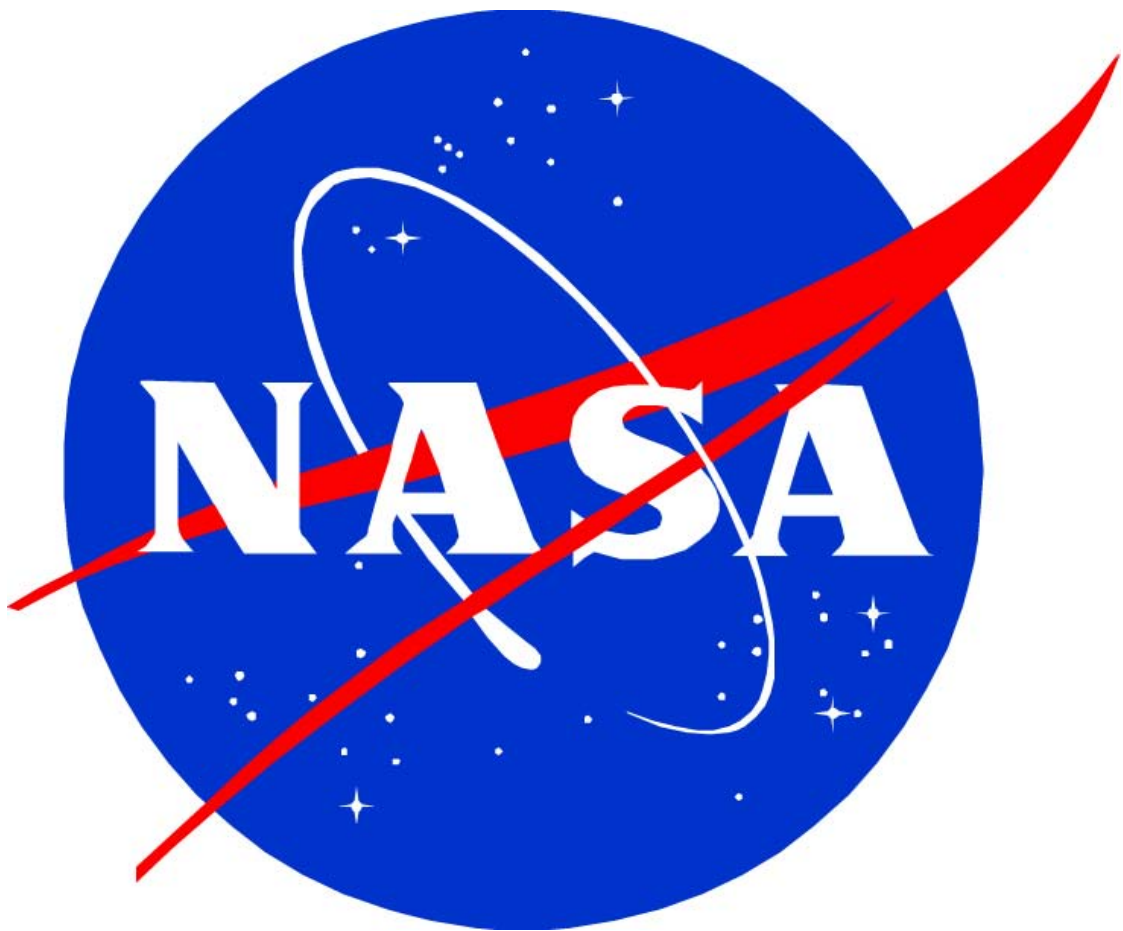


¿How did it all start?

Space Race 1



(Carlos Gonzalez. Former Operations Manager at MDSCC)

Brief essay review about the Start of the Space Race

**(Unofficial anecdotes, aisle rumors,
unpublished facts, etc.)**

- 1. THE BEGINNING**
- 2. FIRST FLIGHT**
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As in previous essays, this one is dedicated to my wife, Estrella, and my daughters, Raquel and Sara, that have been able to cope with me (something it would be difficult even without writing) while I was busy compiling existing information with my own memories.

I want to give a special mention to my friend, Luis Miguel Platero, who actually pushed me into initiating this adventure.

Foreword

We have all heard many times about the Space Race. Many of us know that, somehow, Americans won. But we may not be conscious what they had to go through to be the first on the Moon and show the world their economic and technological leadership.

Every new Project or innovative design must go through a series of tests, trials and simulations a few of which become anecdotes due to its curious results and their low or negative impact to the end result.

I tried to rememorize, in this essay, some of the crucial or funny moments that made possible the development of the Space Race.

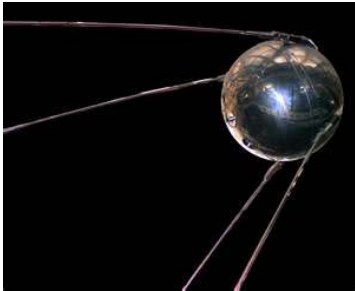
I have enjoyed remembering and writing them and I hope readers will also have a good time.

Obviously, as in my previous essays, nothing written here has been taken from official publications or has been endorsed from any official organization and it is only aisle rumors and things heard here and there for which I am the only responsible.



1. The beginning

When the Soviet Union placed *Sputnik 1*, and later Laika, into Earth's orbit, the USA became aware they had to show the world that their technology was not behind that of the USSR and, thus, created the National Aeronautics and Space Administration (NASA) whose mission was to overcome soviet's power in space.



By the way, and so to start, the name of the famous soviet female dog was not "Laika". She was found wandering around the streets of Moscow and taken to the City of Starts by some animal lover that worked there. The first name she got was *Krudiaovka* (*Curly*) but as she wandered freely through every department, she got different names like *Zhuchka* (*little bug*) or *Limonchik* (*small lemon*). She was finally nominated and trained to flight Sputnik 2. To occident countries, Laika was an easy name to remember and so it was adopted as such, but the real meaning of Laika is: "*The one who barks*" and it is a breed of an asian dog mixed with husky. After launch, all the media informed that Laika had died a few hours after attaining orbit. Soviets denied the news and presented Laika to the media after her trip (she was a Laika indeed but not *Krudiaovka*, however, they didn't lie). It is amazing that, in 2002, in a scientific conference, a speaker from the Russian Federation admitted that Laika (*Krudiaovka*) had died about five and a half hours into the trip due to a failure in the environmental system in the capsule.



In the mean time, President Eisenhower signed the National Aeronautics and Space Act, curiously: *NASA*. The change from Act to Administration kept the original acronym (which was neat). There are persons that still believe that the second "A" in NASA means Agency. Well



First things to do were to establish objectives, and thus NASA presented Project *Mercury* designed to place a man (astronaut) into Earth's orbit for which they prepared a program composed of seven flights. (*Mercury 1 - 7*).

To start the search for candidates, NASA thought in placing ads in the media, but the Nation's President (Dwight D. Eisenhower, five stars General during World War II) vetoed the decision and ruled that only test pilots from any of the American Armed Forces could be elected as the future astronauts.

NASA thought this reduced the number of candidates so much they could have problems. To their surprise, they got 508 applications. As the criteria for selection was extremely severe:

1. Be less than 40.
2. Weight less than 70 kg.
3. Be shorter than 1.70 m. *The previous two conditions (numbers 2 and 3) were a requirement related to the extremely small vital space inside a Mercury capsule (1 m³) due to the need to reduce weight the maximum possible.*
4. Be in an excellent physical condition.
5. Be, at least, in possession of a Bachelor degree.
6. Be a graduate test pilot.
7. Have, at least, 15,000 flight hours.
8. Be a qualified jet pilot.

The number got reduced from the initial 508 to 110.

After the interviews with the instructors, the number went down to 69 and another 37 declined for personal reasons leaving the final number to 32.



Medical exams reduced this number to 18 but still they were 11 too many.

NASA contacted M.D. Lovelace, in Albuquerque, N.M. (expert in physical fitness) and asked him to develop a program hard enough to get rid of the 11 extra candidates and just leave the seven needed.

First thing was to design, develop and construct of a centrifuge that would be able to confront the future astronauts to accelerations to up to 20 Gs (although, in theory, it was expected they would never go above 7 to 7½ Gs). Surprisingly enough, they were all able to sustain up to 17 Gs without problems and there was even one that was able to maintain consciousness at 20 Gs.

So, he had to think in something else. Easy things.....Things that anybody would be able to support like:

1. Let a few drops of chilled water fall into their eardrums and note the time needed to recover equilibrium and get rid of the headache.
2. Place the feet into a water container filled with ice and keep them inside a minimum of 7 minutes.
3. Run on a treadmill at 12 km/h while the slope increased +5 ° every half hour.
4. Respond to questions and tests while inside a hyperbaric chamber where oxygen had been reduced to that of the top mountains of the Himalayas.

5. Respond to questions and tests while inside a chamber with extremely high levels of noise and vibration.
6. Try to compensate the erratic movements of a five levels of liberty chair.



7. Go through the SEAL Qualification Training (SQT).
8. Etc.

Finally, only seven went through all the requirements and were officially presented to the world as the Astronauts of Project Mercury (*The Mercury 7*). The training to beat soviets in the conquest of Space started immediately.

Surprisingly, the first American astronaut to flight was neither of the Mercury 7. NASA was very conscious of its responsibilities with the tax payers and the world in general and made sure that exposition to microgravity and radiation was not a thread to the physical or mental condition of the astronauts and,

although there had been several suborbital launch tests with different animals, (Spanish fruit flies, Rhesus monkeys, American squirrels and a few other little animals that had more problems returning to Earth than being exposed to microgravity) NASA decided to train a chimpanzee to make him able to respond to certain inputs with specific actions. This way they could test whether his brain had any problems.

Chimp's name was Ham and during his flight he responded to all inputs with a retard of only one to two milliseconds of that of ground. Taking into consideration the stressing environment, the vibration, the noise inside the capsule, etc. the test was considered successful so they proceeded to prepare the first human.

Ham returned to ground with no problems and was, afterwards, the most medically cared chimp ever. He had a healthy and long life and was, probably, one of the happiest chimps in the world.



Curios note. NASA had 12 Mercury capsules ready (4 of which would be used as unmanned test vehicles) for the Mercury 7 and Ham. When time came for Donald (Deke) Slayton, a doctor discovered a faint but obvious sign of a heart problem and Deke was removed from the Mercury Project and never flew a Mercury capsule. NASA named him Operations Director and, as such, he assumed the position of *CapComm 1* (Capsule Communicator. The person designated to establish the two-way communications with the capsule during flight). Astronauts used to refer to him as extremely severe and short-tempered. In 1972 doctors determined that his heart problems were gone and he was assigned to the Apollo-Soyuz mission in 1975.

Another one. Some of these astronauts went, later, to other projects (Gemini, Apollo, etc.). This was the case of Shepard but he developed the Ménière disease that made him unable to ride a space capsule. NASA assigned him as Astronaut Office Manager but he wanted to fly so he went through a surgical operation and was again admitted as astronaut. As such, he flew Apollo XIV and, piloting the LM, he made the most precise lunar landing of the whole Project. At that moment, he was the oldest astronaut in the Project (he stepped onto the Moon being 47).

More. Why was the Mercury capsule so small? The USA didn't have a launcher with enough power to place an object into Earth's orbit and started using a Redstone (ballistic missile to carry much smaller loads). Carrying an object to a 200 km height required the object to be as small as possible.

Still more. Soviets were far ahead in launcher technology. Why? Most probably there were two reasons:

1. The US was far ahead in nuclear technology. Soviets needed a three times as heavy nuclear bomb to produce the same effects as an American bomb so they needed a much bigger launcher.
2. The Soviets had to launch from a facility far northern than the Americans and this meant that the Earth rotation gave them smaller speed to start with, so they needed a bigger launcher.

Just one more. Even though a little outside the purpose of this essay. By 1960 - 1961 the Soviets had a nuclear arsenal big enough to make life on Earth disappear twice. At that same moment, Americans could have vanished life on Earth TEN times.

2. First flight

The token was for Shepard and although he felt the privilege of being the first American astronaut, he also felt the deception of doing a suborbital flight and not go into Earth's orbit. Moreover, Soviet cosmonaut Yuri Gagarin did go into orbit only 23 days prior to Shepard's launch.

Anyway, there he was..... Biomedical sensors were attached to his skin and he was helped to don the flying suit (remember that the space suit used in the Mercury Project was a copy of the ones used by supersonic aircraft pilots and it was not pressurized).

NASA, obviously, had not taken into account the necessity to cope with physiological needs of the astronauts as the flight would be of a very short duration.



Shepard got into the capsule, sat down, safety belts were attached, the hatch was closed and the capsule pressurized.

Countdown was proceeding with no problems except for the weather prediction and a few minor anomalies that were solved in real time but the launch was being delayed over and over.

Finally, when they were ready for launch, Shepard told the Capcom that he had to go to the toilette. Mission Control said the launch was so close and the duration of the flight was so short that he had to hang in there. "You are an astronaut, for Heaven's sake".

Shepard did what he could but shortly thereafter he again requested Control through the Capcom that he needed to go to the toilette. (This could probably be the origin of the call from Apollo XIII but in singular: Houston, I've got a problem). Control said again "NO" and then Shepard responded that if he could not relief

himself he would just “let it go”. The Capcom looked towards the mission director in a silent question, a glance back, and the answer: Do as you please.

Shepard peed on himself. Good as an anecdote but in the Control room there were two versions: The official, the doctors turned off the biomedical sensors conscious that there could be short circuits. The unofficial, Shepard yelled about electrical shocks and then the doctors turned off the sensors. I have no personal opinion (and if I do, I am not going to write it down in here) and I leave the readers as to their own opinion.

3. Second flight

This time, the token went to Grissom. Everything was nominal. There were no physiological problems and everything went nominal up to splashdown.



The capsule was floating in the water in a horizontal position rather than right side up as it was logical and expected.

When the Navy helicopters reached the splashdown point the crews saw two things:

1. Grissom was in the water.
2. The capsule had the hatch open.

First things first, so they took on the effort of recovering the astronaut and, later, they tried

to capture the Liberty Bell and get it out of the water.

Main problem was that, having the hatch open, water was getting into the capsule thus increasing its weight constantly.

Marines finally got hold of the capsule and tried to get it out of the water but the weight had increased so much that, after a few unsuccessful tries, they opted to let it sink to preserve the safety of the helicopter and the crew.

Liberty Bell's hatch had a new pyrotechnical system of aperture to be used in case of emergencies. This system could be actuated from the inside or the outside but it required to be hit with quite a bit of strength. Grissom explained that the hatch had opened by itself, without his intervention. NASA believed him and kept his rotation in the list for future missions. He ended up flying the Gemini 3 and becoming the first astronaut to fly twice. He was later assigned as backup pilot for Gemini 6A and as Command module pilot for Apollo 1 where he passed away.



Obviously, rumors were that Grissom got scared when the capsule was in the water in a horizontal position and had actuated the emergency system to get out.

Schirra believed his college and tried to prove he was saying the truth so, after his flight, he remained inside the capsule until it was placed onto the aircraft carrier where he actuated the emergency system. Due to the pyrotechnical explosion, Schirra suffered of a few burns in his hand that, per the experts, were inevitable if

the emergency system was activated manually. As Grisson didn't have any burns, his version of the incident was accepted as he had told it.

Astronauts had the privilege to assign a name to the capsules they flew so, when Grisson was ready to fly the Gemini 3 he used a reference to a popular Broadway show called *The Unsinkable Molly Brown* and named the capsule *Molly Brown*. NASA didn't like the name and asked Grisson to change it and then he opted for *Titanic*. Obviously, this was worse so NASA accepted *Molly Brown* but refused to make any official references to that name.

During the launch of Gemini 3, the CapCom (Gordon Cooper) told the astronauts: "On your way, Molly Brown", and thus.....

NASA decided to eliminate the option of giving names to the space vehicles until 1967 with the Apollo Program.

On July 20th, 1999, the Liberty Bell was recovered from the ocean depths by using a robot sub financed by *Discovery channel*. It was sitting at 4.6 km deep and it took 14 years to find it. Due to the low water temperature, the capsule was extremely well preserved.

It was sent to the Kansas Cosmosphere and Space Center where it was cleaned and, after touring the USA, it was left exposed to the public.

Curios note. These capsules had an explosive device to auto-destruct in the case of sinking in the ocean. In this case the device failed and thanks to that we now have an original artifact of an unaccountable value.

Another one. Astronauts used to do side jobs for NASA when they were not training or actually flying. Grisson helped in the design of the following NASA Project, the Gemini, which would carry two astronauts vice only one. The problem was that Grisson was one of the smaller astronauts and after finishing the design of the new vehicle it was found that 14 out of the 16 existing astronauts at the time would not fit into it, so it had to be re-designed.

4. Third flight

Finally.....

Glenn was elected for this mission. Von Braun had finally developed a launcher with the needed



power to place a Mercury capsule into Earth's orbit and it was time to prove it worked as expected.

The launcher was an *Atlas - D* and it made the placing of Glenn into orbit possible.

They were late once more but they were already planning the definite blow by sending a man to the Moon and returning him safely to Earth before the Soviets.

The Project following the Mercury and as predecessor to Apollo was the *Gemini* and it was already in the design stage. Due to a heavier capsule, that would accommodate two astronauts vice one and during a much longer time frame, a more powerful launcher was also being developed.

Glenn's flight was long and it required food, drinks and, obviously, some type of an artifact to dispose of the



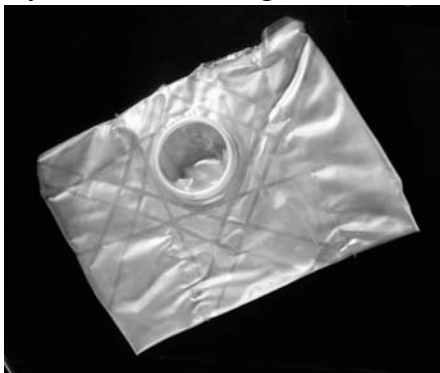
physiological needs of the astronaut.

For urine they experimented with different types of indwelling catheters (*) but those were extremely uncomfortable and prone to infections. The final solution was a condom like artifact with an adjust device and enough capacity for the flight duration.

(*) A tube threaded through the penis to collect urine continuously from the bladder)



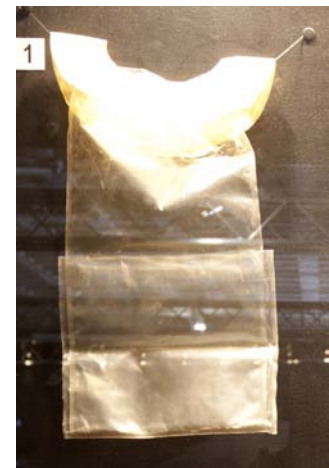
Later, with lengthier flight durations, this gadget was modified to include an adapter to a plastic tube that ended into a plastic bag attached to the leg of the astronaut. This solution gave them more autonomy and functioned reasonable well. I must, here, give appropriate credit to my friend Luis Miguel Platero that, not only he showed me what we use in Spain for



medical purposes, but he got me one that I keep fondly due to its origin (and that it has never been used).

For solid waste, things were a little harder and they opted for a bag. Looking at it, it is difficult to imagine how to use it.

Obviously, it didn't work very well and it was promptly changed to a different type of bag with a flat surface that had a special type of glue. This surface adhered to the gluteus of the astronaut and, supposedly, it was hermetic, but something just didn't work as advertised as the astronauts complained about the aroma inside the capsules regardless of the activated carbon filters.



There's a lot of talking about the diapers developed by NASA and it is true they were able to absorb 400 times its weight in liquid (later they got to 1000 times its weight) but these diapers were not ready until 1983.

Can you imagine what a flight of several days meant (Gemini o Apollo) changing these gadgets once a day? I'll tell you later how this subject was treated during Project Apollo.

Just a short note. A small girl that knew Glenn asked him to take with him on his flight an envelope cancelled on the launch date. Due to the extremely little space inside the Mercury, Glenn couldn't do anything but seat on it. You can figure how the envelope looked like after the flight.

5. The Mercury 13

What happened with women? Up to now, we have only talked about men astronauts but haven't said a word about women astronauts. As a matter of fact, the first American woman to flight into space was Sally Ride and that happened in 1983. Moreover, the first woman piloting a Shuttle was Eileen Collins back in 1995 and she also was the first woman commander of a mission in 1999.

After M.D. Lovelace designed and developed the physical tests to reduce the number of applicants to Project Mercury, NASA asked him to design a program to include two additional stages for the Project Apollo astronauts.

Lovelace thought: What would it happen should we ask a woman to go through the same tests we used to determine the Mercury 7 crew? So he invited Jerrie Cobb to try the same at his clinic at Albuquerque, Nuevo Mexico, and she accepted.

Who was Jerrie Cobb? Since she was a kid she liked aircraft and flying (something she did with her father). When she became 17 she obtained the private pilot license and a year later the commercial pilot license.

Between 20 and 30 she established several records: speed, distance and height. Also, she helped the future young pilots of the Air Force learn to fly. It was logical to pick her up as she would be competing with the best test pilots of the Armed Forces.

Jerrie went through the tests with no problems (matter of fact, she did better than many of her male competitors). Lovelace thought he was faced with a physically exceptional woman and decided to increase the number of participants. The problem was that the cost was high and he could not afford it.

A well known and wealthy pilot, Jacqueline Cochran, decided to defray all the costs related to the testing and another 19 women pilots were contacted, 13 of whom agreed to go through the tests. These were: Jerrie Cobb, Bernice Steadman, Janey Hart, Jerri Truhill, Rhea Woltman, Sarah Ratley, Jan and Marion Dietrich, Myrtle Cagle, Irene Leverton, Gene Nora Jessen, Jean Hixson, and Wally Funk.

Jerrie passed all three stages. The others didn't attempt it but they all went through the Mercury 7 physical events with no problems.





Lovelace was astonished and gave all of them a certificate of ability to join the astronaut's school.

The girls, very excited with the idea of becoming astronauts, went to Pensacola to present their application (a few of them even quit their jobs) but they got really disappointed when NASA told them they didn't accept women.

Next? Write a letter to President Kennedy and Vice-President Nixon accusing the Federal Administration of gender discrimination. Obviously, the government had to take immediate and effective action so.....What do you do when you need that something prolongs for a long time and ends up getting forgotten?.....You create an investigation committee. Moreover, during one of the hearings, NASA lawyers and an astronaut attended the meeting to present their plea.

NASA showed their regulations (per Eisenhower's presidential commandment) where it was stipulated that an astronaut had to come from the test pilot school from any of the USA Armed Forces. They also brought the regulations from the test pilot's schools of all the Armed Forces where it was ruled that women couldn't attend any of them. So....NASA was not guilty.

While all of these were taking place, the Soviets sent *Valentina Tereshkova* into space. It was 1963, 20 years before the flight of Sally Ride.

What conditions made Valentina different from the Mercury 13? She was an amateur parachutist at a school of the Soviet's Air Force and applied for cosmonaut along with more than other 400 candidates.

She was elected as one of the final five candidates and was nominated along with Ponomaryova to flight Vostok 5 and 6 respectively. A last minute change assigned Vostok 5 to Valery Vykovsky and Tereshkova was moved to 6. Valentina was, then, ten years younger than Cooper, the younger of the Mercury 7.



Mercury 13 girls tried to find out what were the differences between Soviet's and Americans' regulations and they were similar. So, how come Valentina became a cosmonaut? Apparently, she was named honorific member of the test Pilot's School of the USSR. ?????.....None of the Mercury 13 ever flew a space mission neither they ever converge around as a group.

Curios note. Sergei Korolev, head of the Soviet's Space Program, was not very happy with Valentina and he made sure that all operations would be controlled from the ground.

Another one. The name Mercury 13 was used by a Hollywood producer, James Croos, in 1995 (36 years after the fact).

Now the question. What happened between 1963 and 1983? No matter how you look at it, the second woman in space was soviet also. Svetlana Savitskaya did it in 1982 (a year before Sally Ride) and she was also the first woman to do a space walk. To make it worse, Yelena Kondakova (Russian Federation) established a long stay record at the MIR.

What about Americans?....NASA was inclined to include women in their space projects so.... What happened?

There's probably, at least, two reasons. First, Mercury 7 astronauts told NASA that if they included women into the project they would resign. Obviously, it was not the best time to stop the Project so NASA accepted. (Mercury 7 chauvinism?) This is, logically, an aisle rumor and, of course, not official.

Second. We're talking of a period of puritanism in the US. After Mercury, all of the projects had two (or more) astronauts. How would a woman change her physiological garments (some of which were not even existent) in intimacy? Well, in 1983 diapers had been developed and.....the Shuttle had a toilette with a DOOR. This is, again, an aisle rumor.

Curios note. Valentina was, probably, the most medically followed woman in the world as Soviets wanted to know whether space radiation was bad for humans.

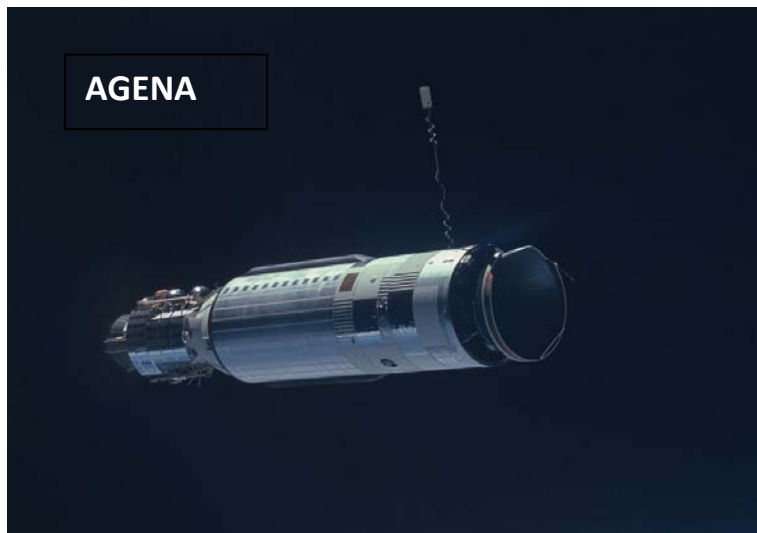
6. Gemini

The bridge between placing a man in Earth's orbit and taking a man to the Moon was the Gemini. It started in 1965 when Apollo was in its most crucial phase of design and it fulfilled several vital objectives for its successor.

The capsule was bigger than Mercury's and flight time was considerably longer so as to test astronauts' endurance, capacity to sleep in a hostile environment, social relations in such a reduced confinement and, also, gave them the opportunity to experiment



space walks which would be necessary during Apollo. The vehicle could also attach to other capsule or to a simulator called *Agena* that was launched at the same time and that gave the possibility of real time training.



The internal configuration was similar to an aircraft. So much that they could move in any direction and even change orbit trajectory, things that Mercury couldn't do.

The launcher was a *TITAN II* and it didn't have an escape tower as the capsule had ejector seats.

The versatility and easiness of repair and maintenance were such that many a NASA manager thought this vehicle could be used as a life boat in case of Apollo having problems while in lunar orbit.

In long duration flights, the gadgets to store urine and solid waste had to be replaced on a daily basis to prevent infections. Solid waste were placed into a container and returned to ground but urine was flushed into space through special valves.

Many animals mark their territory with urine.....Sounds familiar?

