History of the United States Manned Space Program

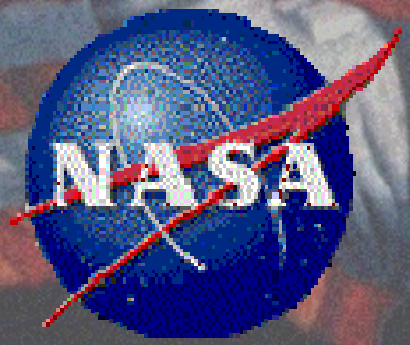
Dr. Rick M. Avramis

Man must rise above the Earth -
to the top of the atmosphere and beyond -
for only thus will he fully understand the
world in which he lives.

Socrates
500 B.C.

National Advisory Committee for Aeronautics (NACA)

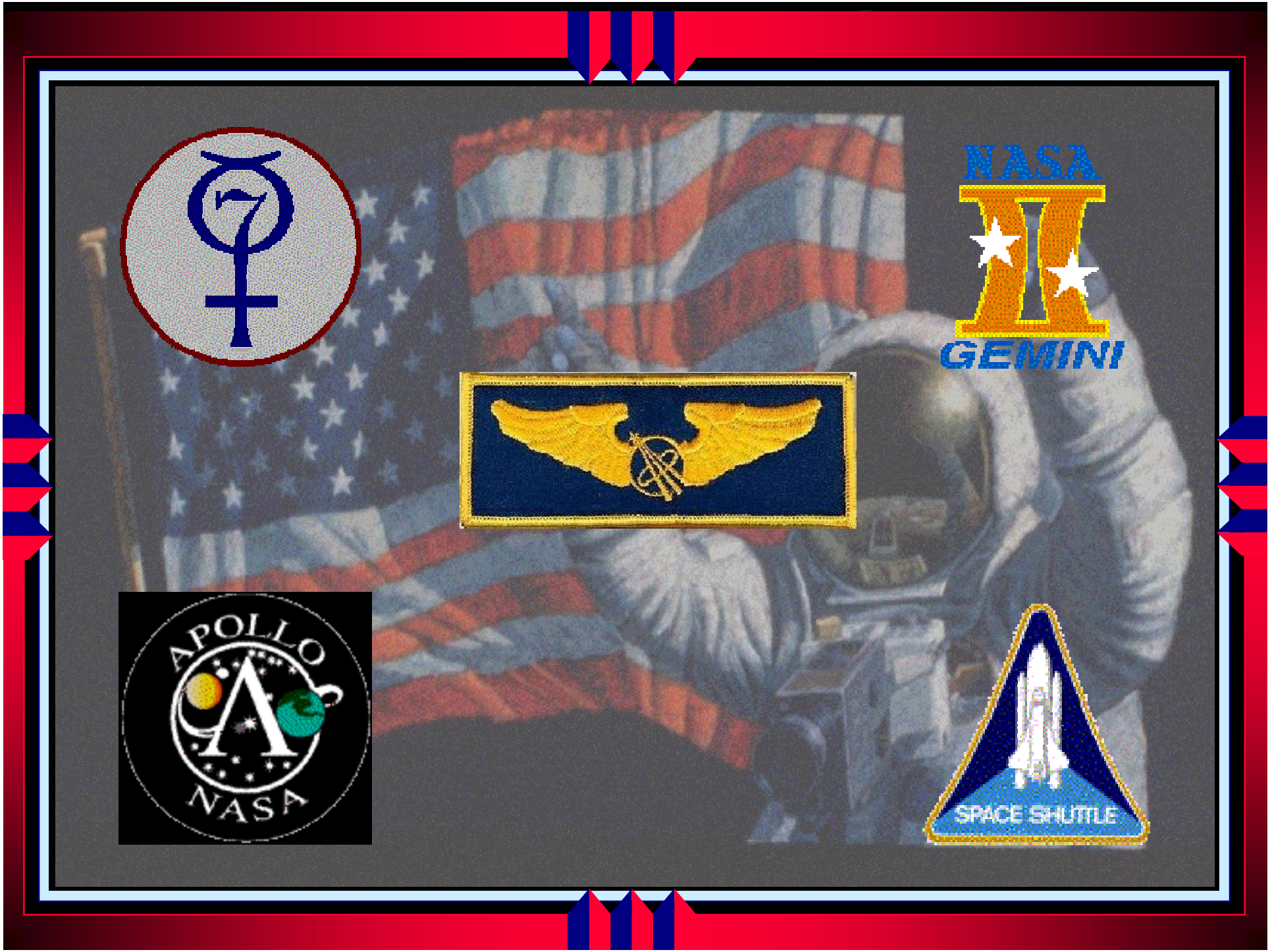
National Aeronautics & Space Administration



October, 1958

Vision

NASA is an investment in America's future. As explorers, pioneers and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.


NASA
GEMINI
APOLLO
NASA
SPACE SHUTTLE

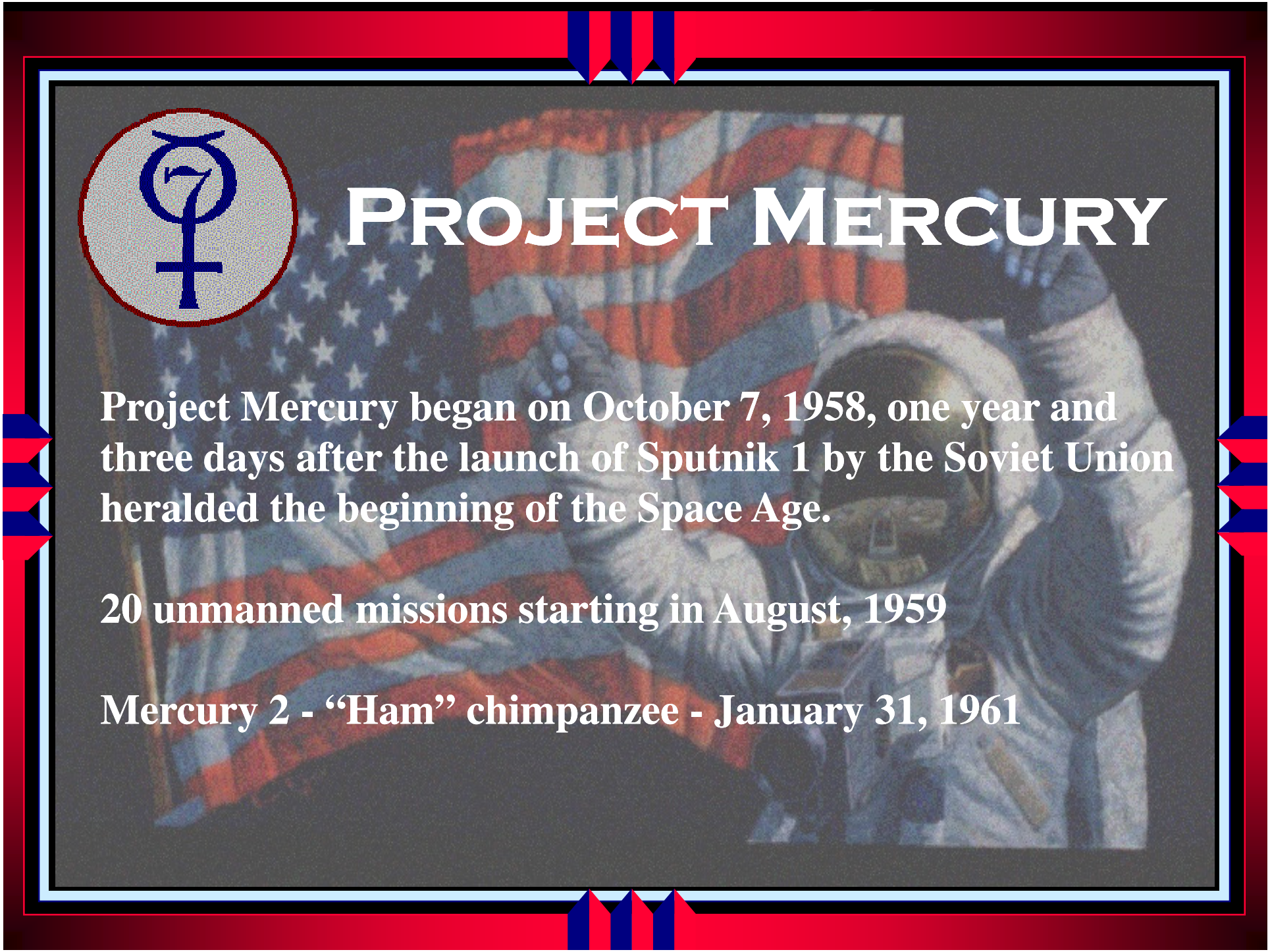
President John F. Kennedy
Speech on "Urgent National Needs" May 25, 1961
Subsequent Address at Rice University, September 12, 1962

"If this capsule history of our progress teaches us anything, it is that man, in his quest for knowledge and progress, is determined and cannot be deterred. The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in the race for space.

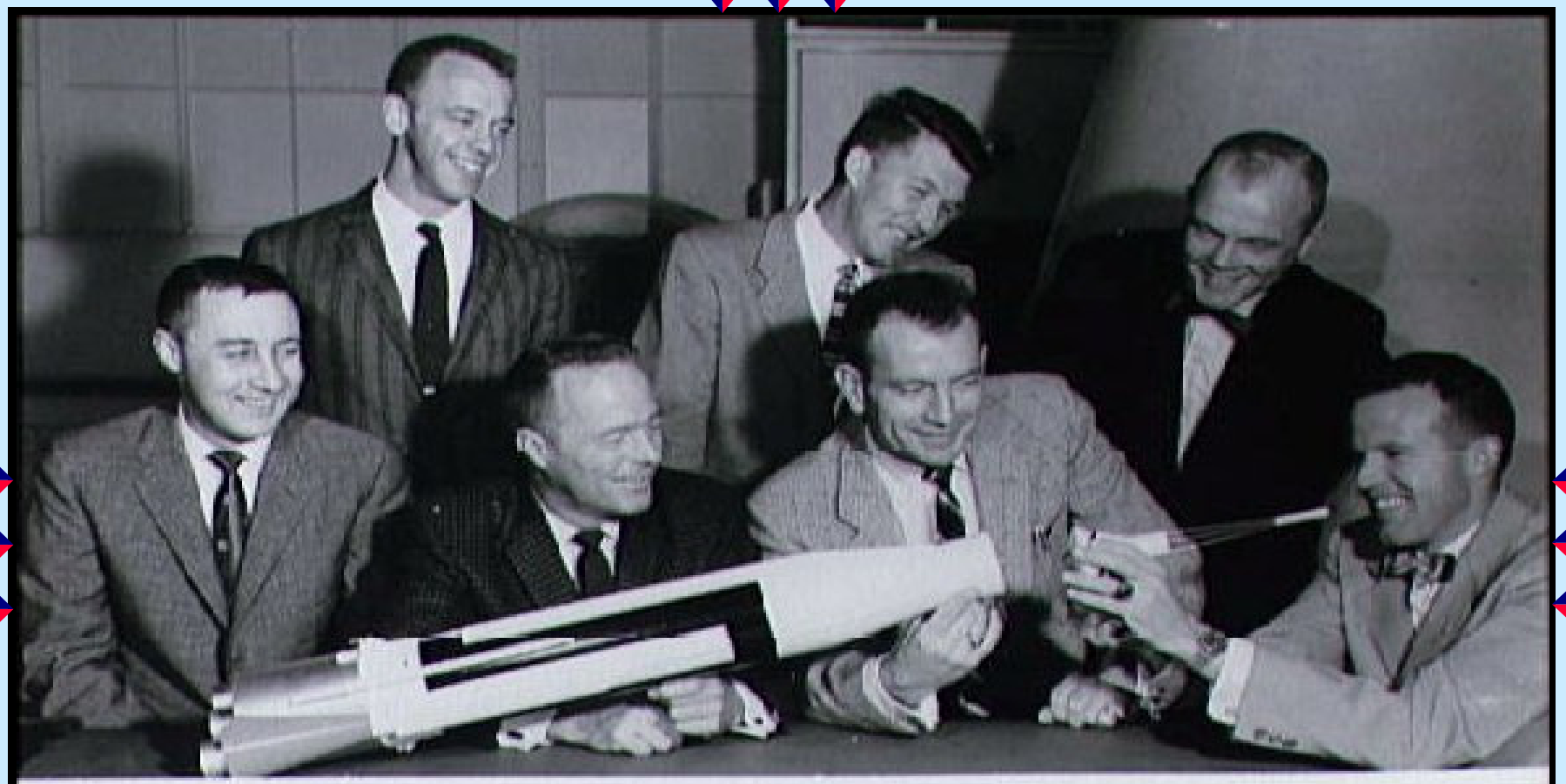
We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.

Space is there, and we're going to climb it, and the moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked."

The Flights of Project Mercury


Project Mercury
Project Mercury began on October 7, 1958, one year and three days after the launch of Sputnik 1 by the Soviet Union heralded the beginning of the Space Age.
20 unmanned missions starting in August, 1959
Mercury 2 - “Ham” chimpanzee - January 31, 1961

The Original 7 "Star Voyagers"



Alan B. Shepard Jr. — Walter M. Schirra / John H. Glenn Jr.

Virgil I. Grissom — M. Scott Carpenter — Donald K. Slayton — Leroy G. Cooper Jr.

Mercury 3

Freedom 7

Crew:
Alan B. Shepard, Jr.

Flight:
May 5, 1961

Mission Objective:
To determine man's capabilities in a space environment and in those environments to which he will be subject upon going into and returning from space.

Mission Highlights:
1st American in space (15 min)

Freedom 7 is now located at the Garber Facility, National Air and Space Museum, Washington D.C.

Mercury 4

Liberty Bell 7

Crew:
Virgil I. "Gus" Grissom

Flight:
July 21, 1961

Mission Objective:
Corroborate man-in-space concept.

Mission Highlights:
Spacecraft sank shortly after splashdown.

Liberty Bell 7 was finally recovered in July, 1999 nearly 3 miles deep in the Atlantic Ocean

Mercury 6

Friendship 7

Crew:
John H. Glenn, Jr.

Flight:
February 20, 1962

Mission Objective:
Place a man into earth orbit, observe his reactions to the space environment, and safely return him to earth to a point where he could be readily found.

Mission Highlights:
1st American in orbit.

Friendship 7 is now located at the National Air and Space Museum, Washington D.C.

Mercury 7

Aurora 7

Crew:
M. Scott Carpenter

Flight:
May 24, 1962

Mission Objective:
Corroborate man-in orbit.

Mission Highlights:
All objectives met; spacecraft overshot target area by 250 miles.

Aurora 7 is now located at the Museum of Science and Industry, Chicago, Illinois

Mercury 8

Sigma 7

Crew:
Walter M. Schirra, Jr.

Flight:
October 3, 1962

Mission Objective:
Man and machine in orbit for 9 hours.

Mission Highlights:
1st live TV broadcast from space.

Sigma 7 is now located at the US Space & Rocket Center, Astronaut Hall of Fame, Titusville, Florida

Mercury 9
Faith 7

Crew:
L. Gordon Cooper

Flight:
May 15 - 16, 1963

Mission Objective:
Manned 1-day mission in orbit.

Mission Highlights:
1st satellite released; 1st American to sleep in space.

Faith 7 is now located at the Johnson Space Center, NASA, Houston, Texas

The Flights of Project Gemini

Project Gemini

The primary purpose of the Gemini missions was to:

- learn how to "fly" a space vehicle.
- maneuver in orbit.
- rendezvous and dock with another vehicle.
- demonstrate that astronauts could endure conditions of weightlessness for the length of time necessary for a lunar mission.

There were ten Gemini missions spanning a period of 20 months.

It was during this period that Mission Control was transferred to the Johnson Space Center in Houston.

The Original 7 Astronauts

The "New Nine"

Astronaut Selection Group 3

Gemini 1

Crew:
Unmanned

Launch:
April 8, 1964

Mission Highlights:
Successful orbital test of the Titan-II launch vehicle.

Gemini 2

Crew:
Unmanned

Launch:
January 19, 1965

Mission Highlights:
Demonstrated satisfactory performance of spacecraft and major subsystems.

Gemini 3

Crew:
Virgil I. Grissom
John W. Young

Flight:
March 23, 1965

Mission Objective:
Demonstrate manned orbital flight and evaluate two-man design.

Mission Highlights:
The only Gemini mission to have a nickname: *Unsinkable Molly Brown*

Gemini 3 is now located at the Grissom Memorial, Spring Mill State Park, Mitchell, Indiana

Gemini IV

Crew:
James A. McDivitt
Edward H. White II

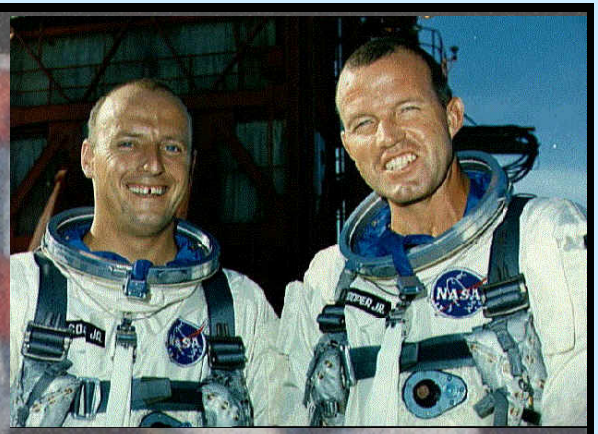
Flight:
June 3 - 7, 1965

Mission Objective:
Demonstrate Extra Vehicular Activity (EVA) operation.

Mission Highlights:
1st American spacewalk (22 min); 1st flight controlled by Houston; 1st flight designated by NASA in roman numerals.

Gemini IV is now located at the National Air and Space Museum, Washington D.C.

Gemini V



Crew:
L. Gordon Cooper
Charles "Pete" Conrad, Jr.

Flight:
August 21 - 29, 1965

Mission Objective:
Demonstrate and evaluate rendezvous Guidance and Navigation system, and 8-day capability of spacecraft and crew.

Mission Highlights:
Considered the point where America took the lead in the Space Race; Duration made possible through use of new fuel cells; Introduced TANG

Gemini V is now located at the Johnson Space Center, NASA, Houston, Texas

Gemini VI

Crew:
Walter M. Schirra, Jr.
Thomas P. Stafford

Flight:
December 15 - 16, 1965

Mission Objective:
Primary objective was to rendezvous with Gemini VII.

Mission Highlights:
Successful rendezvous; 1st pictures of another human-occupied craft in space.

Gemini VI is now located at the St. Louis Science Center, St. Louis, Missouri

Gemini VII

Crew:
Frank Borman
James A. Lovell

Flight:
December 4 - 18, 1965

Mission Objective:
Conduct 14-day mission and evaluate effects on crew.

Mission Highlights:
Successful rendezvous with Gemini VI; New endurance record; Conducted most experiments (20) including studies of nutrition.

Gemini VII is now located at the National Air and Space Museum, Washington D.C.

Gemini VIII

Crew:
Neil A. Armstrong
David R. Scott

Flight:
March 16 - 17, 1966

Mission Objective:
Rendezvous and dock with Gemini Agena target vehicle launched on March 16, 1966 and conduct EVA operations.

Mission Highlights:
1st successful docking with another vehicle in space; Stuck thruster forced undocking after 30 minutes, use of RCS, and mission abort.

Gemini VIII is now located at the Armstrong Museum, Wapakoneta, Ohio

Gemini IX

Crew:
Thomas P. Stafford
Eugene A. Cernan

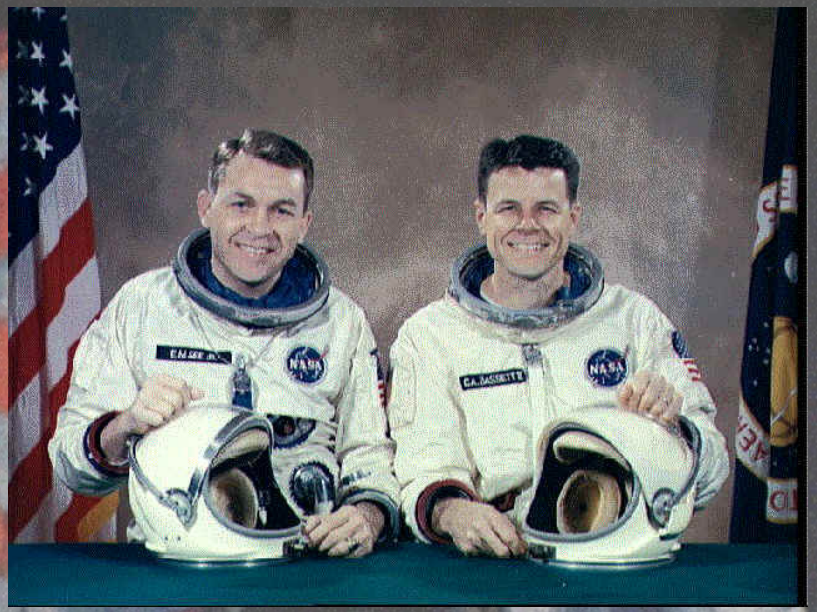
Flight:
June 3 - 6, 1966

Mission Objective:
Perform rendezvous and docking with Augmented Target Docking Adapter (ATDA) and conduct EVA.

Mission Highlights:
1st backup crew to fly in space; Rendezvous successful including simulation of a Lunar Module rendezvous; Docking unsuccessful.

Gemini IX is now located at the Kennedy Space Center, NASA, Cape Canaveral, Florida

Gemini IX



Original Crew:
Elliott M. See
Charles Bassett

Killed in an airplane accident on February 28, 1966 at the McDonnell Aircraft Corporation, St. Louis, MO.

Gemini X

Crew:
John W. Young
Michael Collins

Flight:
July 18 - 21, 1966

Mission Objective:
Rendezvous and dock with Gemini Agena target vehicle.

Mission Highlights:
Attained highest orbit reached by man; Accomplished 1st "double rendezvous" with Gemini VIII Agena; Collins spacewalk to the Agena made him 1st astronaut to meet another spacecraft in orbit.

Gemini X is now located at the Norsk Teknisk Museum, Oslo, Norway

Gemini XI

Crew:
Charles "Pete" Conrad, Jr.
Richard F. Gordon, Jr.

Flight:
September 12 - 15, 1966

Mission Objective:
Rendezvous and dock with Gemini Agena target vehicle.

Mission Highlights:
1st revolution docking to simulate LEM and Apollo Command Module in lunar orbit; Attained highest orbit in human spaceflight (850 miles); 1st fully automatic, computer-controlled landing.

Gemini XI is now located at the California Museum of Science and Industry

Gemini XII

Crew:
James A. Lovell, Jr.
Edwin E. "Buzz" Aldrin

Flight:
November 11 - 15, 1966

Mission Objective:
Rendezvous and docking and to evaluate EVA.

Mission Highlights:
Demonstrated that it was possible for man to work effectively outside the protected environment of a spacecraft in zero gravity.

Gemini XII is now located at the Goddard Space Flight Center, NASA, Greenbelt, Maryland

The Flights of Project Apollo

Project Apollo

The primary purpose of Project Apollo was to land a man on the moon.

The spacecraft was made up of:

- **Command Module**
- **Service Module**
- **Lunar Module**
- **Saturn booster**

There were 9 Apollo moon missions: 3 orbited the moon, 6 landed.

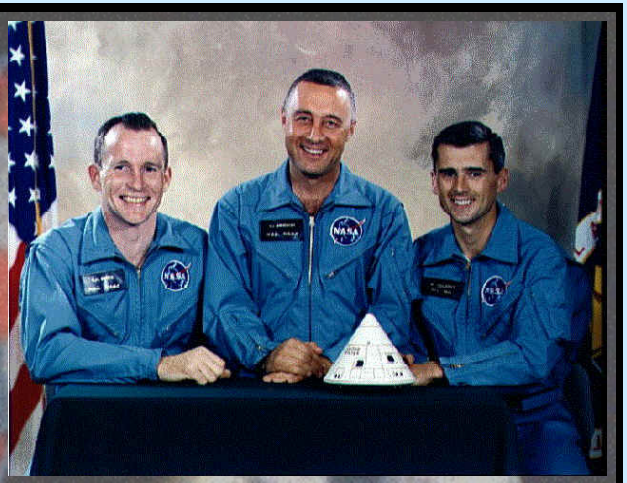
Still considered as humankind's greatest technological achievement.

AS - 201	Saturn 1-B	February 26, 1966
AS - 202	Saturn 1-B	August 25, 1966
AS - 203	Saturn 1-B	July 5, 1966
Apollo 4	Saturn V	November 9, 1967
Apollo 5	Lunar Module	January 22, 1968
Apollo 6	Saturn V,CSM,LM	April 4, 1968

The missions of AS-201 and AS-202 with Apollo spacecraft aboard had been unofficially known as Apollo 1 and Apollo 2 missions. In the spring of 1967, NASA's Associate Administrator for Manned Space Flight, Dr. George E. Mueller, announced that the first manned mission would be known as Apollo 1, and that the first Saturn V launch, scheduled for November 1967, would be known as Apollo 4. The eventual launch of AS-204 became known as the Apollo 5 mission. No missions or flights were ever designated Apollo 2 and 3.

Apollo 1

AS - 204



Crew:

Virgil I. Grissom, CDR
Edward H. White, CMP
Roger B. Chaffee, LMP

Flight:

February 21, 1967

Mission Objective:

First Apollo manned mission.

Tragedy struck the crew during a preflight test on January 27, 1967 when a fire swept through the Command Module.

Apollo 1 is now located at the NASA Langley Research Center, Hampton, Virginia

Apollo 7

Crew:

Walter M. Schirra, Jr., CDR
Donn F. Eisele, CMP
R. Walter Cunningham, LMP

Flight:

October 11 - 21, 1968

Mission Objective:

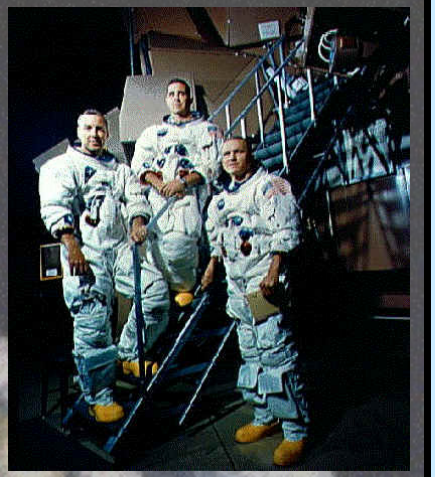
Demonstrate CSM/crew performance, crew/space vehicle/mission support facilities performance during a manned CSM mission.

Mission Highlights:

1st 3-man American crew; 1st live TV downlink.

Apollo 7 is now located at the National Museum of Science & Technology, Ottawa, Canada

Apollo 8



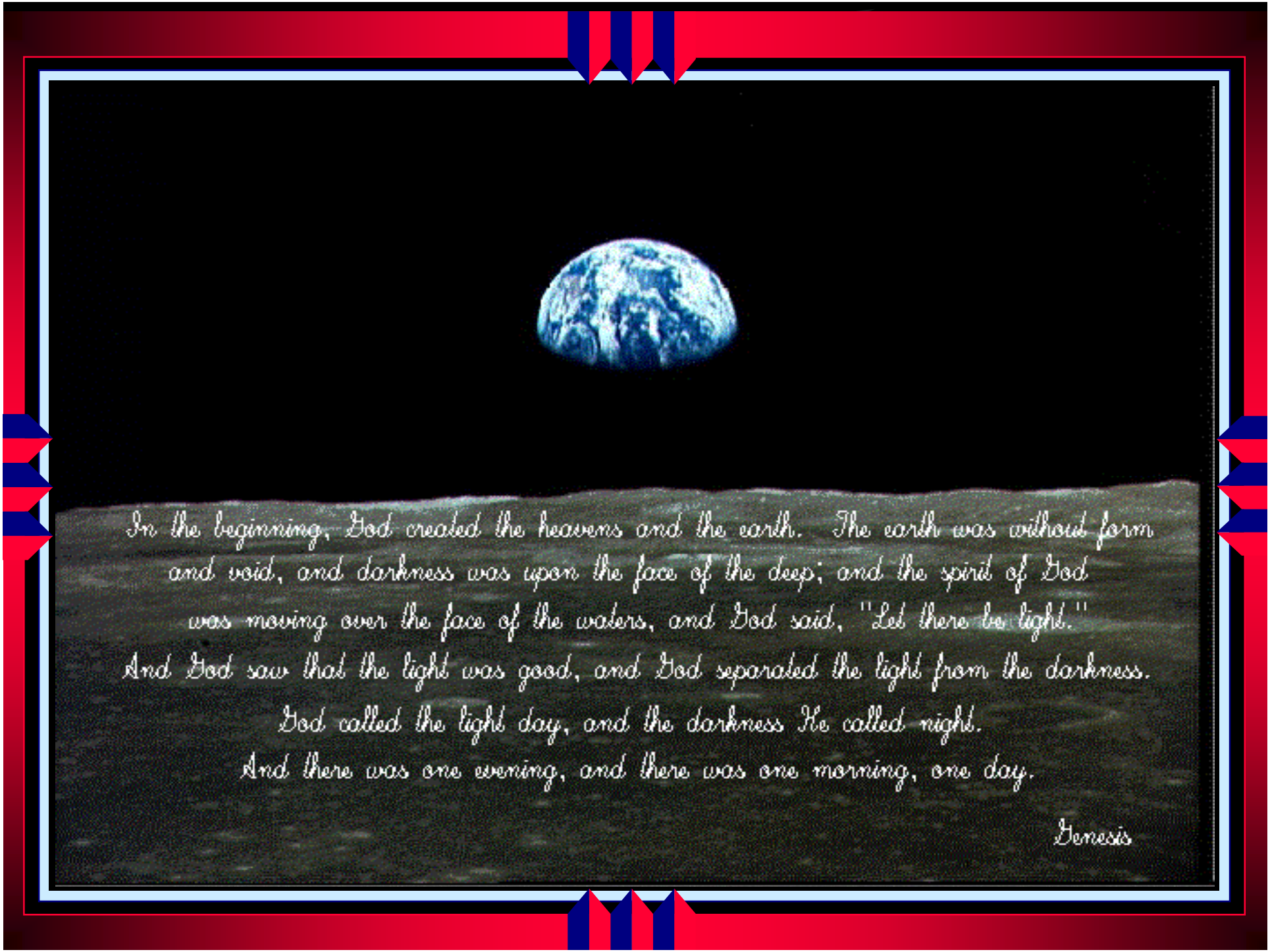
Crew:
Frank Borman, CDR
James A. Lovell, Jr., CMP
William A. Anders, LMP

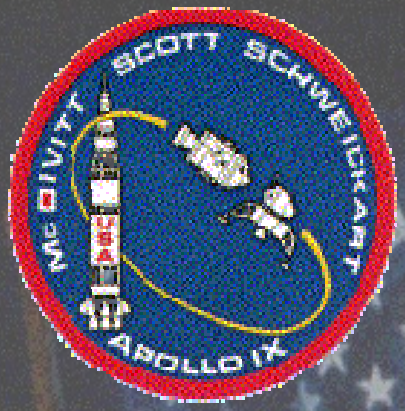
Flight:
December 21 - 27, 1968

Mission Objective:
Demonstrate TransLunar Injection (TLI), CSM performance in cislunar and lunar orbit environment, and communications at lunar distances.

Mission Highlights:
1st flight of Saturn V booster; 1st manned lunar orbital mission.

Apollo 8 is now located at the Chicago Museum of Science & Technology, Chicago, Illinois


In the beginning, God created the heavens and the earth. The earth was without form
and void, and darkness was upon the face of the deep; and the spirit of God
was moving over the face of the waters, and God said, "Let there be light."
And God saw that the light was good, and God separated the light from the darkness.
God called the light day, and the darkness He called night.
And there was one evening, and there was one morning, one day.
Genesis



Apollo 9

Crew:
James A. McDivitt, CDR
David R. Scott, CMP
Russell L. Schweickart, LMP

Flight:
March 3 - 13, 1969

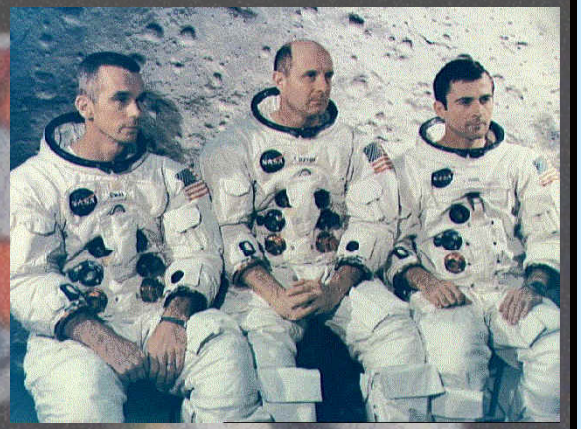
Payload:
Gumdrop & Spider

Mission Objective:
Demonstrate crew/space vehicle/mission support facilities during manned Saturn V/CSM/LM mission.

Mission Highlights:
1st manned flight of all lunar hardware in Earth orbit; 1st manned flight of Lunar Module.

Apollo 9 is now located at the Michigan Space Center, Jackson Community College, Jackson Michigan

Apollo 10



Crew:
Thomas P. Stafford, CDR
John W. Young, CMP
Eugene A. Cernan, LMP

Flight:
May 18 - 26, 1969

Payload:
Charlie Brown & Snoopy

Mission Objective:
Demonstrate performance of LM and CSM in lunar gravitation field.

Mission Highlights:
Dress rehearsal for Moon landing; 1st manned CSM/LM operations in cislunar and lunar environment; Only Apollo mission to launch from 39B.

Apollo 10 is now located at the Science Museum, London, England

Apollo 11

Crew:
Neil A. Armstrong, CDR
Michael Collins, CMP
Edwin E. Aldrin, Jr., LMP

Flight:
July 16 - 24, 1969

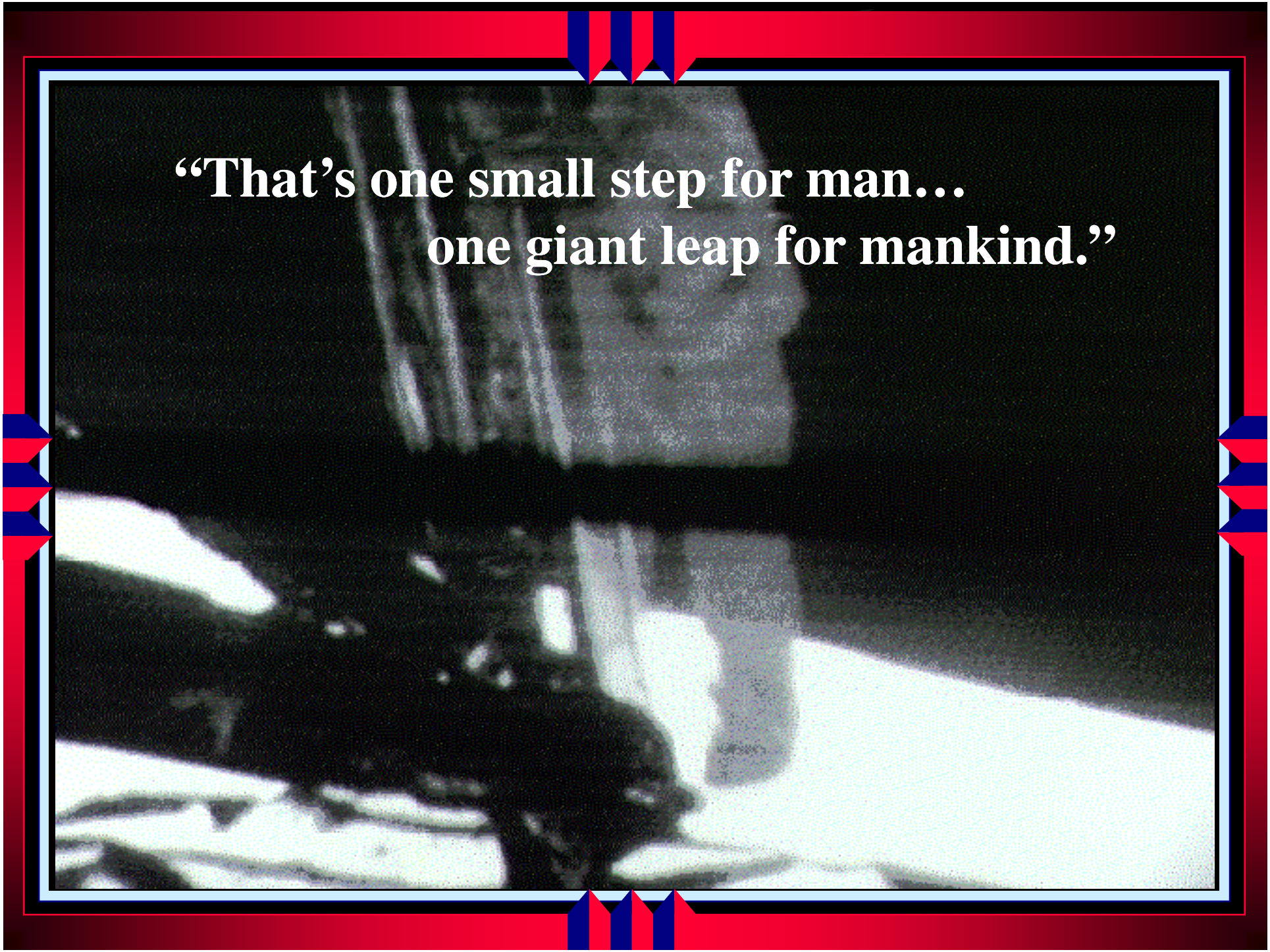
Payload:
Columbia & Eagle

Mission Objective:
Perform manned lunar landing and return mission safely.

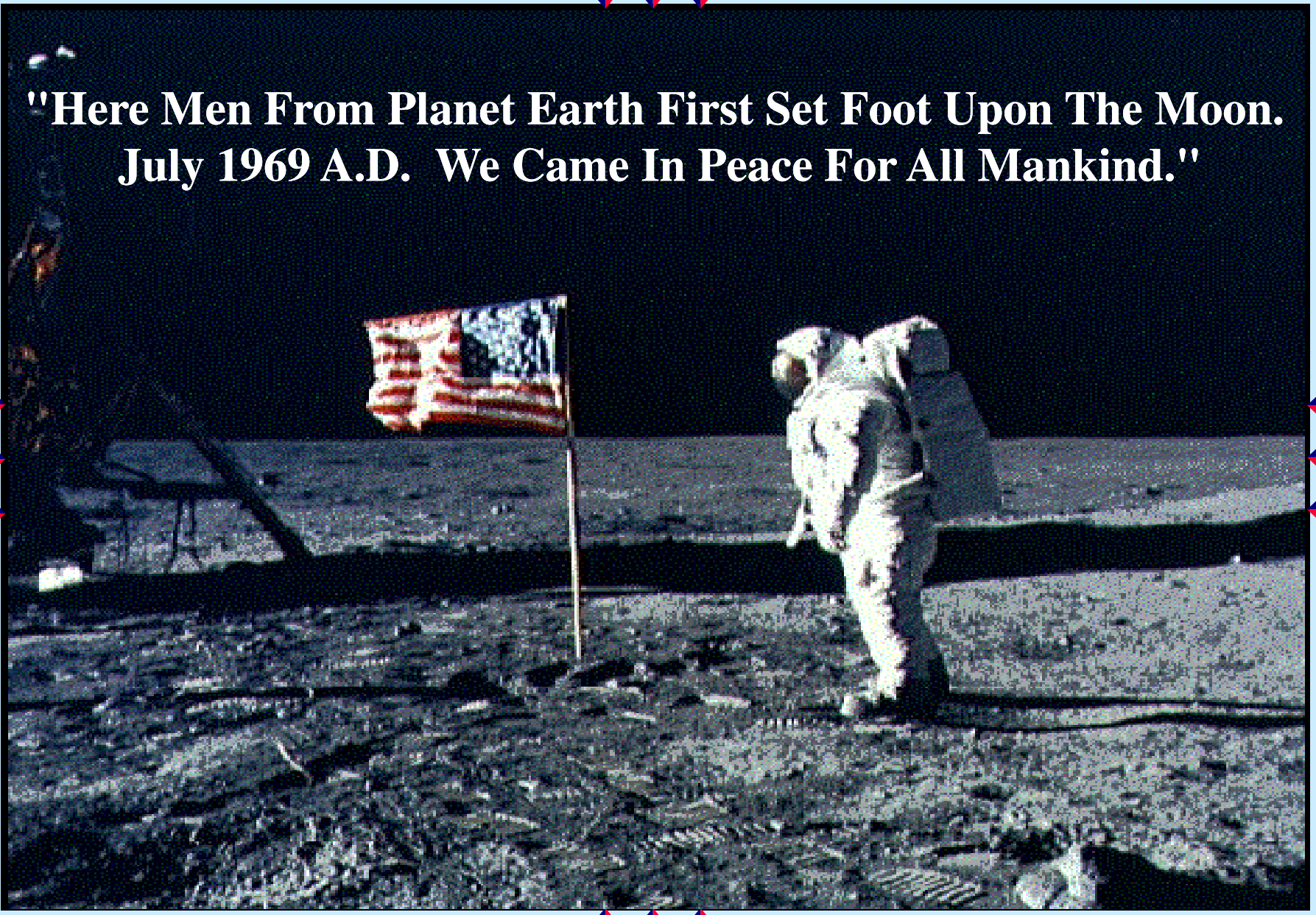
Mission Highlights:
1st manned lunar landing mission and lunar surface EVA, July 20, 1969, Sea of Tranquility

Apollo 11 is now located at the National Air and Space Museum, Washington D.C.

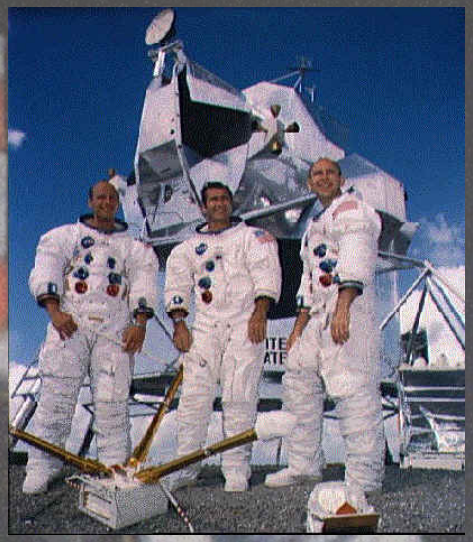
“Houston, Tranquility Base here, The Eagle has landed.”


“That’s one small step for man…
one giant leap for mankind.”

"Here Men From Planet Earth First Set Foot Upon The Moon.
July 1969 A.D. We Came In Peace For All Mankind."



Apollo 12



Crew:
Charles "Pete" Conrad, CDR
Richard F. Gordon, Jr., CMP
Alan L. Bean, LMP

Flight:
November 14 - 24, 1969

Payload:
Yankee Clipper & Intrepid

Mission Objective:
To perform detailed scientific lunar exploration - Ocean of Storms.

Mission Highlights:
The Lunar Module was brought to the surface of the moon automatically by radar and computer; Apollo 12 struck by lightning during liftoff.

Apollo 12 is now located at the Virginia Air & Space Center, Hampton, Virginia

Apollo 13

Crew:
James A. Lovell, Jr., CDR
John L. Swigert, Jr., CMP
Fred W. Haise, Jr., LMP

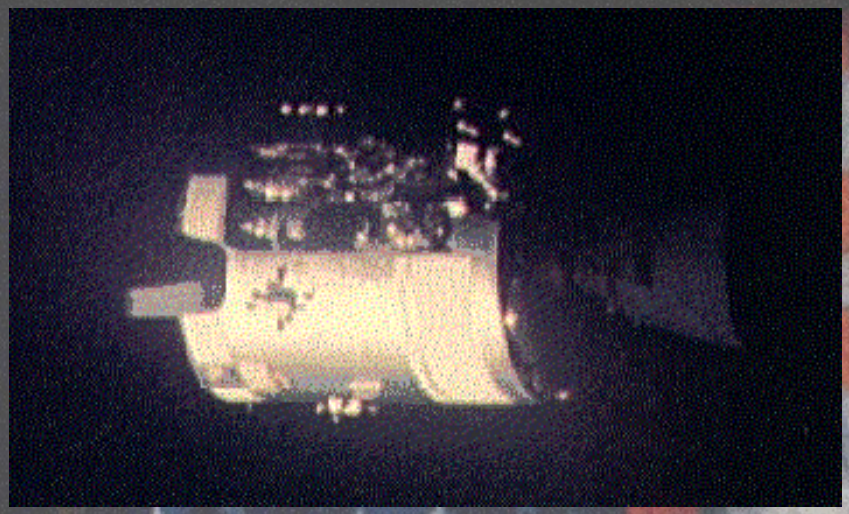
Flight:
April 11 - 17, 1970

Payload:
Odyssey & Aquarius

Mission Objective:
To perform detailed scientific lunar exploration - Fra Mauro.

Mission Highlights:
Mission was aborted after rupture of service module oxygen tank. Classed as "successful failure" because of experience in rescuing crew.

Apollo 13 is now located at the Kansas Cosmosphere and Space Center, Hutchinson, Kansas




WELCOME BACK!
VIII IX X XI XII XIII
ODYSSEY
APOLLO XIII

Apollo 14

Crew:
Alan B. Shepard, Jr., CDR
Stuart A. Roosa, CMP
Edgar D. Mitchell, LMP

Flight:
Jan 31 - Feb 9, 1971

Payload:
Kitty Hawk & Antares

Mission Objective:
To perform detailed scientific lunar exploration - Fra Mauro.

Mission Highlights:
Return to space for America's 1st astronaut; 1st use of handcart to transport rocks; Last crew to be required quarantine.

Apollo 14 is now located at The Boeing Company, Downey, California

Apollo 15

Crew:
David R. Scott, CDR
Alfred M. Worden, CMP
James B. Irwin, LMP

Flight:
July 26 - Aug 7, 1971

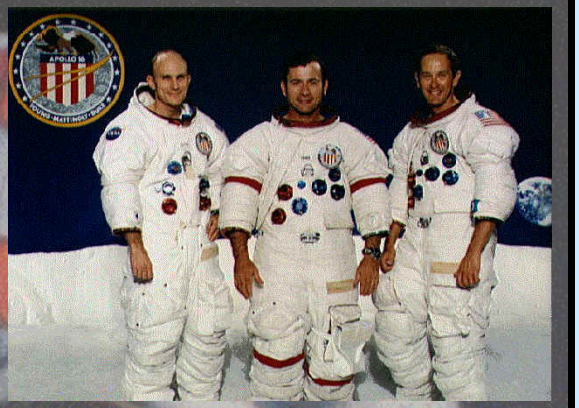
Payload:
Endeavor & Falcon

Mission Objective:
To perform detailed scientific lunar exploration - Hadley-Apennine.

Mission Highlights:
1st use of Lunar Rover; Found "Genesis Rock" depicting origin of moon; 1st spacewalk outside of earth orbit (Worden).

Apollo 15 is now located at the Air Force Museum, Wright-Patterson Air Force Base, Dayton, Ohio

Apollo 16



Crew:
John W. Young, CDR
Thomas K. Mattingly II, CMP
Charles M. Duke, Jr., LMP

Flight:
April 16 - 27, 1972

Payload:
Casper & Orion

Mission Objective:
To perform detailed scientific lunar exploration - Descartes Highlands.

Mission Highlights:
1st study of lunar surface highlands area; 1st use of ultraviolet camera/ spectrograph on Moon; Returned the largest moon rock - 23 pounds.

Apollo 16 is now located at the U.S. Space & Rocket Center, Huntsville, Alabama.

Apollo 17

Crew:
Eugene A. Cernan, CDR
Ronald B. Evans, CMP
Harrison H. Schmitt, LMP

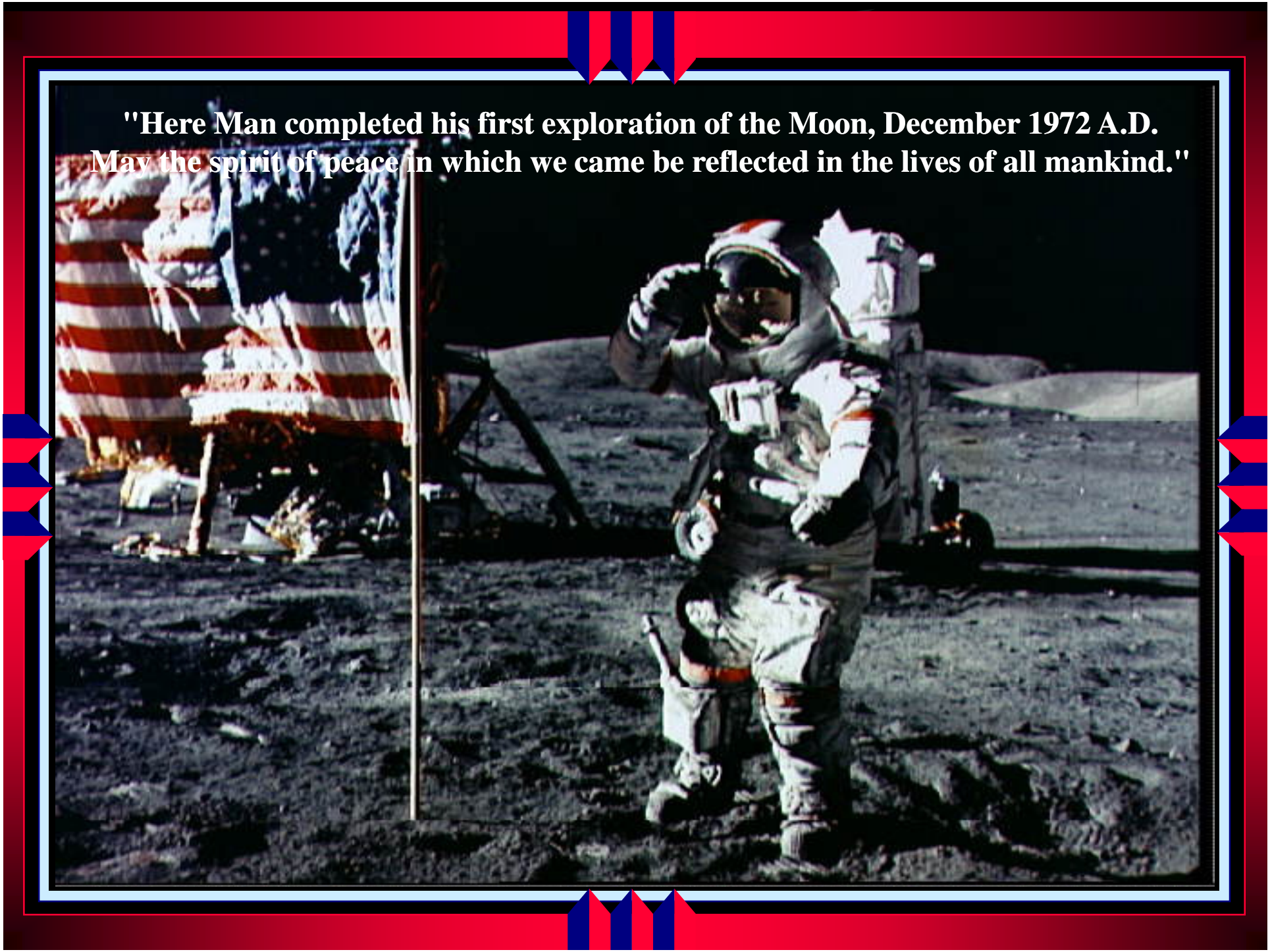
Flight:
December 7 - 19, 1972

Payload:
America & Challenger

Mission Objective:
To perform detailed scientific lunar exploration - Taurus-Littrow Valley.

Mission Highlights:
Last lunar landing mission; 1st scientist to visit the Moon.

Apollo 17 is now located at the Johnson Space Center, NASA, Houston, Texas


"Here Man completed his first exploration of the Moon, December 1972 A.D.
May the spirit of peace in which we came be reflected in the lives of all mankind."

The Flights of Project Skylab

Project Skylab

The primary purpose of Project Skylab as America's first experimental space station was to prove that humans could live and work in space for extended periods, and to expand our knowledge of solar astronomy well beyond Earth-based observations.

The Skylab Station was launched into orbit by a Saturn V booster on May 14, 1973. This marked the last launch of the Saturn V having never failed.

Launch of the unoccupied Skylab Station was designated Skylab 1. The occupied missions were officially designated Skylabs 2, 3, and 4, but are generally referred to as Skylabs I, II, and III.

Skylab I

Crew:
Charles "Pete" Conrad, Jr.
Paul J. Weitz
Joseph P. Kerwin

Flight:
May 25 - June 22, 1973

Mission Objective:
To prove that humans could live and work in space for extended periods.

Mission Highlights:
1st manned space station mission; Doubled the previous American space endurance record set by the Gemini 7 astronauts.

The Skylab I Command Module is now located at the Naval Aviation Museum, Pensacola Florida

Skylab II

Crew:
Alan L. Bean
Jack R. Lousma
Owen K. Garriott

Flight:
July 28 - September 25, 1973

Mission Objective:
Corroborate space station concept.

Mission Highlights:
Doubled the previous endurance record in space set by the astronauts of Skylab I; Conducted many new experiments.

The Skylab II Command Module is now located at the Lewis Research Center, NASA, Cleveland Ohio

Skylab III

Crew:
Gerald P. Carr
William R. Pogue
Edward C. Gibson

Flight:
Nov 16, 1973 - Feb 8, 1974

Mission Objective:
Continue space station exploration.

Mission Highlights:
Conducted thousands of experiments; 4 space walks, including one on Christmas Day to observe the comet Kohoutek.

The Skylab III Command Module is now located at the National Air and Space Museum, Washington D.C.


Skylab's orbit slowly deteriorated and it finally burned up in the atmosphere on July 11, 1979, more than five years after the last crew left for home.

The Flight of Apollo-Soyuz Test Project

Apollo-Soyuz Test Project

Astronaut Crew:
Thomas P. Stafford
Vance D. Brand
Donald K. "Deke" Slayton

Apollo 18 Flight:
July 15 - 24, 1975

Cosmonaut Crew:
Alexei Leonov
Valeri Kubasov

Soyuz 19 Flight:
July 15 - 21, 1975

Docking in Space:
July 17, 1975

Apollo-Soyuz Test Project

Mission Objective:

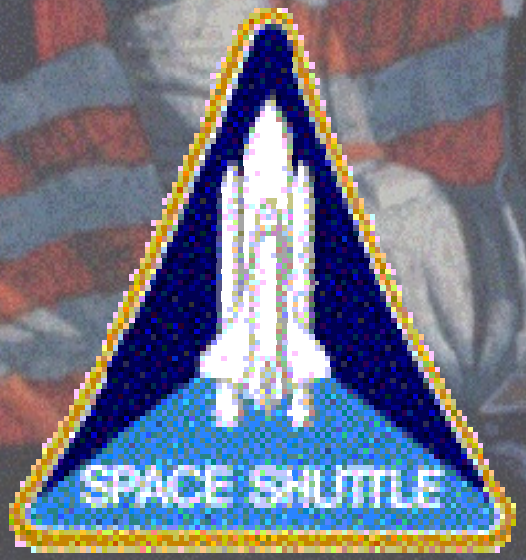
To test the compatibility of rendezvous and docking systems for American and Soviet spacecraft, to open the way for international space rescue as well as future joint manned flights.

Mission Highlights:

1st international manned space flight; 1st docking of spacecraft built by different nations; Deke Slayton's 1st flight; Last flight of Apollo.

The Apollo 18 Command Module is now located at the Kennedy Space Center, NASA, Cape Canaveral, Florida

The Flights of the Space Shuttle



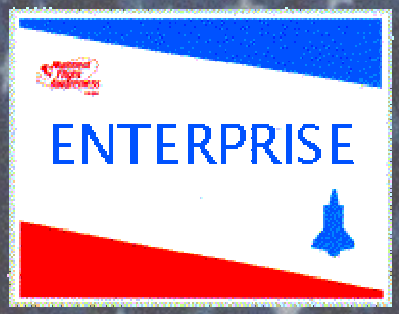
Space Transportation System (STS)

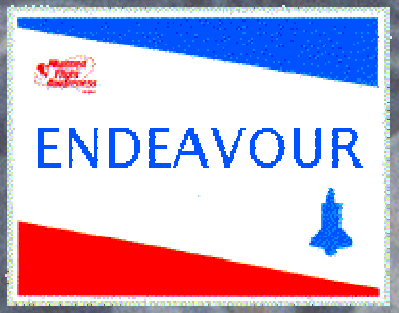
The primary purpose of the Space Transportation System was to improve our access to space with a reusable space vehicle.

The decision to build the shuttle was made in January, 1972 and the contract to build the shuttle was awarded in July, 1972.

- **Orbiter - Boeing (formerly Rockwell)**
- **SRBs - Morton Thiokol Chemical Corporation**
- **External Tank - Lockheed Martin**
- **Main Engines - Boeing Rocketdyne**
- **Operations - United Space Alliance**

Space Shuttle Fleet





Enterprise
OV-101

- Built as a test vehicle and was not equipped for space flight.
- Originally to be named "Constitution" honoring the Bicentennial.
- Rolled out on September 17, 1976 and supported the ground and flight tests of the Approach and Landing Test (ALT) Program conducted from February - November, 1977 at the Dryden Flight Research Facility.
- Flown by 2 astronaut crews:
  Fred Haise & Gordon Fullerton Joe Engle & Dick Truly
- Now the property of the Smithsonian Institution, Washington, D.C.

Columbia
OV-102

- Named after the Boston, MA based sloop captained by Robert Gray on the first American circumnavigation of the globe.
- Also considered to be the feminine personification of the United States.
- Rolled out on March 8, 1979.
- 1st Flight: STS-1, April, 1981; Columbia has flown 26 flights.

STS - 1

Columbia

Crew:
John W. Young, CDR
Robert L. Crippen, Pilot

Flight:
April 12 - 14, 1981
Landing: **Edwards AFB, CA**

Mission Objective:
Demonstrate safe launch into orbit and safe return of the orbiter and crew.

Mission Highlights:
1st flight of Space Transportation System; All mission objectives met; Space Shuttle's worthiness as a space vehicle was verified.

Challenger
OV-099

- Named after an American Naval research vessel that sailed the Atlantic and Pacific oceans during the 1870's.
- Originally was a high-fidelity Structural Test Article (STA-099).
- Rolled out on June 30, 1982.
- 1st Flight: STS-6, April, 1983; Challenger flew 10 flights.

STS 51-L

Challenger

Crew:

Francis R. Scobee, CDR
Michael J. Smith, Pilot
Gregory B. Jarvis, PS1
Judith A. Resnick, MS1
Ellison S. Onizuka, MS2
Ronald E. McNair, MS3
Sharon Christa McAuliffe, PS2 (TISP)

Mission Objective:

Deployment of payloads, several experiments, TISP; 1st Shuttle launch from Pad 39-B.

Flight: January 28, 1986

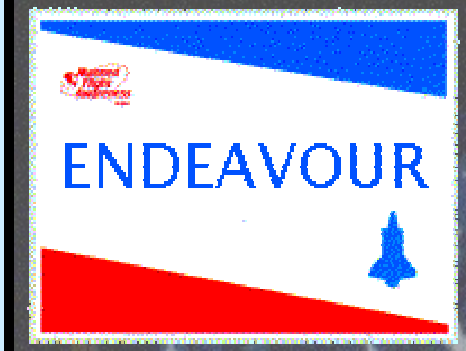
Tragedy claimed the crew and vehicle 73 seconds after liftoff when an O-ring failure in the right SRB caused an explosion.

Discovery
OV-103

- Named after one of two ships that were used by the British explorer James Cook in the 1770s during voyages in the South Pacific that led to the discovery of the Hawaiian Islands.
- Rolled out on October 16, 1983.
- 1st Flight: STS 41-D, August, 1984; Discovery has flown 26 flights.

Atlantis
OV-104

- Named after the first U.S. vessel to be used for oceanographic research from the Woods Hole Oceanographic Institute in Massachusetts from 1930 to 1966.
- Rolled out on March 6, 1985.
- 1st Flight: STS 51-J, October, 1985; Atlantis has flown 20 flights.



Endeavour
OV-105

- Named after the first ship commanded by James Cook, the 18th century British explorer, navigator and astronomer.
- A national competition involving students in elementary and secondary schools produced the name of the new orbiter, announced by President George Bush in 1989.
- Rolled out on April 25, 1991.
- 1st Flight: STS 49, May, 1992; Endeavour has flown 13 flights.

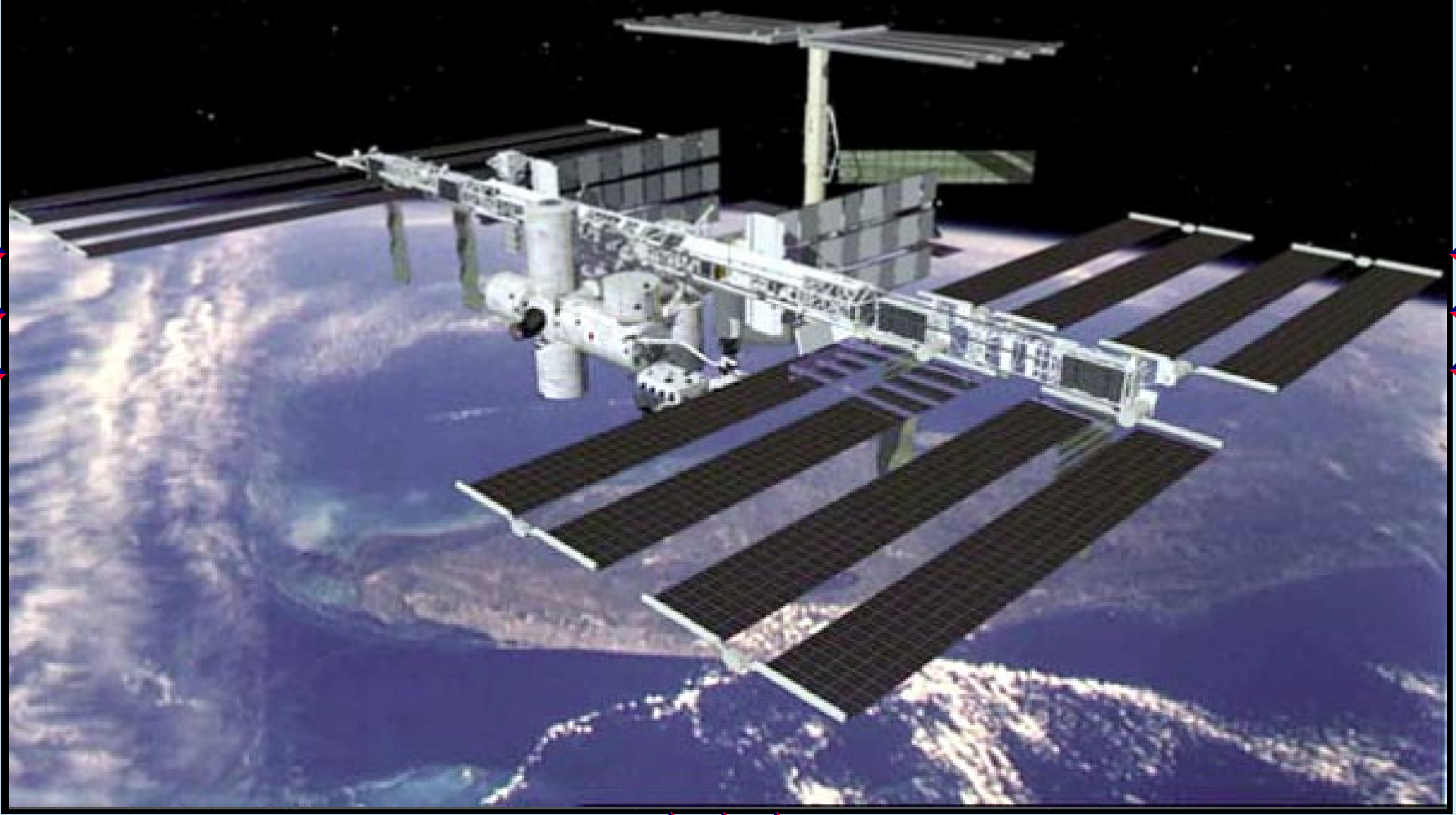
Astronaut Dick Covey

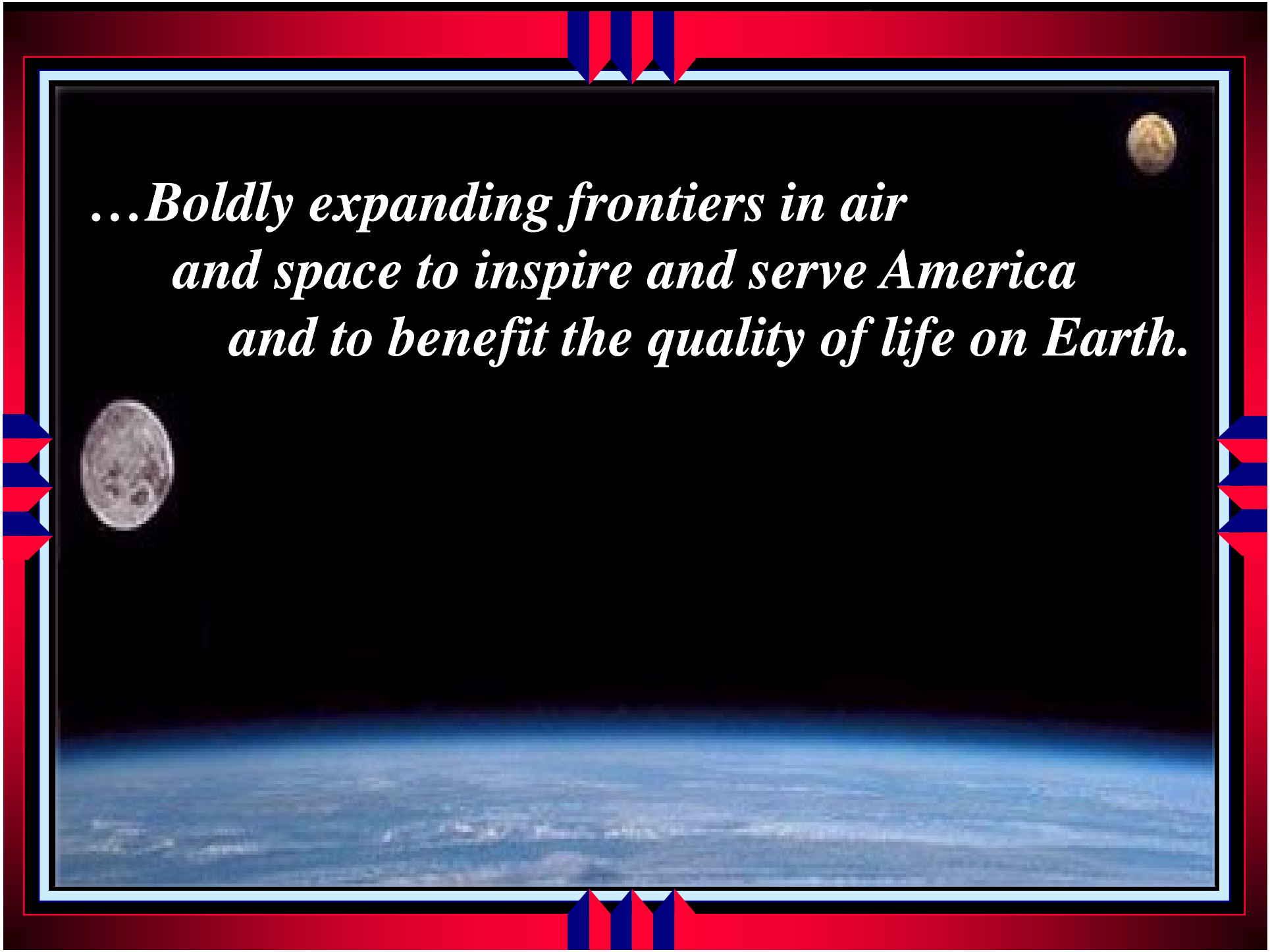
STS 51-I, Discovery, Pilot
STS 26, Discovery, Pilot
STS 38, Atlantis, CDR
STS 61, Endeavour, CDR

Astronaut Brewster Shaw

STS 9, Columbia, Pilot
STS 61-B, Atlantis, CDR
STS 28, Columbia, CDR

To be continued...




…Boldly expanding frontiers in air
and space to inspire and serve America
and to benefit the quality of life on Earth.