

Silver Moon: Project Apollo 25 Years Later

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The Vehicles

Rocket	Saturn V	N-1
Stages	3	4
Spaceship Complex	Apollo	L-3
Orbital ship	Apollo CSM	Soyuz LOK
Lander	LM	LK

Apollo Components

- Command Module (crew of 3)
- Service Module (with SPS engine for Lunar Orbit Insertion and Trans Earth Injection)
- LM Ascent Stage (crew of 2, with APS engine)
- LM Descent Stage (with DPS engine and landing platform)

L-3 Components

- LOK Descent Apparatus (crew of 2)
- LOK Living Module
- LOK Instrument Module (Blok-I engine)
- LK Cabin (crew of 1 and Blok-E engine)
- LK Landing platform
- LK Blok-D engine for Lunar Orbit Insertion and Descent Orbit Insertion

The Flight Plan

Both L-3 and Apollo used the Lunar Orbit Rendezvous method.

- Launch into Earth Orbit [Saturn V; N-1]
- TLI: Translunar Injection [S-IV-B; Blok-G]
- Transposition and Docking [Apollo only]
- TLI rocket separation [S-IV-B; Blok-G]
- Trans Lunar Coast
- LOI: Lunar Orbit Insertion [SPS; Blok-D]
- Crew transfer to lander
- Lander undocking
- DOI: Descent Orbit Insertion [DPS; Blok-D]
- DOI rocket separation [L-3 only]
- PDI: Powered Descent Initiation [DPS; Blok-E]
- Landing on the Moon
- LEVA: Lunar Extravehicular Activity (Moonwalk)
- Liftoff from the Moon [APS; Blok-E]
- Lunar Orbit Rendezvous with orbital ship
- Docking and crew transfer to orbital ship
- Jettison of lander into lunar orbit

- TEI: Trans Earth Injection [SPS; Blok-I]
- Trans Earth Coast
- Reentry cabin separation [CM; L-3 SA]
- Reentry
- Landing [Pacific Ocean; Kazakhstan]

L-3 and Apollo differences

- L-3 had a crew of two, not three - only one would land on the moon.
- Four stages needed to put L-3 on course for the moon, vs. 3 for Apollo (including the S4B high energy stage).
- Cosmonaut transferred to lander and back by spacewalk, no transposition and docking maneuver.
- Descent engine used for lunar orbit insertion, not the orbiter engine.
- Descent engine jettisoned prior to final PDI landing burn, PDI done by 'ascent' engine.

Chronology

Apollo AS-204	1967 Jan 27	Pad fire, 3 killed (Grissom, White, Chaffee)
Lunar Orbiter 3	1967 Feb 5	Lunar mapping
7K No. 3	1967 Feb 7	Third Soyuz auto test
L-1 No. 2	1967 Mar 10	L-1 reentry test
L-1 No. 3	1967 Apr 8	L-1 reentry test, failed
Surveyor 3	1967 Apr 17	Auto lunar landing
7K No. 4 (Soyuz-1)	1967 Apr 23	Soyuz test, Komarov killed
Lunar Orbiter 4	1967 May 4	Lunar mapping
E-6LS 111	1967 May 16	Lunar communications test
Surveyor 4	1967 Jul 14	Crashed on Moon
Lunar Orbiter 5	1967 Aug 1	Lunar mapping
Surveyor 5	1967 Sep 8	Auto lunar landing
L-1 No. 4	1967 Sep 28	Proton rocket blows up with L-1
7K No. 6	1967 Oct 27	Soyuz auto docking test
7K No. 5	1967 Oct 30	Soyuz auto docking test
Surveyor 6	1967 Nov 7	Auto lunar landing
Apollo 4	1967 Nov 9	First Saturn V, first CSM orbital flight
L-1 No. 5	1967 Nov 22	Proton rocket blows up with L-1

Surveyor 7	1968 Jan 7	Last US auto lunar landing
Apollo 5	1968 Jan 22	First auto LM test
E-6LS 112	1968 Feb 7	Molniya rocket explodes with Luna
L-1 No. 6	1968 Mar 2	Test of L-1 in high orbit, failed reentry
E-6LS 113 (Luna-14)	1968 Apr 7	Soviet lunar orbit probe
Apollo 6	1968 Apr 4	Second Saturn V, second auto CSM
7K No. 8	1968 Apr 14	Soyuz auto docking test
7K No. 7	1968 Apr 15	Soyuz auto docking test
L-1 No. 7	1968 Apr 22	Proton rocket blows up with L-1
7K No. 9	1968 Aug 28	Soyuz auto test flight
L-1 No. 9	1968 Sep 14	L-1 flies round moon with turtles, returns to Earth
Apollo 7	1968 Oct 11	First piloted CSM flight (Schirra, Cunningham, Eisele)
7K No. 11 (Soyuz-2)	1968 Oct 25	Soyuz docking test (auto)
7K No. 10 (Soyuz-3)	1968 Oct 26	Soyuz docking test (Beregovoy)
L-1 No. 12	1968 Nov 10	L-1 flies round moon but crashes in reentry
N-6	1968 Nov 16	Test flight of Proton rocket
L-1 No. 10?	1968 Dec	Planned piloted flight of L-1 to Moon cancelled
Apollo 8	1968 Dec 21	First humans to leave Earth gravity First human flight round Moon (Borman, Lovell, Anders)

7K No. 12 (Soyuz-4)	1969 Jan 14	Soyuz EVA transfer test (Shatalov)
7K No. 13 (Soyuz-5)	1969 Jan 15	Soyuz EVA transfer test (Volynov, Yeliseev, Khrunov)
L-1 No. 13	1969 Jan 20	Proton rocket blows up with L-1 test
E-8-201	1969 Feb 19	Proton rocket blows up with moon rover
N-1 Test	1969 Feb 21	Soviet Moon rocket blows up on first test
Apollo 9	1969 Mar 3	First piloted LM flight (McDivitt, Scott, Schweickart)
Apollo 10	1969 May 18	Piloted test of LM in lunar orbit (Stafford, Cernan, Young)
E-8-5-402	1969 Jun 14	Auto sample return blows up at launch
N-1 Test	1969 Jul 3	Soviet Moon rocket blows up on second test, destroys pad
E-8-5-401 (Luna-15)	1969 Jul 13	Auto sample return crashes on Moon
Apollo 11	1969 Jul 16	The flight to the Moon (Armstrong, Aldrin, Collins)