

The Beginnings of the US Space Program



V2 “Vengeance Weapon”

Rocketry started to boom in World War II when the Germans used the V2, the “Vengeance Weapon”

- 1st to reach the Karman Line (edge of space) (100km)
- Started by September 1944 over 3,000 V2's were launched
- 9000 civilians & military personal deaths
- 12,000 laborers & concentration camp prisoners died during the production of the V2 program



V2 “Vengeance Weapon”

Traveled at supersonic speeds and there was no audible warning. Allies had no defense for it so teams of allied forces raced to seize this technology from German manufacturing facilities

Von Braun surrendered to US forces and brought the technology to the United States. He and his team of scientists brought enough material to build 80 V2's. The Soviet Union captured manufacturing facilities and brought it back to Russia.





Wernher Von Braun



Robert H. Goddard

Sputnik (1957)

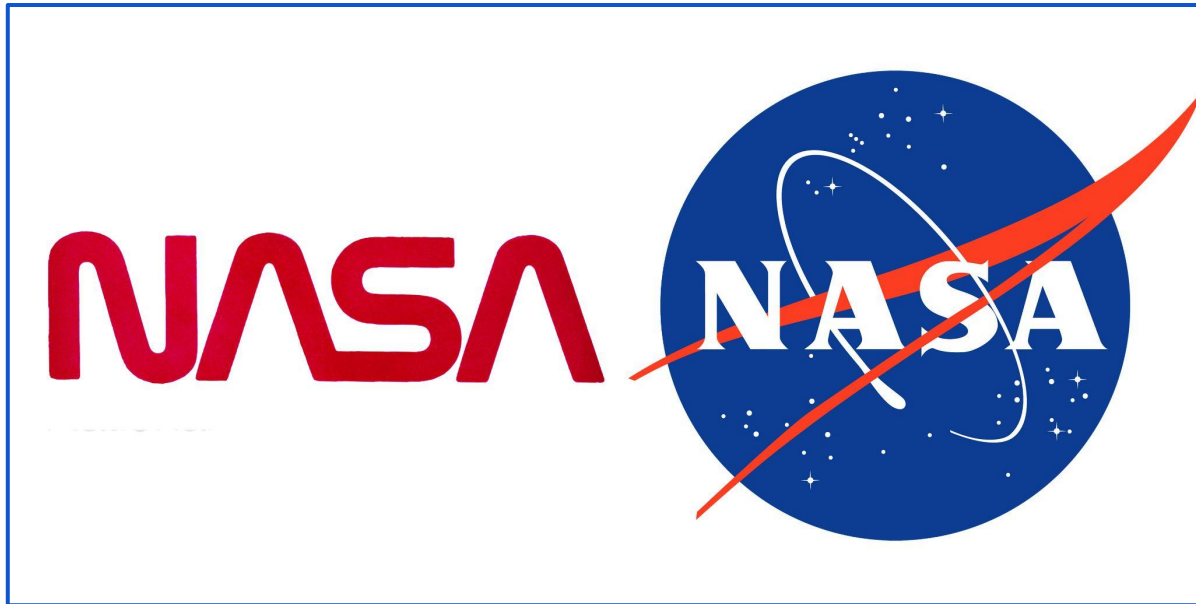
Start of the “Space Race”. Surprised the American public which led to the creation of NASA to expedite space efforts and be under civilian control.



NASA

National Aeronautics and Space Administration

- Mercury Program - To send humans to space
- Gemini Program - To identify techniques and technology to support traveling to the moon
- Apollo Program - To send humans to the moon and safely bring them back to earth



Mercury Program 1958-1963



It's main objective is to put a human into orbit and return him back to safety.

- 1st US human spaceflight program
- 20 uncrewed developmental flights
- 6 flights by astronauts

Those astronauts were also known as the "Mercury 7"

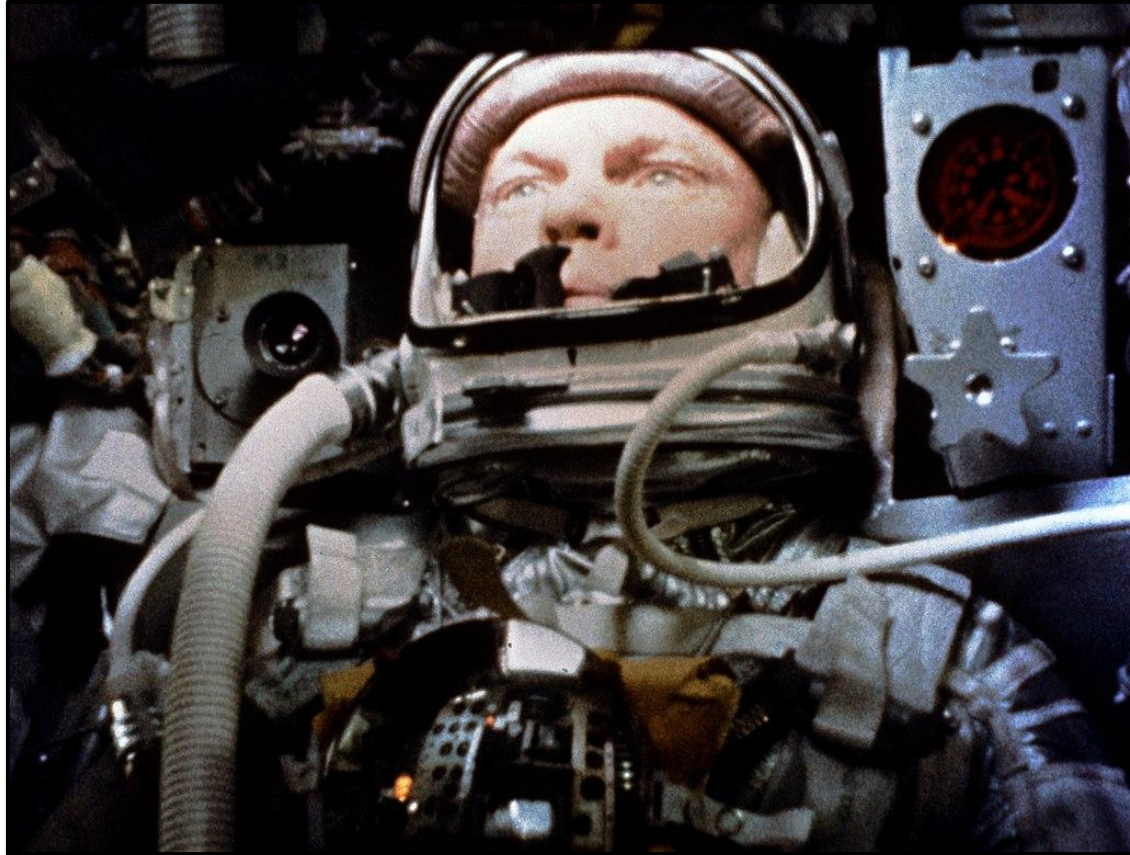
Ham the Monkey



January 31st, 1961
Monkey known as “Ham”
was the 1st great ape to be
launched into space

Yuri Gagarin, Vostok 1

April 12th, 1961, Yuri Gagarin becomes the first human in space and to travel at least 1 orbit around the earth.



Alan Shepard



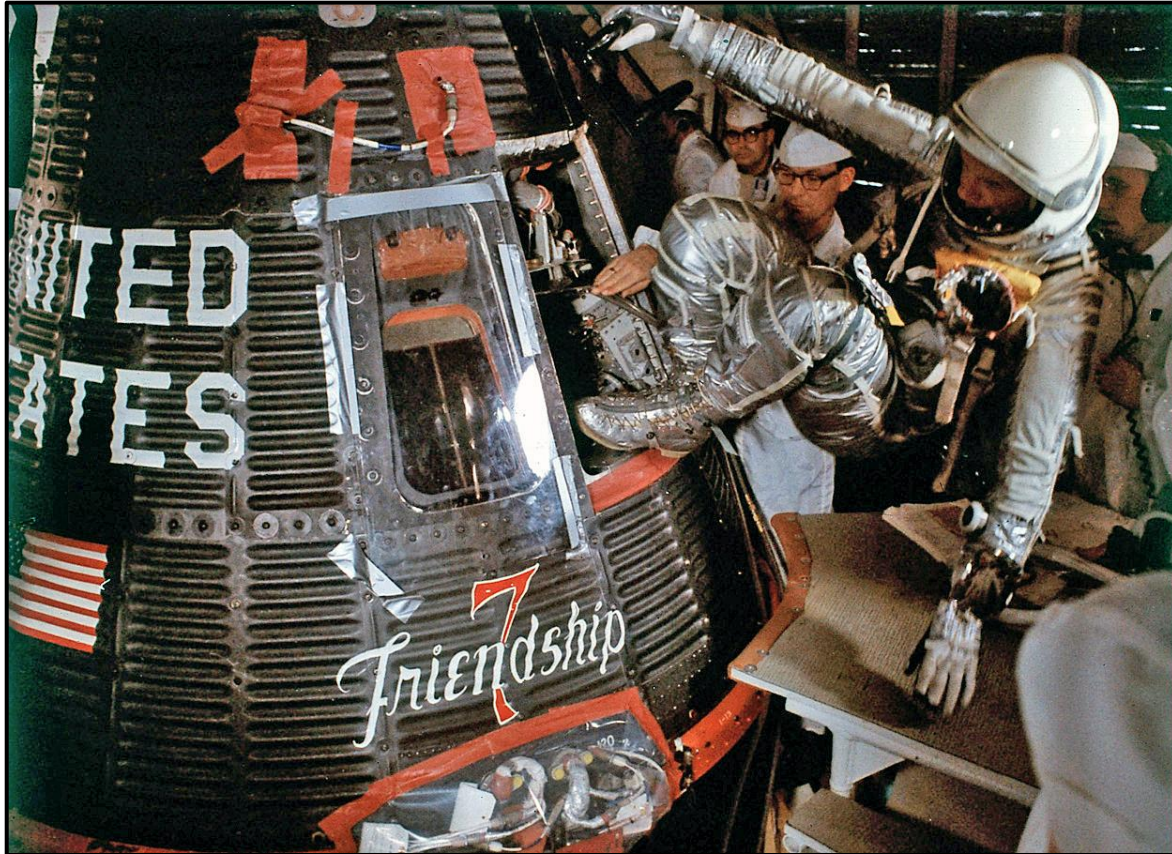
May 5th, 1961 - Alan Shepard is the first American in space.

Only a sub-orbital flight

Spaceflight that reaches the Karman Line and briefly reaches into space



John Glenn



February 20th, 1962 on
Friendship 7

1st American to orbit the earth

Gordon Cooper



May 15th, 1963 Faith 7

Set US endurance record of 34 hours and 19 minutes
22 orbits

Last time and American was launched alone to conduct an entirely solo orbital mission.



Valentina Tereshkova - First Woman in Space

June 16th, 1963 flew on Vostok 6 - 48 orbits



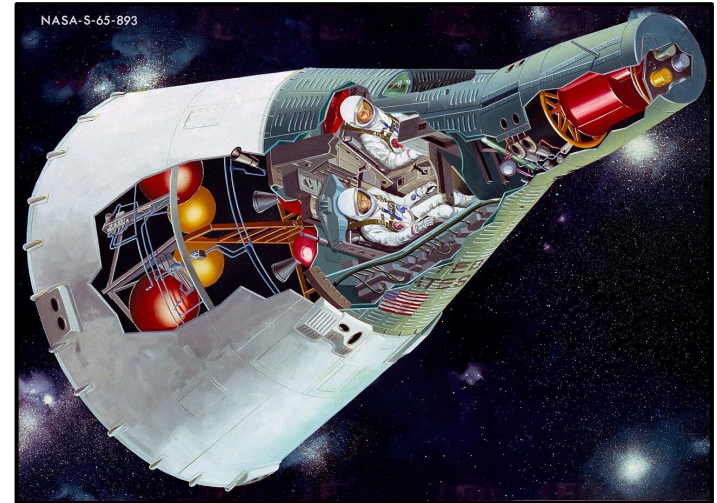
Sally Ride - First American Woman in Space

June 18th, 1983 on the Space Shuttle Challenger



Project Gemini

- Follow up to Mercury Program
- Bridge between Mercury and Apollo programs
- Second US human spaceflight program
- Conceived in 1961, concluded in 1966
- 2 astronaut crew



Gemini Program

Main Objectives

- To develop space travel techniques to support the Apollo missions of going to the moon
 - Catch up and overcome lead by the Soviet Union
- Demonstrate mission endurance of up to 14 days (longer than 8 days that's required to go to the moon)
 - Extravehicular activity (spacewalk)
 - Rendezvous and docking with another spacecraft
 - Perfect techniques on atmospheric entry

Allowed the Apollo program to pursue its main objective without wasting time to develop those techniques



Mercury 7



The New Nine



The Fourteen

Gemini 3

March 23rd, 1965

First time two American astronauts flew together in space. They could also change orbit by using thrusters.



Gemini 4

James McDivitt and Ed White

June 1965

Ed White was the first American to perform a spacewalk.

First American flight to perform scientific experiments.



Gemini 6A

Wally Schirra and Wally P. Stafford

December 1965

1st time rendezvous with another spacecraft (Gemini 7). Although the Soviet Union had previously accomplished the maneuver, it was several kilometers apart. The US were a meter apart and could have docked if both ships were equipped.



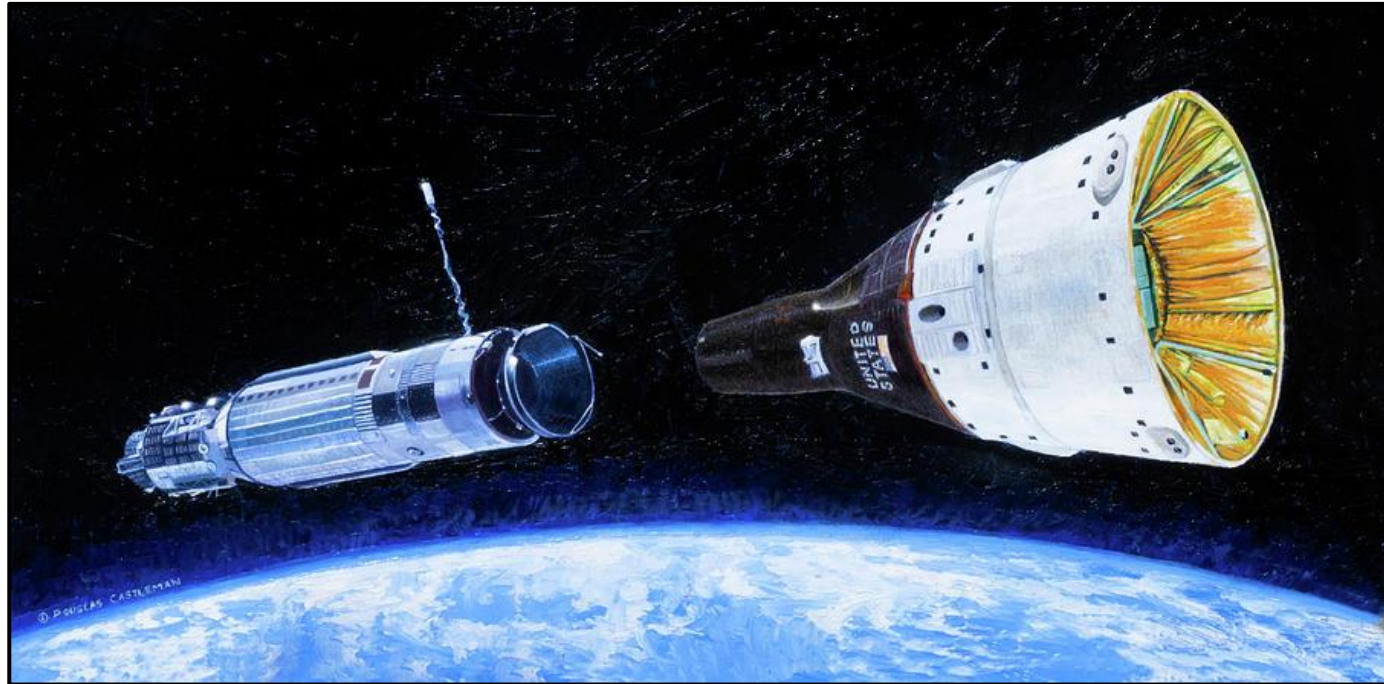
Gemini 8

Neil Armstrong & Neil Scott

March 16th, 1966

1st space docking with uncrewed AGENA Target

AGENA target is an uncrewed vehicle used by NASA to develop techniques for space rendezvous and docking



Gemini 12

Jim Lovell & Edwin E. "Buzz" Aldrin

November 1966

Proved that an EVA, or extracurricular vehicular activity (spacewalk) could perform work outside of a spacecraft.



The Apollo Program

1968-1972



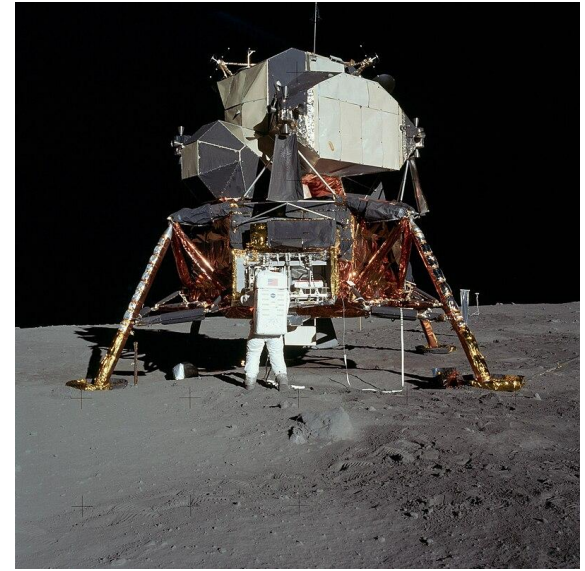
Apollo - named after the Greek God of light, music, and the sun.

The main mission was to prepare and land humans on the moon and return safely back to earth

John F. Kennedy, 35th President of the United States proposed to Congress on May 25th, 1961 of sending humans to the moon 20 days after the flight of Mercury flight "Freedom 7". At the time, the US only sent one man to space and has yet to achieve orbital flight.

Russian Cosmonaut Yuri Gagarin achieved orbital flight on April 12th, 1961, reinforced American fears about falling behind the Soviet Union.

On July 20th, 1969, Kennedy's goal of landing humans on the moon was accomplished with the Apollo 11 mission.



The Apollo 11 crew consisted of Neil Armstrong,
Buzz Aldrin, Michael Collins
Neil Armstrong was the first man on the moon

Accidents during the Apollo Program:

Apollo 1

January 27th, 1967 - A cabin fire during a rehearsal flight test killed all 3 crew members: Gus Grissom, Ed White, Robert Chaffee. The cause were wiring flaws that sparked a fire within the capsule filled with pure-oxygen. The astronauts died from asphyxiation, smoke inhalation, and thermal burns. NASA later fixed the design of the spacecraft by redesigning the electrical wiring, and using non-flammable items.



Apollo 13

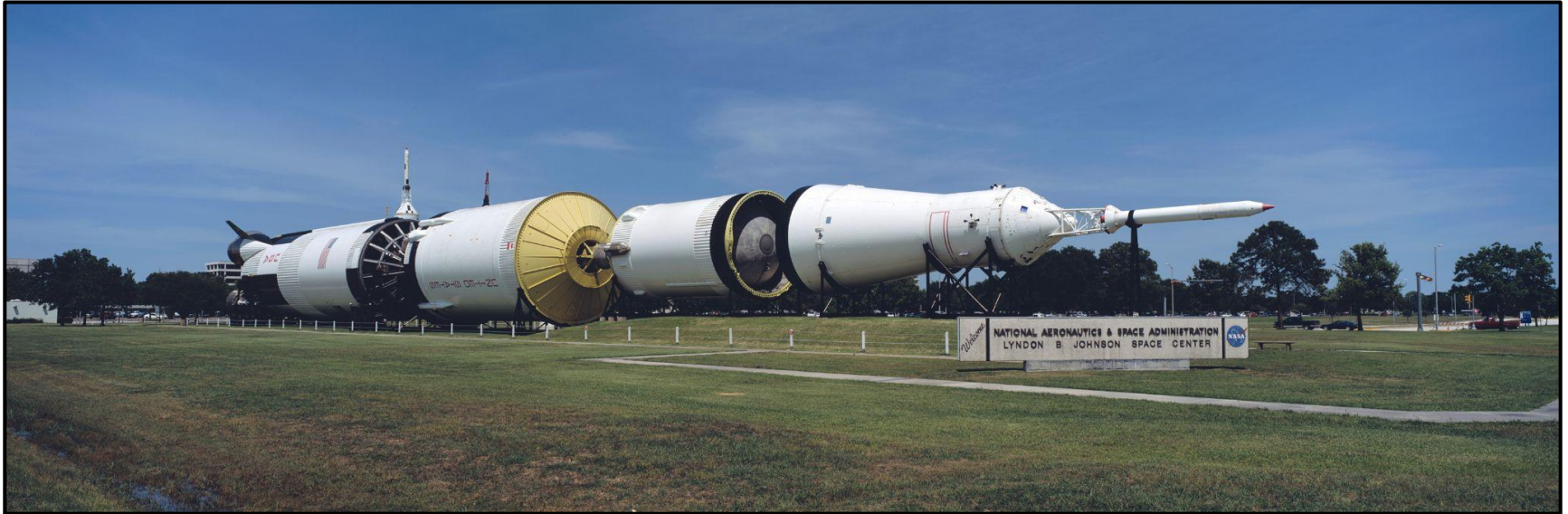
April 11-17, 1970 - During its voyage to the moon, damaged wiring ignited an explosion that damaged its electrical and life support system on the Command Module. The module lost a large amount of oxygen which was needed to generate electrical power, propulsion, and life support. The Command Module was shut down and the astronauts climbed into the lunar module as a lifeboat. The crew consisted of Jim Lovell, Jack Swigert, and Ken Mattingly



The Apollo Program

1968-1972

After the successful landing on the moon by Apollo 11, budget cuts were made which marked the beginning of the end of the Apollo program. The last Apollo mission was Apollo 17. Apollo 18, 19, and 20 were cancelled. There is only one Apollo spacecraft left that was fully flight certified and is currently at the NASA Johnson Space Center in Houston.



Apollo Program Interesting Facts

- Cost = \$25 Billion or \$176 Billion in 2022
 - Employed 400,000 people at its peak
- Astronauts were chosen from Project Mercury and Project Gemini +2 from later astronaut groups
 - All mission were commanded by Gemini or Mercury Veterans
 - A total of 382kg of lunar rocks were brought back
- From analysis, the age of the rocks range from 3.2 billion years to 4.6 billion years. It is believed that the moon as created through the impact of a large body with earth.



Apollo Program Interesting Facts

Legacy:

Cordless Power Tools

Fireproof Materials

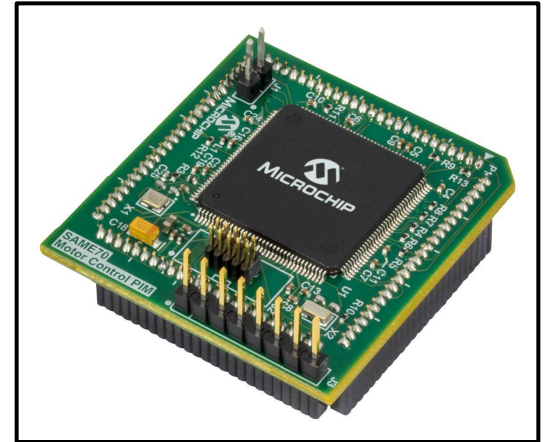
Heart Monitors

Solar Panels

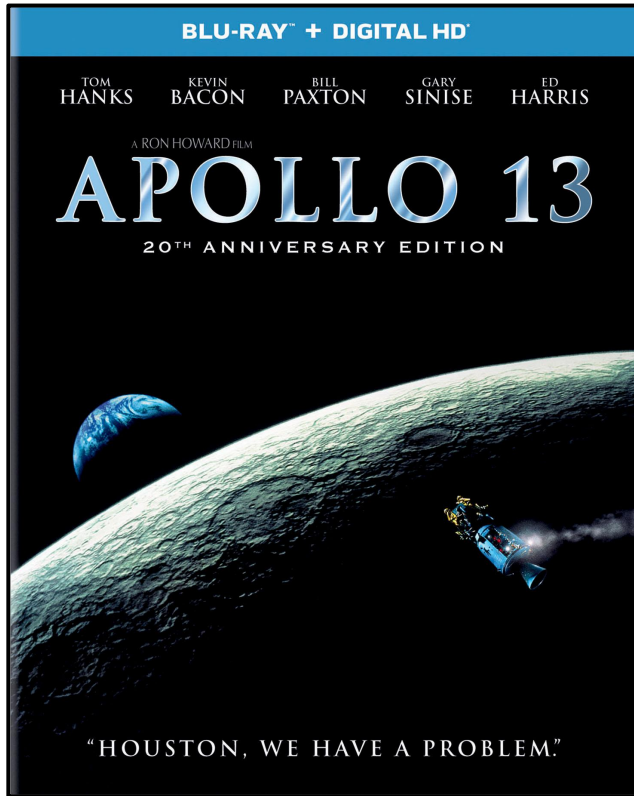
Digital Imaging

Liquid Methane as fuel

Use of the microchip



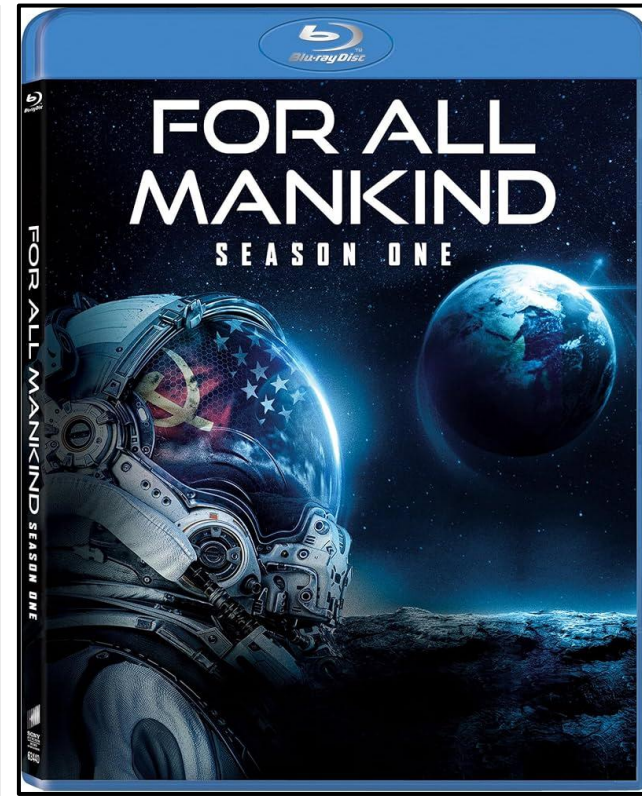
Movies and Television Shows



Apollo 13, 1995



The Right Stuff, 1983



For All Mankind, 2019