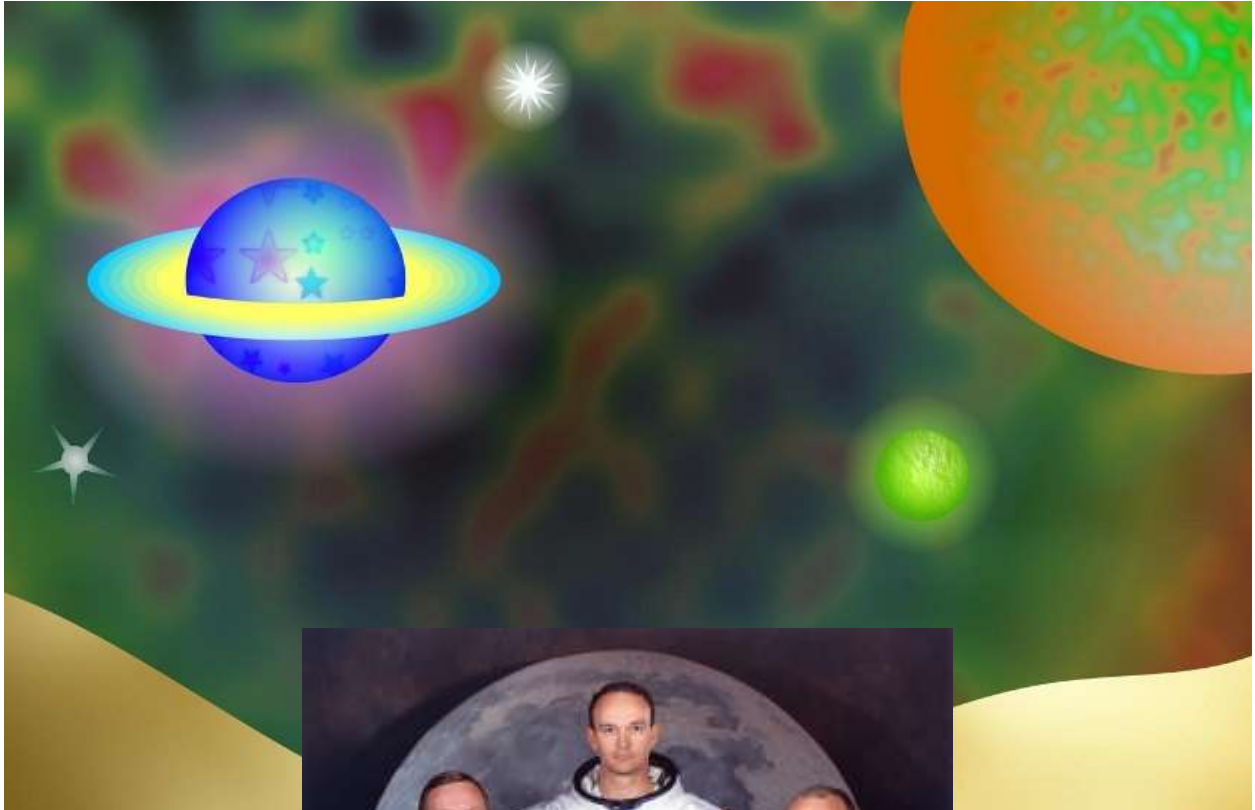


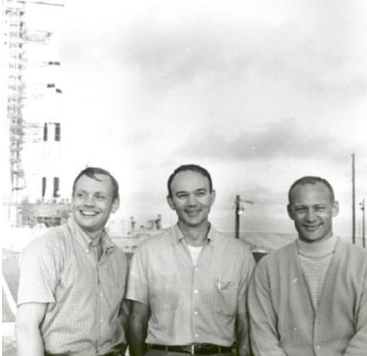
APOLLO II FACTS



APOLLO 11 FACTS

- To the MOON and BACK AGAIN

Armstrong, Collins, Aldrin



On July 16 1969, The *Saturn V* rocket propelled Neil Armstrong, Michael Collins and Edwin (Buzz) Aldrin 239,000 miles into deep space on an historic expedition to the moon and back again.



Astronaut Buzz Aldrin, lunar module pilot, walks on the surface of the Moon near the leg of the Lunar Module (LM) "Eagle". Image NASA

Michael Collins, command module pilot, remained in orbit aboard the Command and Service Modules (CSM) "*Columbia*".

Neil Armstrong and Edwin (Buzz) Aldrin proceeded to the moon in the Lunar Module (LM) "*Eagle*" and became the first humans ever to set foot on the

moon as they explored the *Sea of Tranquility* region.

Apollo 11 Timeline

1. Ascent Phase

| | |
|---------------------|-----------------|
| 16 Jul 1969 | Lift Off |
| 000:00:00.00 | Time: 13:32:00 |

The third stage S-IVB engine ignites after the S-II engine has cut off and been separated. Two minutes of burn time and speed is increased to 16,500 miles per hour and an altitude of 115 statute miles where the earth orbit phase commences.

Abbreviations – CM SM LM

CM Command Module: The compartment where the crew live and work.

SM Service Module "Columbia" provides the propulsion system, water, oxygen, hydrogen and propellant. It puts the space craft into lunar orbit and then sends it on its way back to Earth. Before re-entry into the earth's atmosphere, it is separated from the CM and moved safely away

LM The Lunar Module "Eagle" is used to transport Buz Aldrin and Neil Armstrong to the surface of the moon. The Lunar Module is commanded by Michael Collins who remains in orbit in the Command Module and guides the Lunar Module to the surface of the moon and then back to the Command Module.



Lunar Module during ascent, Earth is visible over the horizon. NASA Source: www.archive.org/details/AS11-44-6642

2. Earth Orbit Phase

| | |
|--------------------|---|
| 16 Jul 1969 | 1.5 Earth orbits lasting 2 hours and 38 minutes and 23.73 seconds. The crew check and test operations and procedures to prepare for moon travel. |
| 000:02:44.0 | 13:34:44 |

3. Translunar Phase

Trans-lunar injection - the third stage engine burns and sends the rocket on its way toward the moon. The engine burns for about 5 minutes and cuts out at about 190 miles above the earth. The rocket is now travelling at 24,300 miles per hour.

| | |
|---------------------|---|
| 17 Jul 1969 | The CSM called <i>Columbia</i>, separated from the Saturn third stage, turned around, and connected nose to nose with the lunar module, called <i>Eagle</i>, which had been stored in the third stage. With Eagle attached to its nose, Columbia drew away from the third stage and continued toward the Moon. |
| 003:24:03.7 | |
| 17 Jul 1969 | Unscheduled 1 st 50 minute television transmission started. |
| 030:28 | 20:00 |
| 17 Jul 1969 | TV transmission ended. |
| 031:18 | 20:50 |
| 18 Jul 1969 | Commenced lunar orbit ignition to insert the spacecraft into lunar orbit. |
| 075:49:50.37 | 17:21:50 |

4. Lunar Orbit / Lunar Surface Phase

| | |
|--------------------|---|
| 19 Jul 1969 | Scheduled TV transmission commenced, providing startling footage of the approach to landing and the lunar surface. |
| 078:20 | 19:52 |
| 19 Jul 1969 | TV transmission ended. |
| 079:00 | 20:32 |
| 19 Jul 1969 | The commander and lunar module pilot transferred to the LM final preparations for descent |
| 095.20 | 12.52 |
| 20 Jul 1969 | CSM/LM separation |
| 100:40:01.9 | 18:12:01 |

Lunar Orbit / Lunar Surface Phase Continued

| | |
|--------------------|--|
| 20 Jul 1969 | LM descent orbit |
| 101:36:44 | 19:08:44 |
| 20 Jul 1969 | LM altitude less than 30,000 feet and velocity less than 2,000 feet per second |
| 102:38:50 | 20:10:50 |

| | |
|--------------------|--|
| 20 Jul 1969 | 1st evidence of surface dust disturbed by descent engine. |
| 102:44:35 | 20:16:35 |
| 20 Jul 1969 | LM lunar landing. Armstrong reported "The Eagle Has Landed." |
| 102:45:39.9 | 20:17:39 |
| 20 Jul 1969 | EVA started (hatch open). |
| 109:07:33 | 02:39:33 |
| 21 Jul 1969 | CDR completely outside LM on porch. |
| 109:19:16 | 02:51:16 |
| 21 Jul 1969 | First clear TV picture received. |
| 109:22:00 | 02:54:00 |
| 21 Jul 1969 | CDR (Commander, Armstrong) at the foot of the ladder, described surface as "almost like a powder." |
| 109:23:38 | 02:55:38 |
| 21 Jul 1969 | 1 st step taken on lunar surface (CDR). "That's one small step for a man...one giant leap for mankind." |
| 109:24:15 | 02:56:15 |
| 21 Jul 1969 | Contingency sample collection. Surface photography (CDR). |
| 21 Jul 1969 | LMP (Lunar Module Pilot, Aldrin) on lunar surface. |
| 109:43:16 | 03:15:16 |
| 21 Jul 1969 | Surface examination and examination of landing effects on surface and on LM started (CDR, LMP). |
| 109:43:47 | 03:15:47 |
| 21 Jul 1969 | Plaque unveiled (CDR). Plaque read (CDR). |
| 109:52:40 | 03:24:40 |
| 21 Jul 1969 | TV camera redeployed. Panoramic TV view started (CDR). |
| 109:59:28 | 03:31:28 |

Lunar Orbit / Lunar Surface Phase *continued*

| | |
|---------------------|---|
| 21 Jul 1969 | Solar wind composition experiment deployed (LMP). |
| | <p>United States flag deployed (CDR, LMP).</p> <p>Presidential message from White House and response from CDR.</p> <p>Evaluation of surface mobility</p> <p>Evaluation of trajectory of lunar soil when kicked (LMP) and bulk sample collection started (CDR).</p> <p>Evaluation of visibility in lunar sunlight (LMP).</p> <p>Evaluation of thermal effects of sun and shadow inside the suit (LMP).</p> <p>Evaluation of surface shadows and colors (LMP).</p> <p>Bulk sample completed (CDR).</p> <p>LM landing gear inspection and photography (CDR, LMP).</p> <p>Passive seismometer deployed.</p> <p>Lunar ranging retroreflector deployed (CDR).</p> <p>1st passive seismic experiment data received on Earth.</p> <p>Collection of documented samples started (CDR/LMP).</p> <p>Solar wind composition experiment retrieved (LMP).</p> |
| 21 Jul 1969 | LMP inside LM. |
| 111:29:39 | 05:01:39 |
| 21 Jul 1969 | CDR inside LM, assisted and monitored by LMP. |
| 111:37:32 | 05:09:32 |
| 21 Jul 1969 | EVA ended (hatch closed). |
| 111:39:13 | 05:11:13 |
| 21 Jul 1969 | LM lunar liftoff ignition (LM APS). |
| 124:22:00.79 | 17:54:00 |
| 21 Jul 1969 | CSM/LM docked. |
| 128:03:00 | 21:35:00 |
| 21 Jul 1969 | LM ascent stage jettisoned. |
| 130:09:31.2 | 23:41:31 |
| 21 Jul 1969 | Transearth injection ignition (SPS). |
| 135:23:42.28 | 04:55:42 |

5. Transearth Phase

| | |
|--------------------|-------------------------------------|
| 22 Jul 1969 | Series of TV transmissions started. |
| 155:36 | 01:08 |
| 23 Jul 1969 | TV transmissions ended. |
| 177:13 | 22:45 |
| 23 Jul 1969 | CM/SM separation. |
| 194:49:12.7 | 16:21:12 |

6. Recovery Phase

| | |
|--------------------|---|
| 24 Jul 1969 | Entry. |
| 195:03:05.7 | 16:35:05 |
| 24 Jul 1969 | Drogue parachute deployed |
| 195:12:06.9 | 16:44:06 |
| 24 Jul 1969 | Radar contact with CM established by recovery ship. |
| 195:08 | 16:40 |
| 24 Jul 1969 | VHF voice contact, recovery beacon contact established. |
| 195:14 | 16:46 |
| 24 Jul 1969 | Splashdown |
| 195:18:35 | 16:50:35 |
| 24 Jul 1969 | Hatch opened for crew to disembark.. |
| 195:49 | 17:21 |
| 24 Jul 1969 | Crew aboard recovery ship. |
| 196:21 | 17:53 |
| 24 Jul 1969 | Crew entered mobile quarantine facility. |
| 196:26 | 17:58 |
| 24 Jul 1969 | CM secured to quarantine facility. |
| 198:26 | 19:58 |
| 24 Jul 1969 | Crew released from quarantine. |

★ Great NASA Links ★★★★★

The information on these pages has been compiled from the NASA website. See below for more great NASA links.

1. View the different components of the *Saturn V* rocket, events and the flight path from moon to earth and return

http://spaceflight.nasa.gov/history/apollo/apollo_mission.html

2. .. *"Eyes on the Solar System* is a 3-D environment full of real NASA mission data. Explore the cosmos from your computer. Hop on an asteroid. Fly with NASA's Voyager 2 spacecraft. See the entire solar system moving in real time. It's up to you. You control space and time...."¹

Download the App

<https://eyes.nasa.gov/eyes-on-the-solar-system.html>

To make the most of *Eyes on the Solar System*, take the time to read the introductory tutorial and watch the video tutorials

3. NASA for students and Educators

<http://www.nasa.gov/audience/forstudents/index.html>

4. 🗣️ Audio from Apollo 11 mission

Onboard audio highlights

http://www.nasa.gov/mission_pages/apollo/40th/a11_audio_highlights.html

5. 🎬 Film Footage

http://www.nasa.gov/multimedia/videogallery/index.html?media_id=11463016

¹ Ref: NASA <http://solarsystem.nasa.gov/eyes/>