



*John F Gardner*

# JOHN F. YARDLEY

1925–2001

Elected in 1977

*“For contributions to engineering theory and practice and leadership of organizations that pioneered major space programs.”*

BY CHRISTOPHER KRAFT

**J**OHAN F. YARDLEY was one of many great engineers and scientists who contributed to the success of the U.S. manned spaceflight program, but few had more of an impact than him. He died on June 26, 2001, at the age of 76.

John was born in St. Louis, Missouri, on February 1, 1925, to F. A. and Johnnie (Patterson) Yardley. He served in the U.S. Navy as an ensign from 1943 to 1946, during which time he received a B.S. in aeronautical engineering from Iowa State University. In 1946 he married Phyllis Steele and started work as a stress analyst with the McDonnell Aircraft Corporation in St. Louis.

From 1946 to 1958, John contributed to numerous McDonnell aircraft designs and took on increasing responsibilities for structural analysis and design, serving as chief strength engineer from 1955 to 1958. In 1950 he earned an M.S. in applied mechanics from Washington University. The aircraft programs he contributed to included the FH-1 Phantom, the F-2H Banshee, the F-101 Voodoo, and several experimental aircraft. For a time he headed McDonnell's Structural Research/Structural Methods Group and was responsible for developing advanced analytical methods.

In the very early days of the establishment of the first man in space project, John became an intimate part of the team at McDonnell Aircraft Corporation that proposed to the National Aeronautics and Space Administration (NASA) a spacecraft capable of putting men in space, orbiting Earth, and returning them safely. John recognized early on that the job of building a manned spacecraft was very different from the previous flying vehicles that his company had been building. He saw that the task was more one of system engineering and that it would require the melding of the entire gamut of systems required to support the life of a pilot in an entirely new environment of zero gravity and a near-perfect vacuum. It was this recognition and design approach that won the NASA contract for McDonnell to build the first manned spacecraft that flew Alan Shepard and John Glenn into space. From 1958 to 1960, John served as Project Engineer for the Mercury spacecraft design.

In addition, many new areas of technology had to be assembled to carry out the objectives of orbiting Earth. These included environmental support systems, attitude control systems, navigation devices, heat protection materials, retrofire devices, and pilot pressure suits and contoured seats for withstanding the high temperatures and g-forces of reentry. Along with his NASA counterparts, John created this new flying machine in a relatively short period of time under great political and scientific pressures.

After delivery of the first spacecraft to Cape Canaveral for launch into space, McDonnell and NASA recognized the need for people to prepare and operate the systems for launch and to assure that the spacecrafts were indeed ready to fly. In 1960, Yardley was selected as the launch operations manager for Mercury and led this group at Cape Canaveral for the entire Mercury project. He was also active as a participant in support of the in-flight activity and the flight control team that conducted the flight operations.

As the Mercury project unfolded and President Kennedy challenged the country to send men to the Moon, Yardley was again called on by McDonnell to design and build a space vehicle capable of conducting the many facets of spaceflight

operations necessary to formulation of the operations concepts being developed to travel to the Moon, land on the Moon, and return safely to Earth. Utilizing the lessons learned on Mercury, McDonnell and Yardley proposed and were awarded a contract to build the Gemini spacecraft for carrying out the extensive spaceflight operations necessary for preparations to travel to and from the Moon. From 1964 to 1968, John served as Gemini's technical director. The Gemini program, although it had many difficult problems and less than spectacular results at times, produced the operational experience absolutely essential to carrying out the lunar landing program.

John Yardley was a major contributor to these exploratory missions. The program produced a large number of firsts, which the Apollo program then utilized to build its success. Gemini conducted a series of rendezvous maneuvers to determine the most effective techniques to rendezvous two vehicles in space. This required the development of space radar systems to determine range and range rate, computer programs to compute the maneuvers required, an onboard computer for making calculations, devices for displaying information to the pilots, and docking mechanisms to bring the space vehicles together. In addition, the program developed such new systems as fuel cells to provide electric power and the ability to perform a controlled entry path to a specific landing area through an automatic control system guided by means of an onboard computer. Also, Gemini brought about the first U.S. extravehicular activity by an astronaut and a long-duration flight of 14 days by two men to assure that humans could work and survive at zero gravity for the length of time required to travel to and from the Moon.

Starting in 1968, John became vice president and deputy general manager of the Eastern Division of McDonnell Douglas Astronautics. During the Apollo program, he served the nation as an expert in many fields as the program progressed through testing and development. At the time of the tragic accident on the launch pad in 1967, Yardley was called on to aid in the review of the accident's cause and his knowledge and experience were very helpful in bringing

about a rapid and technically sound solution to the problems found. During this period, John's responsibilities included the Apollo Applications program (Skylab).

As the nation sought to construct a follow-on space program, the Nixon administration, along with NASA and the Congress, decided the next affordable step to exploring outer space required a lower-cost space transportation system capable of transporting large and heavy masses into orbit. After considerable study, debate, and haggling, a consensus was arrived at with the Space Shuttle program, which consisted of a partially reusable space transportation system.

NASA started the program with a team of government and industry organizations and, because of the scope of this group, established a management scheme to be led by a group at the headquarters level reporting directly to the NASA administrator. As the program began to develop, NASA sought an experienced engineering manager from the aerospace industry to lead the effort. In 1974 the NASA hierarchy prevailed on John Yardley to leave his post at the McDonnell Douglas Corporation and join NASA to become associate administrator for manned space flight. This was an extremely daunting task given the political and budgetary circumstances surrounding the space program in the 1970s. In addition to the Space Shuttle program, the position included overall management responsibility for Spacelab, Skylab, and NASA's expendable launch vehicles.

John assembled a group of engineers and managers to help manage the three NASA centers and the numerous aerospace companies in the detailed design and manufacturing of the first reusable spacecraft. He had to continuously interact with Congress and the White House to assure both political support and continued budgetary support. The biggest problem was the ever-decreasing funding which forced the schedule to be continuously extended. These delays also had a damaging effect on the progress of the construction of new factories and thereby delayed many of the technical and construction decisions from being made in a timely manner. Yardley was a fiercely competitive manager in this environment and with

the help of his colleagues brought the first Space Shuttle to the launch pad. After the first successful flight in 1981, John returned to St. Louis as president of McDonnell Douglas Astronautics, with responsibility for space, missile, and electronics programs. He retired in 1989.

The success of the Space Shuttle program cannot be overpraised. Its accomplishments were truly outstanding. Such equipment as the Hubble Space Telescope, numerous U.S. Department of Defense payloads that support intelligence efforts, numerous commercial satellites, other complex scientific satellites, and eventually the delivery and assembly of the International Space Station are testimony to the significance of the Space Shuttle program.

John received many honors and awards during his distinguished career. In addition to his election to the National Academy of Engineering in 1977, he was elected a fellow of both the American Institute of Aeronautics and Astronautics and the American Astronautical Society. He received NASA Public Service awards for contributions to the Mercury and Gemini programs in 1963 and 1966, respectively. In 1973 he was awarded the Spirit of St. Louis Medal by the American Society of Mechanical Engineers. He also received alumni citations from his alma maters—Iowa State (1970 and 1976) and Washington University (1975). NASA awarded him a Special Achievement Award and its Distinguished Service Medal in 1981, and in 1983 the National Space Club awarded him the Goddard Trophy.

John Yardley was a first-class engineer, a great manager of complex engineering programs, a highly respected leader, and a fine supporter of the fundamental fabric required to keep our country great. At the time of his death, he was survived by his wife Phyllis, four daughters, a son, nine grandchildren, and several great-grandchildren.