jr. (1923– 2007) was one of the original seven astronauts chosen by NASA in 1959. He became the fifth American in space in 1963 when he piloted the Mercury 8 mission. Schirra earned a bachelor of science degree from the United States Naval Academy in 1945. As a Navy pilot he flew 90 combat missions over Korea and was awarded the Distinguished Flying Cross and two Air Medals for his service. He then attended the Naval Air Safety Officer School at the University of Southern California and completed test pilot training at the Naval Air Test center in 1958. Schirra was the only person to fly in America's first three space programs—Mercury, Gemini and Apollo—logging over 295 hours in space. In 1969 he was awarded three separate honorary doctorates in astronautical engineering, science, and astronautics. See "Schirra, Walter M. Mercury Flight," biographical file 001915, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC and (*http://www.jsc.nasa.gov/Bios/htmlbios/schirra-wm.html*) accessed 23 October 2006.

Harrison H. Schmitt (1935–) occupied the lunar module pilot seat as a scientist-astronaut on Apollo 17. Schmitt conducted the longest and most productive lunar exploration of the Apollo program during this mission, spending twenty-two hours exploring the surface of the Moon and bringing back the largest lunar sample to date. He earned a bachelor of science degree from the California Institute of Technology in 1957 and a doctorate in geology from Harvard in 1964. Before joining NASA in 1965, Schmitt worked with the U.S. Geological Survey's Astrogeology Center at Flagstaff, Arizona, where he was project chief for lunar field geological methods. While at this position, he was among the USGS astrogeologists that instructed NASA astronauts during their geological field trips. In 1974, after assuming additional duties as Chief of Scientist-Astronauts, he was appointed NASA Assistant Administrator for Energy Programs. Dr. Schmitt left NASA in 1975 to run for the United States Senate and subsequently served a six-year term in his home state of New Mexico. In 2005 he became chair of the NASA Advisory Council. See "Schmitt, Dr. Harrison (Jack) thru A-17," biographical file 001925, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC and (*http://www.jsc.nasa.gov/Bios/htmlbios/schmitt-hh.html*) accessed 3 October 2006.

William C. Schneider (1923–1999) joined NASA in June 1963 and was the Gemini mission director for seven of the ten piloted Gemini missions. From 1967 to 1968, he served as Apollo mission director and the Apollo program's deputy director for missions. He then served from 1968 to 1974 as the Skylab program's director. After that, he worked as the Deputy Associate Administrator for Space Transportation Systems for almost four years. From 1978 to 1980, he served as the Associate Administrator for Space Tracking and Data systems. He received a Ph.D. in engineering from Catholic University. See "Schneider, William C.," biographical file 001927, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Russell L. Schweickart (1935–) served as lunar module pilot during the Apollo 9 mission in 1969, during which he tested the portable life support backpack which was subsequently used on the lunar surface explorations. He earned a bachelor of science degree from the Massachusetts Institute of Technology in 1956 and then served as a fighter pilot in the Massachusetts Air National Guard until 1963. He then returned to MIT as a graduate student and research scientist

at the school's Experimental Astronomy Laboratory, earning a master of science degree in 1963. That same year, Schweickart was selected by NASA to be in the third group of astronauts and fly in the Apollo program. After Apollo he served as backup commander for the first Skylab mission in 1973 and assumed responsibility for the development of hardware and procedures associated with erecting the emergency solar shade and deployment of the jammed solar array wing following the loss of the Skylab vehicle's thermal shield. Schweickart finished his career at NASA serving as the Director of User Affairs in the Office of Applications in Washington, DC. (*http://www.jsc.nasa.gov/Bios/htmlbios/schweickart-rl.html*) accessed 3 October 2006.

David R. Scott (1932–) was selected as one of the third group of astronauts in 1963 and flew in the Gemini 8, Apollo 9, and Apollo 15 missions. He graduated near the top of his class at West Point with a bachelor of science degree and then chose to commission into the Air Force. He completed pilot training at Webb Air Force Base, Texas, in 1955 and was assigned to the 32d Tactical Fighter squadron stationed in Netherlands until 1960. Upon completing his tour of duty, Scott returned to the U.S. to study at MIT where he earned a master of science degree in aeronautics and astronautics as well as an engineering degree in aeronautics and astronautics, both in 1962. After leaving the astronaut corps in 1972, he was named Technical Assistant to the Apollo Program Manager at Johnson Space Center. He retired from the Air Force in March 1975 with the rank of Colonel and over 5600 hours of flying time. In that same year, Scott was appointed Director of Dryden Flight Research Center where he remained until he left NASA for private business ventures in 1977. Recently, Scott was the technical consultant to the 1998 HBO miniseries *From the Earth to the Moon*. See "Scott, David R. (Post – NASA)," biographical file 001958, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC and (*http://www.jsc.nasa.gov/Bios/htmlbios/scott-dr.html*) accessed October 3, 2006.

Robert C. Seamans, Jr. (1918–2008) was born on October 30, 1918, in Salem, Massachusetts. He attended Lenox School, Lenox, Massachusetts; earned a bachelor of science degree in engineering at Harvard University in 1939; a master of science degree in aeronautics at Massachusetts Institute of Technology (MIT) in 1942; and a doctor of science degree in instrumentation from MIT in 1951. Dr. Seamans also received the following honorary degrees: doctor of science from Rollins College (1962) and from New York University (1967); doctor of engineering from Norwich Academy (1971), from Notre Dame (1974), and from Rensselaer Polytechnic Institute (RPI) in 1974. In 1960, Dr. Seamans joined NASA as Associate Administrator. In 1965, he became Deputy Administrator, retaining many of the general management-type responsibilities of the Associate Administrator and also serving as Acting Administrator. During his years at NASA he worked closely with the Department of Defense in research and engineering programs and served as Co-chairman of the Astronautics Coordinating Board. Through these associations, NASA was kept aware of military developments and technical needs of the Department of Defense and Dr. Seamans was able to advise that agency of NASA activities which had application to national security. Seamans left NASA in late 1967; in 1969 President Nixon named him Secretary of the Air Force. He subsequently became the first Administrator of the Energy Research and Development Administration. For further information on Robert C. Seamans, Jr., see his autobiography, *Aiming at Targets* (Washington, DC: NASA

SP-4106, 1996), his monograph *Project Apollo: the Tough Decisions* (Washington, DC: NASA SP-2005-4536, 2005), and "Robert C. Seamans, Jr." (*http://www.hq.nasa.gov/office/pao/History/Biographies/seamans.html*) accessed 23 October 2006.

Joseph F. Shea (1926–1999) served NASA as Deputy Director of the Office of Manned Space Flight at Headquarters in Washington, DC, and as manager of the Apollo spacecraft program in Houston. He earned bachelor's degrees in both engineering and mathematics and a master's and doctorate degree in engineering mechanics, all at the University of Michigan. Shea worked in numerous positions in private companies, including Space Program Director at the Space Technology Laboratories in California, Advance Systems R & D Manager with General Motors, and Military Development Engineer with the Bell Telephone Laboratories. Shea officially retired from NASA in 1993 after his health began to fail him. He also was Senior Vice President for Engineering at Raytheon Co. from 1980 until his death in 1999. See "Shea, Joseph F.," biographical file 2007, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Alan B. Shepard, Jr. (1923–1998) was a member of the first group of seven astronauts in 1959 chosen to participate in Project Mercury. He was the first American in space, piloting Mercury-Redstone 3 (*Freedom 7*), and was backup pilot for Mercury-Atlas 9. He was subsequently grounded due to an inner-ear ailment until May 7, 1969 (during which time he served as chief of the astronaut office). Upon returning to flight status Shepard commanded Apollo 14, and in June 1971 resumed duties as chief of the astronaut office. He retired from NASA and the U.S. Navy on August 1, 1974, to join the Marathon Construction Company of Houston, Texas, as partner and chairman. See Alan Shepard and Deke Slayton, *Moonshot: The Inside Story of America's Race to the Moon* (New York: Turner Publishing, Inc., 1994); The Astronauts Themselves, *We Seven* (New York: Simon and Schuster, 1962); (*http://www.jsc.nasa.gov/Bios/htmlbios/schirra-wm.html*) accessed 23 October 2006.

Hugh S. Sidey (1927–2005) was a top reporter for *Time* and *Life* magazines during the Kennedy Presidency. He graduated from Iowa State University with a bachelor's degree in 1950 and immediately began working with numerous publications such as the *Omaha World-Herald* and the *Free Press*. He would later author a biography of President Kennedy entitled *John F. Kennedy, President*. See *Who's Who in America, 1966-1967* (Chicago, IL: Marquis, 1966).

Abe Silverstein (1908–2001), who earned a B.S. in mechanical engineering (1929) and an M.E. (1934) from Rose Polytechnic Institute, was a longtime NACA manager. He had worked as an engineer at the Langley Aeronautical Laboratory between 1929 and 1943 and had moved to the Lewis Laboratory (later, Research Center) to a succession of management positions, the last (1961–1970) as director of the Center. Interestingly, in 1958 Case Institute of Technology had awarded him an honorary doctorate. When Glennan arrived at NASA, Silverstein was on a rotational assignment to the Washington headquarters as Director of the Office of Space Flight Development (later, Space Flight Programs) from the position of Associate Director at Lewis, which he had held since 1952. During his first tour at Lewis, he had directed investigations leading to significant improvements in reciprocating and early turbojet engines. At NASA Headquarters he helped create and direct the efforts leading to the space flights of Project Mercury and

to establish the technical basis for the Apollo program. As Lewis's director, he oversaw a major expansion of the Center and the development of the Centaur launch vehicle. He retired from NASA in 1970 to take a position with Republic Steel Corp. On the career of Silverstein see, Virginia P. Dawson, *Engines and Innovation: Lewis Laboratory and American Propulsion Technology* (Washington, DC: NASA SP-4306, 1991), passim; "Silverstein, Abe," biographical file 002072, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Donald K. Slayton (1924–1993) was named one of the original seven Mercury astronauts in 1959, but was relieved of this assignment following the discovery of a heart condition in August of that same year. Instead he assumed the role of Director of Flight Crew Operations in 1963, bringing upon himself the responsibilities of directing the activities of the astronaut office, the aircraft office, the flight crew integration division, the crew training and simulation division, and the crew procedures division. Born and raised in Sparta, Wisconsin, Slayton joined the Air Force after high school and earned his wings in 1943. As a B-25 pilot with the 340th and 319th Bombardment groups, he flew a total of 63 combat missions over Europe and Japan. Upon completion of his tour of duty he attended the University of Minnesota, earning a bachelor of science degree in aeronautical engineering in 1949. He then worked for two years as an aeronautical engineer with the Boeing Aircraft Corporation until he was recalled to active duty in 1951 with the Minnesota Air National Guard. After his second tour of duty, he attended the USAF Test Pilot School in 1955 at Edwards Air Force Base, California, where he subsequently served as a test pilot until 1959. Slayton resigned from the Air Force in 1963 to fully devote himself to his duties at NASA. In 1972, following a comprehensive review of his medical status, he was finally restored to full flight status and certified eligible for piloted space flight. Two years later he made his first space flight as Apollo docking module pilot of the Apollo-Soyuz Test Project, logging over 217 hours in space. Slayton retired from NASA in 1982 and founded a company to develop rockets for small commercial payloads. (*http://www.jsc.nasa.gov/Bios/htmlbios/slayton.html*) accessed 16 October 2006.

Charles P. Sonnett (1924–) served as chief of NASA's Lunar and Planetary Sciences from 1960–62. He earned a bachelor of arts degree in physics from the University of California at Berkeley in 1949 and a masters and Ph.D. both in Nuclear Physics from the University of California at Los Angeles in 1951 and 1954, respectively. From 1954 to 1960 he was the Senior Staff Head of the Space Physics Section of Space Technology Laboratories while at the same time lecturing in the U.C.L.A. department of engineering. In 1962 Dr. Sonnett became the head of the Space Sciences Division at Ames Research Center, where he oversaw research for the nation's space program in the areas of geophysics, interplanetary and planetary physics, planetary sciences, astronomy, and astrophysics. See "Sonnett, Dr. Charles P.," biographical file 002160, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

T

Edward Teller (1908–2003) was a naturalized American physicist born in Hungary who made important contributions to the development of both fission-

and fusion-type bombs. As a member of the advisory committee of the AEC, he advocated the hydrogen bomb as a U.S. tactical weapon, arousing a great deal of controversy. He also spoke publicly about Sputnik as showing that the Soviets were beginning to gain a lead on the U.S. in the fields of science and technology. Among other works on Teller, see the view of the insider, Herbert York, *The Advisors: Oppenheimer, Teller, and the Superbomb* (San Francisco: W. H. Freeman, 1976). For one perspective on Teller's more recent and still controversial activities in the world of science and defense technology, see William J. Broad, *Teller's War: The Top-Secret Story Behind the Star Wars Deception* (New York: Simon & Schuster, 1992).

Albert Thomas (1898–1966) (D-TX), a lawyer and World War I veteran, had first been elected to the House of Representatives in 1936 and served successively until 1962. In 1960–1962 he was chair of the independent offices subcommittee of the House Appropriations Committee and thus exercised considerable congressional power over NASA's funding. "Thomas, Albert," biographical file 002295, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Howard W. Tindall (1925–1995) was an expert in orbital mechanics and a key figure in the development of rendezvous techniques for Gemini and lunar trajectories for Apollo. He was directly responsible for planning all ten of the Gemini missions at the Manned Spacecraft Center in Houston. Tindall received a bachelor of science degree in mechanical engineering from Brown University in 1948 and subsequently joined the National Advisory Committee for Aeronautics at Langley Research Center that same year. He moved to Houston in 1961 to assume mission planning responsibilities in the Flight Operations Directorate for Gemini. He gained popularity within the organization for his irreverently written "Tindallgrams" which captured the details of complicated aspects of key flight problems. In 1970, Tindall was appointed deputy director of Flight Operations, and in 1972, he became director. He retired from NASA in 1979 after thirty-one years of service. See "Tindall, Howard W., Jr.," biographical file 004812, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

V

Cyrus Vance (1917–2002) had a long career as a senior government official in various Democratic administrations. He had been general counsel for the Department of Defense during the Kennedy administration of the early 1960s, and as Secretary of the Army, 1962-1964. He was Deputy Secretary of Defense, 1964–1967. He served as Secretary of State for President Jimmy Carter in the latter 1970s. See "Vance, Cyrus R[oberts]," *Current Biography 1977*, pp. 408-11.

Robert B. Voas (1928–) was part of the first Space Task Group in 1958 and helped to conceptualize the criteria for the selection of astronauts. He earned a bachelor of arts, master of science and Ph.D. in psychology from the University of California in Los Angeles, as well as a bachelor of philosophy degree from the University of Chicago. Voas served in the United States Navy where he reached the rank of lieutenant and logged about three hundred hours in jet aircraft. After being assigned to NACA in 1958, Voas went on to serve as Training

Officer for project Mercury and later proposed the selection process for the Gemini astronauts. See "Voas, Robert B.: Biography," biographical file 002449, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Wernher von Braun (1912–1977) was the leader of what has been called the "rocket team," which had developed the German V-2 ballistic missile in World War II. At the conclusion of the war, von Braun and some of his chief assistants—as part of a military operation called Project Paperclip—came to America and were installed at Fort Bliss in El Paso, Texas, to work on rocket development and use the V-2 for high altitude research. They used launch facilities at the nearby White Sands Proving Ground in New Mexico. Later, in 1950 von Braun's team moved to the Redstone Arsenal near Huntsville, Alabama, to concentrate on the development of a new missile for the Army. They built the Army's Jupiter ballistic missile, and before that the Redstone, used by NASA to launch the first Mercury capsules. The story of von Braun and the "rocket team" has been told many times. See, as examples, David H. DeVorkin, *Science With a Vengeance: How the Military Created the US Space Sciences After World War II* (New York: Springer-Verlag, 1992); Frederick I. Ordway III and Mitchell R. Sharpe, *The Rocket Team* (New York: Thomas Y. Crowell, 1979); Erik Bergaust, *Wernher von Braun* (Washington, DC: National Space Institute, 1976); "Wernher von Braun,"(*http://history.nasa.gov/sputnik/braun.html*) accessed 23 October 2006; "Marshall Space Flight Center (MSFC)," (*http://history.nasa.gov/centerhistories/marshall.htm*) accessed 23 October 2006.

W

James E. Webb (1906–1992) was NASA Administrator between 1961 and 1968. Previously he had been an aide to a Congressman in New Deal Washington, an aide to Washington lawyer Max O. Gardner, and a business executive with the Sperry Corporation and the Kerr-McGee Oil Co. He had also been director of the Bureau of the Budget between 1946 and 1950 and Under Secretary of State, 1950–1952. See W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore, MD: Johns Hopkins University Press, 1995) and "James E. Webb" (*http://www.hq.nasa.gov/office/pao/History/Biographies/webb.html*) accessed 23 October 2006.

Caspar W. Weinberger (1917–2006), longtime Republican government official, was a senior member of the Nixon, Ford, and Reagan administrations. For Nixon he was deputy director (1970–1972) and director (1972–1976) of the Office of Management and Budget. In this capacity he had a leading role in shaping the direction of NASA's major effort of the 1970s, the development of a reusable Space Shuttle. For Reagan he served as Secretary of Defense, where he also oversaw the use of the Shuttle in the early 1980s for the launching of classified Department of Defense payloads into orbit. See "Weinberger, Caspar W(illard)," *Current Biography 1973*, pp. 428-30.

Edward C. Welsh (1909–1990) had a long career in various private and public enterprises. He had served as legislative assistant to Senator Stuart Symington (D-MO), 1953–1961, and was the executive secretary of the National Aeronautics and Space Council through the 1960s. See "Welsh, Dr. Edward C.," biographical

file 002546, NASA Historical Reference Collection, NASA History Division, NASA Headquarters, Washington, DC.

Jerome B. Wiesner (1915–1994) was Science Advisor to President John F. Kennedy. He had been a faculty member of the Massachusetts Institute of Technology, and had served on President Eisenhower's Science Advisory Committee. During the presidential campaign of 1960, Wiesner had advised Kennedy on science and technology issues and chaired a transition team report on the space program that questioned the value of human spaceflight. As Kennedy's Science Advisor he tussled with NASA over the lunar landing commitment and the method of conducting it. See Gregg Herken, *Cardinal Choices: Science Advice to the President from Hiroshima to SDI* (New York: Oxford University Press, 1992).

Edward H. White, Jr. (1930–1967) piloted the Gemini 4 mission during which he carried out the first extra vehicular activity. He graduated with a bachelor of science degree from the United States Military Academy in 1952 and then was commissioned into the Air Force. Following his flight training, he was stationed in Germany for three and a half years with a fighter squadron, flying F-86's and F-100's. White then returned to the United States and earned a master of science degree in aeronautical engineering from the University of Michigan in 1959. That same year he attended the Air Force Test Pilot School at Edwards Air Force Base, California, and was later reassigned to Wright-Patterson Air Force Base in Ohio as an experimental test pilot with the Aeronautical Systems Division. He was named a member of the second group of astronauts selected by NASA in 1962. After piloting Gemini 4 and serving as backup command pilot for Gemini 7, he was named as one of the pilots for the Apollo 1 mission. Lieutenant Colonel White died on January 27, 1967 in the Apollo spacecraft flash fire during a launch pad test at Kennedy Space Center, Florida, and was posthumously awarded the Congressional Space Medal of Honor. See "Edward H. White, II," (*http://www.jsc.nasa.gov/Bios/htmlbios/white-eh.html*) accessed 30 October 30, 2006.

Walter C. Williams (1919–1995) earned a B.S. in aerospace engineering from LSU in 1939 and went to work for the NACA in 1940, serving as a project engineer to improve the handling, maneuverability, and flight characteristics of World War II fighters. Following the war, he went to what became Edwards Air Force Base to set up flight tests for the X-1, including the first human supersonic flight by Capt. Charles E. Yeager in October 1947. He became the founding director of the organization that became Dryden Flight Research Facility. In September 1959 he assumed associate directorship of the new NASA Space Task Group at Langley, created to carry out Project Mercury. He later became director of operations for the project, then associate director of the NASA Manned Spacecraft Center in Houston, subsequently renamed the Johnson Space Center. In 1963 Williams moved to NASA Headquarters as Deputy Associate Administrator of the Office of Manned Space Flight. From 1964 to 1975, he was a vice president for Aerospace Corporation. Then from 1975-1982 he served as chief engineer of NASA, retiring in the latter year. See "Williams, W.C.," biographical file 002618, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

Z

Charles H. Zimmerman (1907–) was handpicked by Robert R. Gilruth to serve on the first Space Task Group in 1958 and served as Director of Aeronautical Research in NASA's Office of Advanced Research and Technology from 1962-1963. He received a B.S. in electrical engineering from the University of Kansas in 1929 and joined the staff of the National Advisory Committee for Aeronautics in that same year. He spent the next 33 years of his life in government and private industry developing and improving new aircraft. Zimmerman earned a master's degree in aeronautical engineering from the University of Virginia in 1954 and two years later was the recipient of both the Alexander Klemin Award of the American Helicopter Society and the Wright Brothers Medal of the Society of Automotive Engineers. See "Charles H. Zimmerman," biographical file 002882, NASA Historical Reference Collection, History Division, NASA Headquarters, Washington, DC.

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