Project Mercury

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Introduction

Traveling in space has been a thought of man throughout history. The actual beginning of the effort began during the Cold War. The United States going into space and to the moon had many benefits. In addition to the main achievement, there were many spinoff products that came out of the knowledge we gained from the space program.

Project Mercury was the United States program to put a man into Earth's orbit and return him safely. Project Mercury was the basis for more ambitious programs. It was the first of three programs; Mercury, Gemini, and Apollo that would lead the United States to the Moon. It began in 1958 and was completed in 1963. This was the portion of the Space Program that was portrayed in the movie "The Right Stuff". It had its origins in the arms race after World War 2 between the United States and the Soviet Union, that developed into the space race after the 1957 Sputnik 1 launch. This launch is what convinced the American public to support a manned space flight program. Part of the arms race was using test pilots to fly higher and faster than the last and to always try to stay ahead of the Soviet Union. Captain Charles "Chuck" Yeager made the first supersonic flight on October 14, 1947 in the XS-1 rocket plane that was part of the X series research conceived in 1944.

Experimentation with the V-2 rocket began in 1948 by sending a primate into space on June 11, 1948. The primate, named Albert, died of suffocation. On June 6, 1949, Albert II was launched, but died on the return to earth.

In June of 1952, the NACA Committee on Aerodynamics increased research efforts. The two areas of main concern were aerodynamic heating and stability and control at high speeds and altitudes.

Engineering and project management played a vital role in the space race. The program had its successes and failures. They learned from the failures and made adjustments as necessary.

Project Mercury officially began on October 7, 1958. The life of Project Mercury began with this official beginning and lasted until the 34-hour orbital mission of Astronaut Gordon Cooper. Project Mercury had six manned flights from 1961 to 1963. Not only was Project Mercury a test of engineering and man, it was a production for the media.

Project Mercury had three main objectives at the time of project go-ahead. The first was to place a manned spacecraft into orbit around the earth. The second was to evaluate man's performance capabilities and ability to function in space. The third objective was safely recover the man and spacecraft.

They worked to accomplish the objectives of the Mercury Project within certain guidelines established to assure a safe and expedient approach. The established guidelines were as follows:

1) Existing technology and off the shelf equipment should be used where practical.
2) The simplest and most reliable approach to system design would be followed.

3) An existing launch vehicle would be used to put the spacecraft into orbit.

4) A progressive and logical test program would be conducted.

More detailed requirements for the spacecraft were established as follows:

1) The spacecraft must be fitted with a reliable launch-escape system to separate the spacecraft and its crew from the launch vehicle in case of impending failure.
2) The pilot must be given the capability of manually controlling spacecraft attitude.
3) The spacecraft must carry a retrorocket system capable of reliably providing the necessary impulse to bring the spacecraft out of orbit.
4) A zero-lift body utilizing drag braking to be used for reentry.
5) The spacecraft design must satisfy the requirements for a water landing.

In order to be successful, Project Mercury had to build a spacecraft, a launch vehicle and select a pilot. They learned from each flight and incorporated the lessons learned into the next flight.

The Spacecraft Design

The Mercury spacecraft design and development phases were conducted concurrently. The Project Mercury spacecraft design to meet the detailed requirements is shown in Figure 1. The spacecraft was produced by McDonnell Aircraft Corporation. They were chosen as the prime contractor for the spacecraft in January 1959. The principle designer for the spacecraft was M.A. Faget.

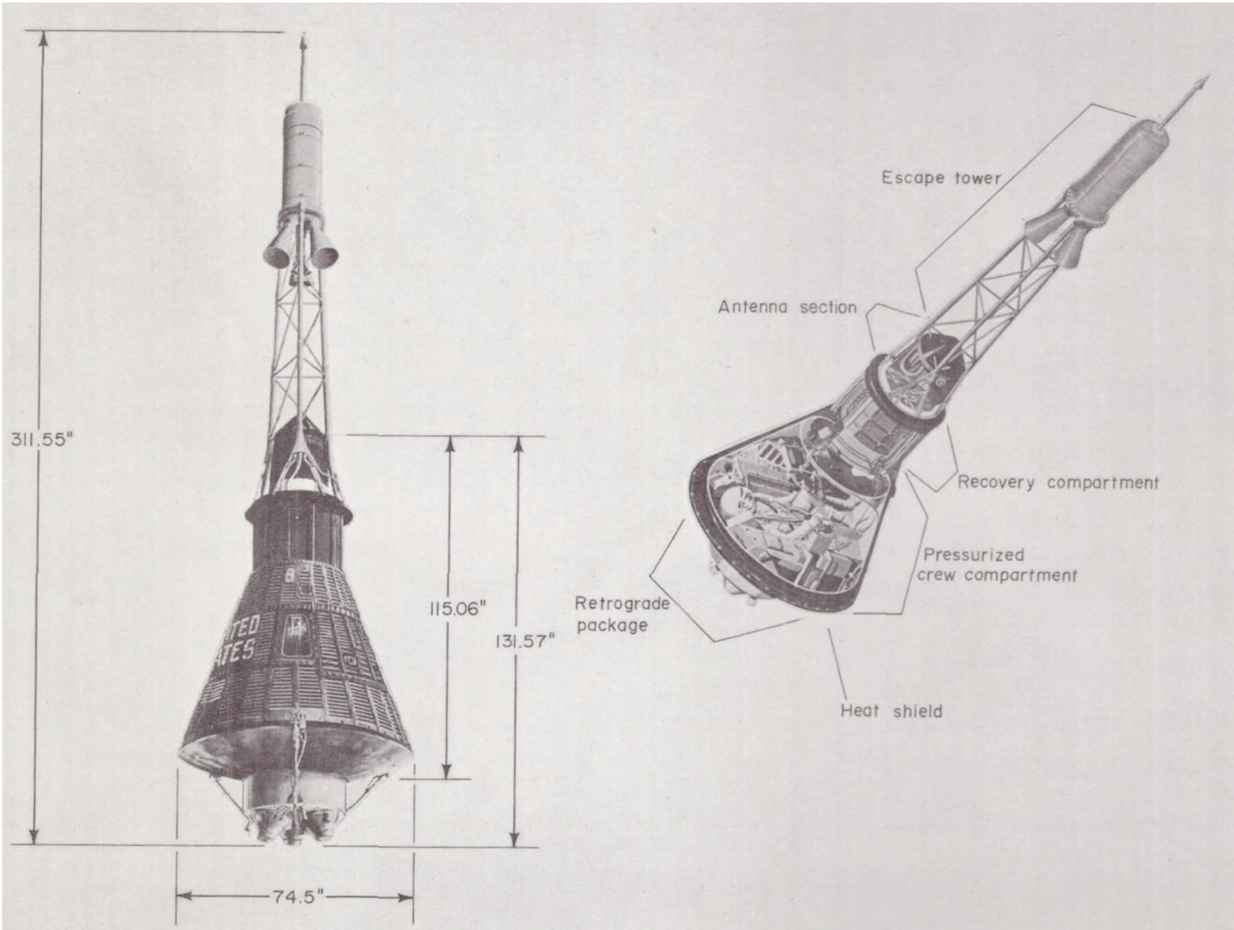

Figure 1.Project Mercury spacecraft design

The first spacecraft was designed as a cone-shaped capsule with a cylinder mounted on top. It was designed as a one-man capsule that was approximately two meters long and 1.9 meters in diameter. There was a 5.8 meter escape tower fastened to the cylinder. The blunt end of the capsule was covered with a heat shield to protect it during the reentry portion of the flight, where 3000 deg F heat was possible. The outer skin of the capsule was made from Rene 41 (UNS N07041), a high nickel alloy with excellent high temperature mechanical properties.

The complexity of the spacecraft was increased by redundancy more than any other requirement. We take this for granted in today's world of microchips and redundant systems that are common in control systems. The spacecraft first had to be qualified without a man aboard. Provisions for completely automatic operation of the critical spacecraft functions were provided. These automatic systems were backed up by redundant automatic systems to ensure reliable operation. Part of the reason for this was that the reactions of man and his capabilities in the space environment were unknown. Electrical and mechanical (manual) control systems were also employed.

The spacecraft had a launch-escape system that incorporated a solid rocket motor to propel the spacecraft rapidly away from the launch vehicle during an abort in the atmosphere. The tower assembly was designed to be jettisoned during powered flight once it was no longer required for an abort.

An important design feature of the Mercury spacecraft was the contour couch. It allowed the astronaut to be exposed to accelerations in a favorable manner. The pilot experienced these for all major g-loads occurring during powered flight, launch escape motor thrusting, posigrade motor thrusting, reentry, parachute deployment, and splashdown. The pilot was forced into the couch.

The spacecraft was a bell shaped design to create maximum drag. The mode of reentry was designed to be drag braking for simplicity. They designed a beryllium thermal heat shield employing the heat sink principle. This was later changed to a more efficient ablative (evaporative) design for the Mercury-Atlas orbital missions.

The retrorocket motors used a solid propellant for reliability. A system of three solid rocket motors was used. They were assembled in a package to be jettisoned for a safe reentry.

During and after landing, the spacecraft had to maintain its structural integrity. This was to be habitable after landing, since it may take time to recover the pilot. Touchdown decelerations had to be controlled to a level that was tolerable to the human body.

Also important to the human body were life support considerations. Some of these represented new design challenges. Gas partial pressure measurement and bioinstrumentation were two of these challenges. Another was the long-term attachment of sensor leads to the astronaut. Some of the life support systems for high performance aircraft experience could be adapted, but this was limited in the challenge of space. Space is a vacuum, and this presented a challenge.

The electrical systems were another challenge. Due to redundancy of systems and system complexity, extra effort had to be made to eliminate stray voltages, or back-door circuits. The consequences of stray voltages were shown in the Little Joe 1 (LJ-1) mission, which was the first launch attempt using a full-scale Mercury spacecraft. In the final moments of countdown, during a spacecraft battery charging operation, a stray voltage started the launch escape sequence. The battery was only partially charged, so only the drogue parachute deployed. Since the main parachute was not deployed, the spacecraft was destroyed upon landing. This back door circuit had to be located and eliminated.

A production spacecraft was a reasonable complete spacecraft that contained many or most of the systems that were used in the manned missions. There were also boilerplate spacecraft for testing (usually made from steel plates) that did not have the systems used in manned flight.

The spacecraft-system testing was grouped into two types of testing. One was ground testing for research, design, development, qualification, acceptance, and checkout. Another type of testing was flight tests using other than production spacecraft for research studies, development tests, and qualification programs.

The Launch Vehicle

The launch vehicle was created by adapting existing technology, the Atlas Missile. A flight test program schedule was developed for three primary types of tests. One type of test was the research and development tests. The second type of flight test was flight qualification of the production spacecraft. The third was the manned orbital flight tests. The flight tests involved using four basic types of launch vehicles. These were the Little Joe (escape system testing), the Mercury-Redstone (suborbital), the Mercury-Jupiter (cancelled), and the Mercury-Atlas (orbital). The planned flight test program was for 27 major launchings, of which 25 were actually conducted.

Of the planned tests, there was one Little Joe qualification flight planned. This was for the spacecraft abort testing. There were also eight flight tests planned with the Redstone launch vehicle. There were two flight test planned with the Jupiter launch vehicle. There were three qualification tests planned using the Atlas launch vehicle and the rest were to be used for manned orbital flight.

The manned fights used two launch vehicles, a Redstone (Figure 2) for the suborbital flights and an Atlas (Figure 3) for the orbital flights.

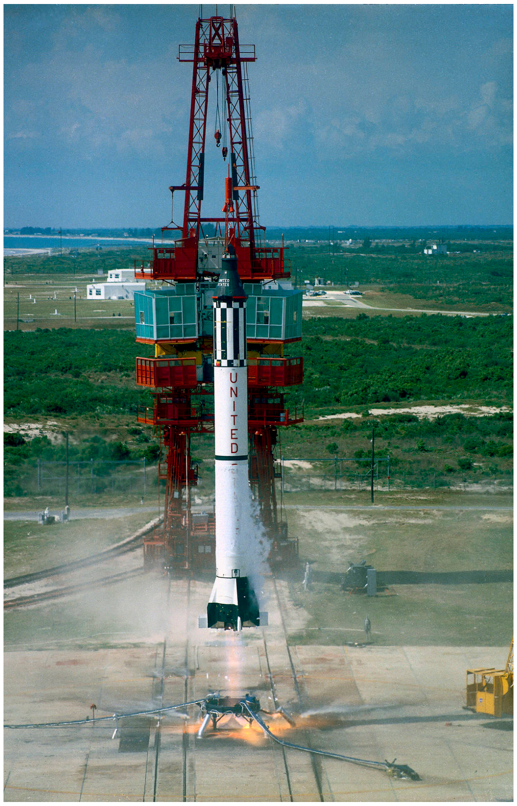

Figure 2. The Redstone launch vehicle

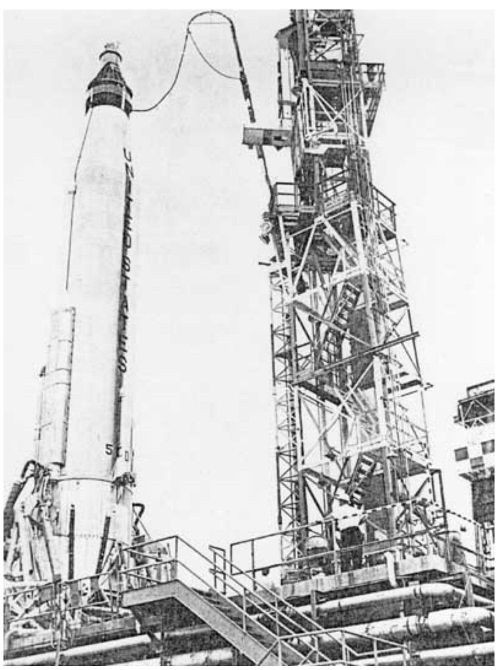

Figure 3. The Atlas launch vehicle

Astronaut Selection and Training

The selection of astronauts was an important component of the project. On April 9, 1959 the astronauts were introduced to the world at a press conference, where they became known as the Mercury Seven. They were introduced in civilian dress. They were all military officers that were specially selected for the project. They had gone through a series of tests during the selection.

Project Mercury was where they had to develop the method for selecting astronauts. The selection of the Mercury Astronauts began in January 1959. In April of that year they reported to the Manned Spacecraft Center, now known as the Johnson Space center, in Houston, Texas. Orientation was April 2nd through the 16th. For the next two years they were in a group training program.

The astronauts were selected from a pool of military officers that volunteered as test subjects. They were to be college educated engineers and military test pilots. This stemmed from Eisenhower's decision that the military services could provide the pilots simplified the selection procedure. A total of 508 service records were screened in January 1959, of which they found 110 men found to meet the minimum standards. The list of 110 was divided into three groups. These groups were invited separately to Washington DC for briefings and interviews.

The men had taken took a battery of written tests, technical interviews, psychiatric interviews, and medical history reviews. Of these, thirty two (32) became candidates and went through examination at the Lovelace Clinic in New Mexico before undergoing extreme mental and physical environmental tests at the Wright Air Development Center, in Dayton, Ohio. They each arrived in Albuquerque, New Mexico for a week of medical evaluations. They underwent over 30 tests and their bodies were thoroughly mapped. Only one of the 32 was found to have a medical problem potentially serious enough to eliminate him from the subsequent tests at the Wright Aeromedical Laboratory in Ohio.

The purpose of the testing at Wright Aeromedical Laboratory was to determine the capability of the individual physically and psychologically to respond to the various types of stresses associated with missions in space. The candidates had to undergo pressure suit tests, acceleration tests, vibration tests, heat tests, and loud noise tests. They also had to prove their physical endurance on treadmills, tilt tables, with his feet in ice water, and blowing up balloons until exhausted. In addition to these tests, they had continuous psychiatric interviews, living with two psychologists throughout the week, and a battery of psychological and intellectual tests.

In the final evaluation of the data in March 1959, eighteen of the thirty one candidates came recommended without medical reservations. In the final selection, the candidates were selected to complement each other. They could never reach the magic number of six, therefore we had the Mercury Seven.

The Mercury Seven as they became known were as follows, from the Navy, Air Force, and Marines:

John Herschel Glenn, Jr. – A Lt Col in the United States Marine Corps (USMC) who was a test pilot. He quit college to enlist after the United States entered World War 2. He was commissioned after completing his flight training in 1943. He served in World War 2 and in the Korean Conflict. He entered the Naval Test Pilot School in 1954. On July 16, 1957 he made the first supersonic transcontinental flight from Los Alamitos, California to New York City. He was the most senior in age and date of rank.

Walter Marty Schirra, Jr. – A Lieutenant Commander in the United States Navy was a Naval Academy graduate. He was accepted into the Naval Test Pilot School in 1958. In 1959, he was selected by his commander as one of the 110 selected military test pilots. He flew into space during Project Mercury, Project Gemini, and the first crewed Apollo mission.

Alan Bartlett Shepard, Jr – A Lieutenant Commander in the United States Navy was also a Naval Academy graduate. He entered Naval Test Pilot School in 1950 and later instructed. He went on to the Apollo Program and was the only Project Mercury astronaut to walk on the moon.

Malcolm Scott Carpenter – Enlisted in the Navy and became an aviation cadet in a college program. He attended Naval Test Pilot School in 1954. At the time of his selection for Project Mercury, he was a Navy Lieutenant at the time he was selected. He only went on one flight into space.

Donald Kent Slayton – A Captain in the United States Air Force (USAF) had originally enlisted in the United States Army Air Forces in World War 2. He graduated Air Force Test Pilot School in 1955. He was grounded in 1962 during Project Mercury for an irregular heart rhythm. He was eventually cleared in 1972 to fly in future programs.

Leroy Gordon Cooper – A Captain in the USAF completed his bachelor in Aerospace Engineering in 1956. He then entered the USAF Experimental Test Pilot School and was assigned to Edwards Air Force Base. His Project Mercury flight was the longest. He also flew on one of the Project Gemini missions.

Virgil Ivan Grissom – Also a Captain in the USAF and was friends with Cooper before Project Mercury. They attended USAF Experimental Test Pilot School together. He was assigned to Wright-Patterson Air Force Base at the time he was selected as an astronaut candidate. He went on to participate in the Gemini and Apollo Programs. He died in a fire during an Apollo 1 pre-launch test on January 27, 1967.

Figure 4 shows the Mercury astronauts selected for the program

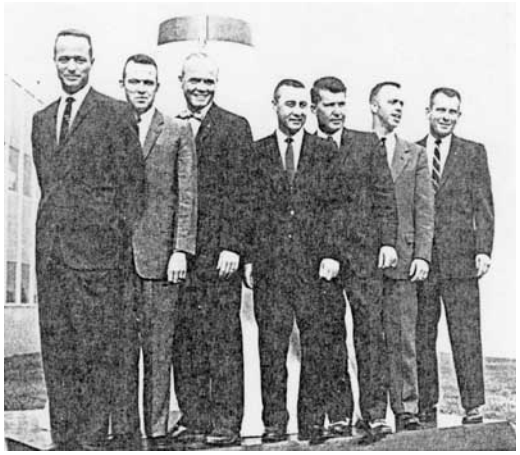

Figure 4.The Mercury astronauts

The astronauts went through a rigorous training schedule for the next two years. The initial phase of the group training program was a brief, but comprehensive course in the astronautical sciences required in the Mercury flight program. The subjects included: Elementary, Mechanics and Aerodynamics, Principles of Guidance and Control, Navigation in Space, Elements of Communication, Space Physics, and Basic Physiology.

A large portion of the group training program was on systems training. This was essential to their contributing to the development program. There were several ways that the systems training was conducted as part of the group astronaut training. The methods included: Systems briefings, Contractor visits, Manuals, Specialty assignments, Mercury procedures trainers (flight simulators) and Environmental control systems trainer.

Another portion of the group training consisted of attitude control training. A number of fixed and moving based simulators were employed. There were a number of trainers that were employed because a single trainer was not possible. There were nine different types of trainers used to simulate various flight activities.

Another part of the group training program was centrifuge training. There were four (4) formal centrifuge programs that were part of the group training program that was conducted at the Aviation Medical Acceleration Laboratory. The first two programs were engineering-feasibility and preliminary astronaut familiarization programs. The last two programs were intensive operational training programs for the Redstone and Atlas flights. The astronauts spent an average of 45 hours on the centrifuge.

Environmental familiarization training was conducted to provide additional familiarity with the space environment. They already had a general familiarity with the environment and could operate effectively under stress. There were five requirements that were thought to be conducive to good performance under space flight conditions. The astronaut were required to have a detailed knowledge and confidence in the equipment (i.e. pressure suits) they needed to operate in the space environment. They were also required to be familiar with the environment itself, to include distractions, and practiced specialized breathing techniques. They were also required to have a high level of physical conditioning that was left to the individual to maintain. They were required to plan and practice emergency procedures until they were second nature. The final requirement was that they had to maintain their habits of alertness they had developed, by maintaining their flying skills.

Egress and survival training was also critical for the astronauts. There were several programs to train the astronauts to exit the spacecraft and survive until they could be recovered. Egress training was conducted in three phases. Survival training was conducted in two phases to include desert and water survival.

The training included the preflight preparation that began about three months prior to each flight. The pilot and his backup began specific preparations for the mission. The program was designed where the backup for a mission was to be the primary on the next mission. Pilots that participated in earlier missions had the advantage that the training received in the group program was fresher.

Flight Schedule

The difference between the planned flight schedule and the actual flight schedule can be seen by examination of Figure 5 and Figure 6 respectively.

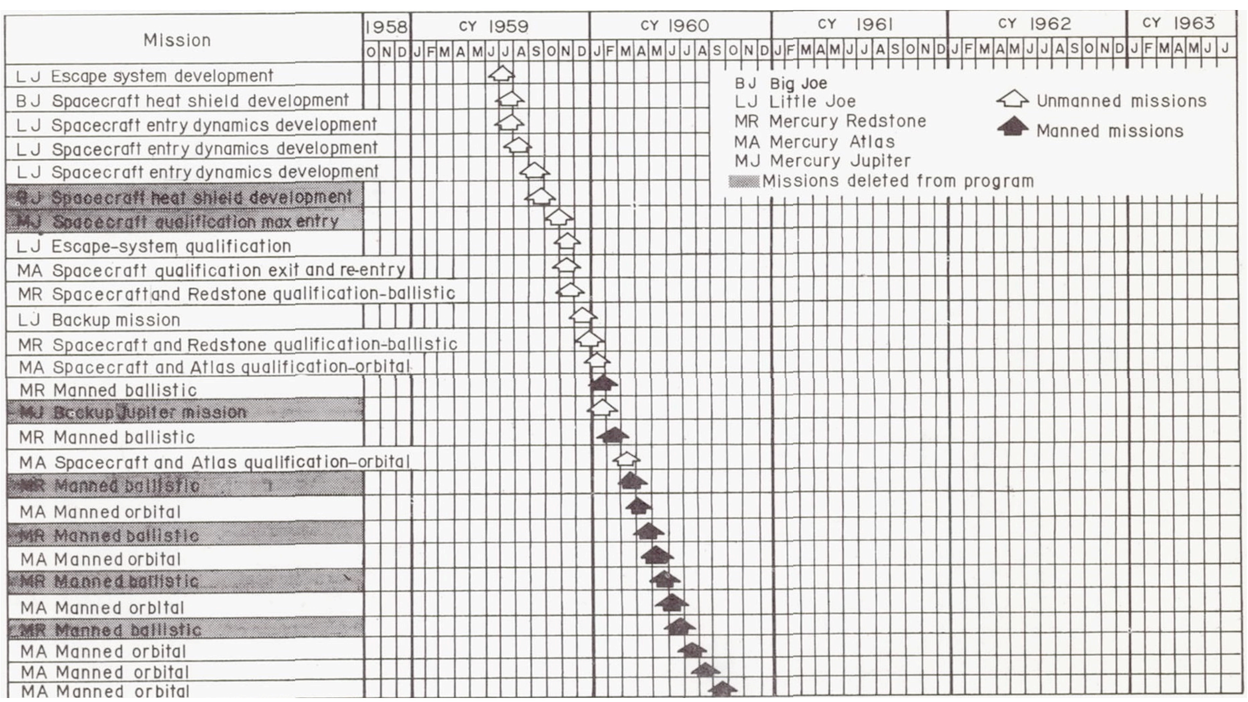

Figure 5.The planned flight schedule

Figure 5 shows the planned flight schedule as of January 1959. The schedule assumed a trouble-free ideal program. As the program progressed, changes were made to incorporate lessons learned from the previous flights. Figure 6 shows the actual flight schedule.

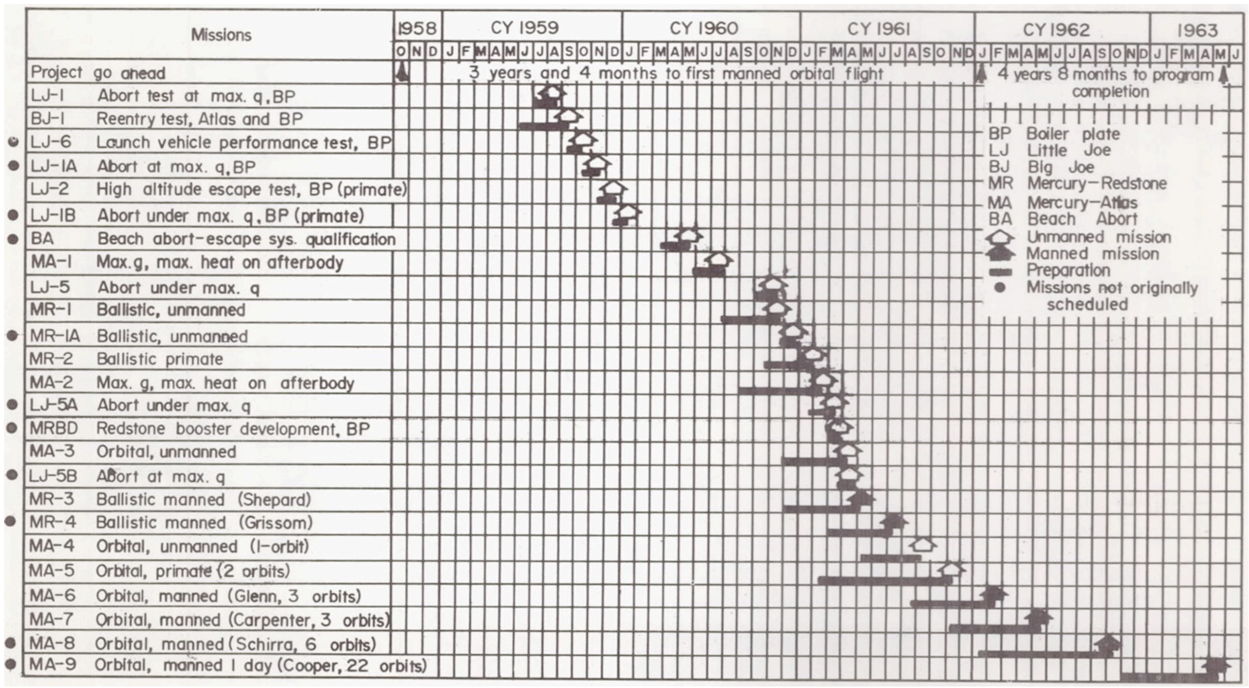

Figure 6.The actual flight schedule

As can be seen from examination of the Figures, the actual schedule took much longer than planned. Some of the missions failed at their main objective, yet secondary objectives were met. The planned flight schedule showed 27 scheduled launches. There were three types of flights in the testing schedule: research and development test flights, flight qualification tests of the spacecraft, and the manned orbital flight tests. These included four different launch vehicles: the Little Joe, Mercury-Redstone, Mercury-Jupiter, and Mercury-Atlas.

Flights

The 25 actual flight test missions are summarized as follows:

1) Little Joe 1 (LJ-1) mission initiated the flight test program with a research and development mission that failed, destroying the boilerplate spacecraft when it impacted the water. The escape rocket fired prematurely due to a faulty escape circuit. The launch attempt was at the NASA launch site at Wallops Station, Virginia. The main parachute deployment was not activated due to insufficient electrical power when testing the inflight abort. This unmanned mission occurred on August 21, 1959 was a failure.

2) Big Joe 1 (BJ-1) primary mission was to investigate the performance of the ablation heat shield during reentry, measure afterbody heating, as well as to investigate spacecraft reentry dynamics. The test objectives were satisfied and used a boilerplate spacecraft. The heat shield temperature reached 3500 degrees Fahrenheit, and were lower than expected. This unmanned mission was the maiden flight on September 9, 1959 from Cape Canaveral and was a partial success due to the deviation from the planned trajectory.

3) Little Joe 6 (LJ-6) was successful and qualified the launch vehicle using a boilerplate spacecraft successfully in flying with staged propulsion. The integrity of the launch vehicle airframe and motor system were tested. This partially successful unmanned mission occurred on October 4, 1959 from the Wallops Station launch site.

4) Little Joe 1A (LJ-1A) occurred on November 4, 1959 and was a repeat of LJ-1, from the Wallops Station launch site using a boilerplate capsule. This unmanned mission was unsuccessful on the main objective due to slow ignition of the escape rocket motor, so it did not separate until bypassing the desired test region. The spacecraft was successfully recovered.

5) Little Joe 2 (LJ-2) mission on December 4, 1959, was intended to evaluate the boilerplate spacecraft during a high altitude abort. This one was launched from the Wallops Station launch site and had a passenger, a monkey, named Sam. The spacecraft and monkey were successfully recovered.

6) Little Joe 1B (LJ-1B) on January 21, 1960 finally met the test objectives that LJ-1 and LJ-1A failed to meet. This mission was launched from the Wallops Station launch site and also had a monkey, named Miss Sam, as a passenger in a boilerplate capsule. Both were successfully recovered.

7) Beach Abort 1 (BA-1) on May 9, 1960 was the first time a production spacecraft was flight tested for a major qualification. It was launched on an abort sequence from a launcher on the ground as escaping from a launch vehicle while still on the launching pad. The test occurring from the Wallops Station launch site was a successful test of the escape system.

8) Mercury-Atlas 1 (MA-1) mission on July 29, 1960 was to test the structural integrity of a production Mercury spacecraft and its heat protection elements during reentry from an exit abort condition. This mission failed about 60 seconds after lift-off from the Cape Canaveral test site. The spacecraft and launch vehicle impacted the water.

9) Little Joe 5 (LJ-5) mission on November 8, 1960, launched from the Wallops Station launch site, was to qualify a production spacecraft. This failed in flight when the escape rocket motor was ignited before the spacecraft was released from the launch vehicle. They remained attached until impact and destruction. They were unable to determine the exact cause due to the condition of the vehicle after impact.

10) Mercury-Redstone 1 (MR-1) on November 21, 1960 at Cape Canaveral was to provide a qualification of a nearly complete production spacecraft. This mission was unsuccessful, as the launch vehicle engine shut down at lift off, due to improper separation of electrical cables. It settled back on the pad after only lifting off a few inches.

11) Mercury-Redstone 1A (MR-1A) was successful on December 19, 1960 after correcting electrical problems from MR-1. Provided a qualification of a nearly complete production spacecraft.

12) Mercury-Redstone 2 (MR-2) mission on January 31, 1961 was a production spacecraft with a chimpanzee named Ham. It was launched from the Cape Canaveral test site and landed well beyond intended recovery area. The chimpanzee was recovered in good condition, but the spacecraft was damaged. Several modifications were made after this flight. This was a successful suborbital mission.

13) Mercury-Atlas 2 (MA-2) mission conducted on February 21, 1961 from the Cape Canaveral test site had a main objective of demonstrating integrity of the spacecraft, heat shield, and afterbody shingles for the most severe reentry. These were the objectives of the MA-1 mission. Analysis showed that the spacecraft afterbody temperatures were somewhat lower than anticipated. This mission was successful.

14) Little Joe 5A (LJ-5A) was a mission on March 18, 1961, from the Wallops Station launch site, that was added due to the failure of the LJ-5 mission. This mission also failed due to early ignition of the escape rocket motor.

15) Mercury-Redstone-Booster Development (MR-BD) mission was made on March 24, 1961 due to problems with the launch vehicle in the MR-1A and MR-2 missions. The mission was conducted from the Cape Canaveral launch site and was the final Redstone test flight. This mission was successful, but no attempt to recover the spacecraft was made.

16) Mercury-Atlas 3 (MA-3) was intended to orbit an unmanned production spacecraft once around the earth. The flight was terminated 40 seconds after liftoff from the Cape Canaveral test site on April 25, 1961, when the launch vehicle failed to roll and pitch over to the flight azimuth. The spacecraft was recovered with only minor damage.

17) Little Joe 5B (LJ-5B) vehicle was launched on April 28, 1961 from the Wallops Station test site. The spacecraft had been used on Little Joe 5A. This test was on the spacecraft escape system and successfully demonstrated the structural integrity of the spacecraft. Last Little Joe test flight.

18) Mercury-Redstone 3 (MR-3) mission, designated Freedom 7, was launched on May 5, 1961 from Cape Canaveral Launch Complex 5. This was the first manned flight with Alan B. Shepard as the pilot, who became the first American in space with this suborbital

flight. The launch vehicle was identical to the one in the MR-BD mission. The pilot and spacecraft were successfully recovered.

19) Mercury-Redstone 4 (MR-4) flight was launched from Cape Canaveral Launch Complex 5 on July 21, 1961. The pilot was Virgil I. Grissom and the launch vehicle used was identical to the MR-3 mission. The spacecraft, for the first time, had a large top window and a side hatch opened by an explosive charge. The flight was successful, but a spacecraft hatch action resulted in a loss of the spacecraft. Astronaut Grissom was recovered safely from the water. The premature egress was investigated and questions about it remained for years. The testing of the explosive bolts included 67 firings, but did not account for static electricity to the extent it should have been. His spacecraft, Liberty Bell 7, was recovered in 1999 after 38 years.

20) Mercury-Atlas 4 (MA-4) was launched on September 13, 1961 from the Cape Canaveral launch site. This was a repeat of the MA-3 test. This had a complete spacecraft with a man simulator on board. This was to provide a load on the environmental control system during the orbital flight. Although there were anomalies, the mission was a success.

21) Mercury-Atlas 5 (MA-5) was a successful flight occurring on November 29, 1961 from the Cape Canaveral Launch Complex 14. The objective was to test the environmental control system in orbit. It was to be the last qualification flight before a manned orbital mission. The spacecraft completed two of the three planned orbits. This flight had a chimpanzee passenger named Enos. He was recovered in excellent condition. He died the next year due to a condition unrelated to his flight.

22) Mercury-Atlas 6 (MA-6), designated Friendship 7, was the first manned orbital flight launched from Cape Canaveral on February 20, 1962. The launch vehicle for this mission was an Atlas 109-D. This planned three orbital passes with John H. Glenn, Jr. as the pilot and the first American to orbit the earth. He reported seeing "fireflies" that was eventually determined to be frost from the reaction control jets. A false sensor reading led to the modification of the re-entry procedures to assure the heat shield remained in place upon re-entry.

23) Mercury-Atlas 7 (MA-7), designated Aurora 7 was launched on May 24, 1962 from the Cape Canaveral Launch Complex 14. Scott Carpenter was the pilot and three orbital passes were planned and this flight achieved all objectives. The spacecraft landed 250 miles downrange from the planned landing point after the retrofire was 3 seconds late. The late firing accounted for 20 miles of the overshoot, and the rest to a 25 degree yaw error at the time the retrograde rockets were fired. Carpenter saw the "fireflies" that were seen by John Glenn.

24) Mercury-Atlas 8 (MA-8), designated Sigma 7, was launched from the Cape Canaveral Launch Complex 14 on October 3, 1962. Walter M. Schirra, Jr. was the pilot. The

mission planned for six orbits. The objectives were successfully accomplished. Walter Schirra was awarded the NASA Distinguished Service Medal.

25) Mercury-Atlas 9 (MA-9), designated Faith 7, was launched from the Cape Canaveral Launch Complex 14 on May 15, 1963, after a failure the previous day. L. Gordon Cooper was the pilot for the planned 22 orbital pass mission. Eighteen orbits were completed with few problems. On the 19th pass problems occurred and it was determined that the pilot would have to make a manual retrofire and reentry. The pilot and spacecraft were recovered shortly after landing. This was the last American solo flight in space.

Timeline of Major Events in Project Mercury

Date	**Event**
10/04/1957	Launch of Sputnik 1
11/1957	M.A. Faget presentation on manned orbital flight
04/1958	Faget conceived of the contour coach to withstand high g-load
10/07/1958	Official beginning of Project Mercury
01/1959	508 military service records screened, of which 110 met minimum standards
02/1959	56 pilots took the initial battery of tests, interviews, and reviews
03/1959	36 total qualified of which 32 accepted and became candidates
04/09/1959	NASA announces the astronauts selected as the Mercury Seven
08/05/1959	The astronauts sold their personal stories to Time-Life for $500,000
02/1960	Egress training, phase 1
03/1960	Survival training, phase 1 – water survival
03/1960	Egress training, phase 2
07/1960	Survival training, phase 2 – desert survival
08/1960	Egress training, phase 3
12/60-01-61	Astronauts participated in environmental control systems simulations
01/31/1961	MR-2 mission with chimpanzee Ham as passenger
04/12/1961	Yuri Gagarin became the first human to orbit Earth in Vostok 1
05/05/1961	Alan Shepard became the first American into space aboard Freedom 7 (MR-3)
06/06/1961	Gherman Titov make a day long orbital flight for the Soviets.
07/21/1961	MR-4 with Virgil I. Grissom aboard Liberty Bell 7.
11/29/1961	MA-5 mission with chimpanzee Enos as passenger
02/20/1962	John H. Glenn, Jr. becomes the first American to orbit the Earth aboard MA-6
05/24/1962	Scott Carpenter orbits the earth three passes in MA-7
10/03/1962	Walter Schirra is launched for 6 orbits in the MA-8 mission
10/15/1962	Walter Schirra receives the NASA Distinguished Service Medal
05/15/1963	L. Gordan Cooper makes multiple orbits around the Earth in the MA-9 mission
06/13/1963	McDonnell's Project Mercury contract terminated

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