

Historian Corner

By Barb Sande

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ANNOUNCEMENT: October 19, 2020, will be the 15th anniversary of the end of the Titan program. I am looking for a few retirees who worked on that program (the earlier the better) to participate in a panel discussion in October (location and date TBD). Please contact me at the email noted above if you are interested.

Program Profile

This issue profiles the second lunar landing, the Apollo 12 mission. The 50th anniversary occurred in November 2019. The Historian Corner features either a program profile or a History on the Road article, along with the milestones list. Historical information and program updates are always available on the MARS Associates Facebook page.

Apollo 12 Mission

Launched: 11/14/1969 16:22:00 AM UTC LC-39A

Splashdown: 11/24/1969 20:58:24 UTC, Southern

Pacific, USS Hornet recovery ship

Saturn V AS-507 Launch Vehicle

Translunar Trajectory

45 lunar orbits

Landing site: Ocean of Storms (lunar mare), located at lunar coordinates 3.01 degrees south, 23.42 degrees west

CSM Call Sign: *Yankee Clipper* (CSM-108)

LM Call Sign: *Intrepid* (LM-6)



**Apollo 12 Crew –
Commander Charles "Pete" Conrad, Jr.,
CM Pilot Richard F. Gordon, Jr., LM Pilot Alan L. Bean
Credit: NASA**

After the phenomenal success of the first lunar landing mission (Apollo 11), NASA forged ahead with the second planned mission in 1969, Apollo 12. In contrast to the

laconic all-business crew members on Apollo 11, Apollo 12 had a gregarious, all-Navy crew composed of Mission Commander Charles "Pete" Conrad, Jr, LM Pilot Alan L. Bean and CM Pilot Richard F. Gordon, Jr. They spent many hours during mission training exchanging jokes and pranks with their back-up crew (Dave Scott, Jim Irwin and Al Worden, all members of the Air Force, who later flew on Apollo 15).

The mission objectives for the Apollo 12 mission were identified as follows:

- 1) Perform inspection, survey and sampling in lunar mare area
- 2) Deploy an Apollo Lunar Surface Experiment Package (ALSEP)
- 3) Develop techniques for a point landing capability
- 4) Develop capability to work in the lunar environment
- 5) Obtain photographs of candidate exploration sites.

A secondary objective was an attempt to retrieve portions of the Surveyor 3 spacecraft, which had soft-landed on April 20, 1967, on the inner slope of a crater in the targeted Ocean of Storms landing area.

Apollo 12 launched on schedule on November 14, 1969, into overcast, rainy skies. The wind speeds during ascent were as high as 174.6 mph (151.7 knots), the highest for any Apollo mission. The weather was a major topic of discussion by Mission Control prior to launch, but no concerns were identified for delays. This evaluation was immediately brought into play when the upper part of the launch vehicle was struck by the first of two lightning strikes during ascent at T+36.5 seconds. This first strike was generated on the vehicle itself and discharged to Earth through the exhaust plume. All three fuel cells in the Service Module (SM) went offline due to detected overload conditions, along with much of the CSM instrumentation.

At T+52 seconds, the second strike occurred, knocking out the "8-ball" IMU attitude indicator in the CM and creating a garbled telemetry stream. Amazingly, the Saturn V launch vehicle continued to fly normally, as its systems were independent of the CSM. The loss of the three fuel cells and an A/C inverter lit up nearly every warning light in the CM.

The Mission Control EECOM (Electrical, Environmental, and Communications) manager John Aaron, a mere 26 years old at the time of Apollo 12, recognized the unusual conditions as being caused by a fault in the Signal Conditioning Electronics (SCE) subsystem, which was used to convert raw instrumentation signals to standard voltages for encoding and display; normal operations could be restored by switching the SCE to an

auxiliary



**Apollo 12 Saturn V Launch,
November 14, 1969
Credit: NASA**

setting, allowing it to operate even in low-voltage. Aaron, who became known as the "steely-eyed missile man" on this mission and Apollo 13, relayed the order to the crew to "switch SCE to Aux." Flight director Gerald Griffin, CAPCOM Gerald Carr and Mission Commander Conrad did not recognize this function. Fortunately, Alan Bean (the LM pilot) knew where the switch was from a training mission and flipped it, resulting in a return to nominal conditions. Other actions during ascent brought the fuel cells back online. The crew carefully checked out the CM and SM functions in orbit and had to restore the IMU to baseline alignment before firing the S-IVB upper stage; no permanent damage was done by the lightning strikes.

Apollo 12 entered a lunar transfer trajectory and other tasks on the first day included extraction, docking and inspection of the Lunar Module. On day 4 (November 18), the mission entered orbit around the moon.

The *Intrepid* LM crew (Conrad and Bean) separated from CM *Yankee Clipper* and CM pilot Gordon without incident and descended for lunar landing on November 19, 1969. Using high-resolution photography from Lunar Orbiter 3, the high-precision guidance for this flight and future Apollo flights was finally demonstrated. The descent was mostly automatic, with Conrad taking over for the final moments to avoid near-field obstacles and try not to damage the Surveyor 3 spacecraft. The descent and landing also used a feature called the "Snowman" to precisely identify the landing location. The precision landing was a success, as the Surveyor 3 lander was only 600 feet from *Intrepid*; the descent engine did high-velocity sandblasting on the Surveyor. The landing site was later named *Statio Cognitum* on lunar maps; Conrad called it "Pete's Parking Lot". Gordon was able to spot their landing site from orbit using a 28X sextant scope.



**Intrepid During Descent to the
Lunar Surface, November 19, 1969
Credit: NASA**

Conrad and Bean began preparations for two EVAs on the surface. The first EVA on November 19 began at 11:42:22 UTC with the words from 5'6" Conrad, stepping onto the surface: "Whoopie! Man, that may have been a small one for Neil, but that's a long one for me!" Apparently, Conrad had made a bet with a journalist before the mission about his first words, because the journalist (believed to be Oriana Fallaci) was skeptical that Armstrong created the memorable words he spoke on Apollo 11. Bean followed Conrad

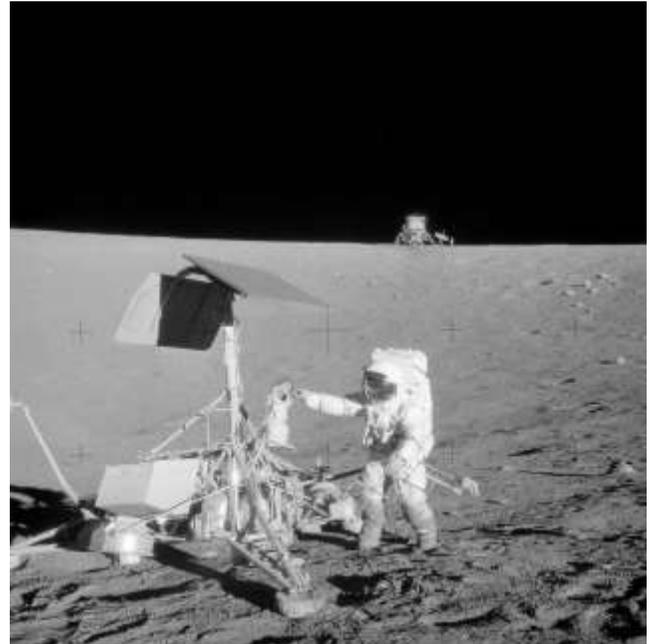
approximately 30 minutes later; his first words on the surface were about the brightness of the sun.

One of the first tasks in EVA #1 was to set up a color television camera near the LM. Unfortunately, the Secondary Electron Conduction tube in the camera was destroyed when Conrad inadvertently pointed the camera at the sun. This eliminated any television coverage from the surface for the duration of the mission. This same camera did provide images of the astronauts descending to the surface before it was damaged. The other tasks during the EVA were the placement of the flag and deployment of the nuclear-powered ALSEP station, containing 15 active and passive scientific instruments (seismic, solar wind, lunar ejecta, gravitometer, magnetometer, and a laser ranging experiment). The ALSEP was the first complex long-term experiment system deployed on the Moon; Apollo 11 put in a place a simplified earlier version. Apollo 12's ALSEP (and the ones placed by Apollo 14, 15, 16, and 17) functioned until September 1977 when budgetary constraints shut them off. During the EVA a few lunar soil and rock samples were also obtained. The first EVA ended with Conrad entering *Intrepid* almost four hours later and thirteen minutes after Bean.

After a seven-hour rest period, EVA#2 was initiated. Conrad descended at 03:59:00 am UTC on November 20, followed by Bean at 4:06:00 am UTC. The second EVA was a geology traverse by both astronauts that included a stop at the Surveyor 3 spacecraft and visits to several nearby craters. The astronauts covered 4300 feet of lunar surface during this traverse and collected numerous soil and rock samples using a variety of techniques (core tube, trench site and gas sampling). The lunar regolith (surface dirt and rocks) in the Ocean of Storms was primarily basalt and the material was found to be hundreds of millions of years younger than the Apollo 11 samples. Conrad and Bean also took photographs of the Surveyor 3 spacecraft and collected a painted tube, unpainted tube, the sampling scoop and the camera from the lander. There were controversial findings later with the Surveyor 3 camera that it had a live culture of *Streptococcus mitis* on it that had survived the lunar conditions. However, the analysis of the camera on earth was not done in appropriate clean room conditions, resulting in the controversy.

The second EVA lasted 3 hours and 50 minutes. The crew returned to *Intrepid*, discarded their lunar suits onto the surface, ate a meal and then prepared for ascent. After 31.7 hours on the surface, *Intrepid's* upper stage ignited and the second crew to walk on the moon headed back to rendezvous with *Yankee Clipper*. All systems functioned nominally, and docking was a success. After docking and transferring to *Yankee*

Clipper, the LM upper stage was discarded and impacted the moon about 40 miles away from the ALSEP. The seismic disturbance lasted almost an hour, surprising seismologists.



Apollo 12 EVA #2: November 20, 1969
Pete Conrad at Surveyor 3 Lander
Credit: NASA

The flight plan had the crew stay an extra day in lunar orbit and photograph features for future missions and evaluation. The SPS (Service Propulsion System) engine ignited 172 hours 21 minutes into the mission on November 21. The return home was uneventful, with only one course correction required. Apollo 12 splashed down on November 24 approximately 400 miles southeast of American Samoa. As with the Apollo 11 crew, this crew was immediately transferred to a quarantine facility for three weeks. They also had a series of parades and publicity tours following quarantine.

Personal note about Apollo 12: This second lunar mission did not seem very exciting for me, when compared to Apollo 11 and subsequent missions. I think the lack of detailed memories about it is probably due to the fact that coverage was really boring without television images from the lunar surface, although I do recall listening to some of the broadcasts. It might also be because at the time of the Apollo 12 mission, I was now in the ninth grade, facing all of the nonsense that goes on with teenagers at that age.

Crew biographies

Charles "Pete" Conrad, Jr. was born in Philadelphia, Pennsylvania on June 2, 1930. His parents were wealthy but became impoverished during the Great Depression. Conrad struggled in school because he suffered from dyslexia but overcame those struggles to be accepted at Princeton University in 1949 on a full Naval ROTC scholarship. Conrad was commissioned in the Navy in 1953 and was accepted for the Naval Test Pilot school in Patuxent, Maryland (classmates included Wally Schirra and Jim Lovell). He logged over 6500 hours of flying time during his naval career. Conrad was invited to take part in the selection process for the Mercury Seven, but rebelled at the ridiculous medical tests at the Lovelace Clinic and walked out of the selection process. Alan Shepard asked Conrad to reapply and he was accepted in the second class of astronauts in 1962. Conrad's missions prior to Apollo 12 for NASA included Gemini 5 and Gemini 11, both ground-breaking Gemini missions (duration, docking, altitude). Conrad's final mission for NASA was as the commander of the first Skylab mission, which included spacewalk repairs of the solar panels. After NASA, Conrad worked for ATC and then joined McDonnell-Douglas in a variety of leadership roles. He had four children (one deceased) with his first wife Jane. He died from injuries sustained in a motorcycle accident near Ojai, California on July 8, 1999.

Alan L. Bean was born March 15, 1932 in Wheeler, Texas. He graduated with a degree in Aeronautical Engineering from the University of Texas and was commissioned into the Naval Reserve Office Flight Training Corps. He was later accepted into the Naval Test Pilot School, where his instructor was Pete Conrad. Bean logged over 7,000 hours flight time during his naval career. In 1963, Bean was selected as part of Astronaut Group 3 by NASA. After astronaut Clifton Williams died in a plane crash, space opened up on one of the earlier backup crews for Apollo. Conrad personally requested Bean for the crew of Apollo 12. After Apollo 12, Bean was the Commander of the Skylab 3 mission. He resigned from NASA in 1981 to pursue a full-time career as an artist. Bean's space paintings are considered collector's items and have been exhibited at the Smithsonian. Bean was married twice and had a daughter and son from his first marriage. He passed away on November 8, 2018, after suffering a sudden illness.

Richard F. Gordon, Jr. was born in Seattle, Washington on October 5, 1929. He attended the University of Washington, graduating with a degree in Chemistry. Gordon joined the Navy after graduation and became a naval aviator. He also was accepted at the Naval Test Pilot School in Patuxent, Maryland. Gordon

logged over 4,500 hours of flight time and won the Bendix trophy in 1961 for a cross-country flight record. He applied and was accepted by NASA as an astronaut in the third class in 1963. Prior to Apollo 12, Gordon was assigned to Gemini 11 and flew that mission with Pete Conrad. He was slated to be the Mission Commander of Apollo 18 (canceled due to budget cuts). After leaving NASA, Gordon worked in the front office for the New Orleans Saints and participated in a leadership role in several start-up companies, including REDCO (well fire suppression services) and Astro Sciences Corporation. Gordon had six children by his first wife, Barbara. He passed away in San Marcos, California, on November 6, 2017.

References for Apollo 12 article

Apollo Flight Journal: <https://history.nasa.gov/afj/>
NASA Apollo Program: https://www.nasa.gov/mission_pages/apollo/missions/apollo12.html
Wikipedia (source of biographies and overview): <https://www.wikipedia.org>

On This Date in History

This section has milestones retrieved from publicly available information for LM, ULA and heritage programs from 10 to 60 years ago (2010, 2000, 1990, 1980, 1970, 1960). Delta launches prior to the formation of ULA, unless it included an LM or heritage company payload or upper stage, are not listed. No classified programs are identified, even if the program is now considered unclassified. The events reflect milestone activity in the quarter before the release of the MARS STAR — where appropriate, key press releases are also included; significant milestones are in bold. There will be gaps if no events occurred in that decadal year for that month (no events January-March 1970). The list is not intended to be all-inclusive due to historical record inaccuracies.

EVENT OF NOTE: The second Titan III Commercial launch, on 3/14/1990, ended in failure when the INTELSAT 603 spacecraft did not separate from Stage II. This was a completely preventable failure that was caused by design errors and inadequate test-like-you-fly processes. Commercial Titan was designed for a two-payload mission and the first launch was successful on 1/1/1990, with two satellites deployed. INTELSAT 603 was too large for the Titan to accommodate a second spacecraft. System testing was done assuming a generic two-spacecraft system; in actual flight, Stage II/spacecraft separation signals went to the forward (non-existent) spacecraft during the mission and no signal was sent to the aft spacecraft (both conditions

were tested simultaneously without ensuring that independent signal paths were functional). The satellite and second stage were left in a useless orbit. A later STS mission (STS-49) was able to separate the spacecraft and attach a kick motor, resulting in eventual success for INTELSAT 603. In retrospect, I can say with assurance that this failure was PAINFUL; Commercial Titan III only had two more launches.

Events in January (10 to 60 years ago)

- 01/20/2010: Lockheed Martin Press Release: Lockheed Martin achieves key integration milestones on First MUOS (Mobile User Objective System) satellite
- 01/21/2000: LM DSCS III B-8 launched by LM Atlas IIA, SLC-36A, CCAFS
- **01/01/1990: Skynet 4A, JCSAT 2 launched by Commercial Titan III (first flight), LC-40, CCAFS**
- 01/09/1990: STS-32 (Columbia) launched, LC-39B, KSC; LEASAT 5, 5 astronauts
- 01/18/1980: FLTSATCOM 3 launched by GD Atlas SLV-3D Centaur D1AR, LC-36A, CCAFS
- 01/07/1960: GD Atlas SM-65D launched, LC-13, CCAFS
- 01/08/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS
- 01/13/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS
- 01/20/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS
- 01/26/1960: GD Atlas SM-65D launched, LC-576A-3, VAFB
- 01/27/1960: GD Atlas SM-54D launched, LC-13, CCAFS
- 01/27/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS

Events in February (10 to 60 years ago)

- **02/03/2010: Lockheed Martin Press Release: Lockheed Martin responds to the FY2011 NASA Budget Proposal to cancel Orion**
- **02/08/2010: STS-130 (Endeavour) launched, LC-39A, KSC; Tranquility and Cupola assemblies for ISS, six astronauts. Last night launch of Endeavour.**
- 02/11/2010: Solar Dynamics Observatory (with AIA and HMI instrument modules built by LM) launched by ULA Atlas V 401, SLC-41, CCAFS
- 02/03/2000: Hispasat launched by LM Atlas IIAS, SLC-36B, CCAFS
- 02/11/2000: STS-99 (Endeavour) launched, LC-39A, KSC; Shuttle Radar Topography Mission, six astronauts
- 02/28/1990: STS-36 (Atlantis) launched, LC-39B, KSC (classified satellite), five astronauts

- 02/07/1980: Classified launch by MM Titan III(23D), SLC-4E, VAFB
- 09/09/1980: Navstar 5 launched by GD Atlas E/F-SGS-a, SLC-3E, VAFB
- 02/02/1960: Martin HGM-30A Titan I launched, LC-19, CCAFS
- 02/04/1960: Classified launch by Thor DM-18 Lockheed Agena-A, LC-75-3-4, VAFB (launch failure)
- 02/04/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS
- 02/05/1960: Martin HGM-30A Titan I launched, LC-16, CCAFS (launch failure)
- 02/10/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS
- 02/12/1960: GD Atlas SM-65D launched, LC-13, CCAFS
- 02/19/1960: Classified launch by Thor DM-18 Lockheed Agena-A, LC-75-3-5, VAFB (launch failure)
- 02/24/1960: Martin HGM-30A Titan I launched, LC-15, CCAFS
- **02/26/1960: GD Atlas LV-3A, Lockheed Agena A launched, LC-14, CCAFS (Launch failure; maiden flight of Atlas/Agena)**
- 02/26/1960: Lockheed UGM-27 Polaris A1 launched, LC-29A, CCAFS (launch failure)

Events in March (10 to 60 years ago)

- 03/01/2010: Lockheed Martin Press Release: Orion Team fabricates world's largest heat shield structure
- 03/04/2010: GOES-P launched by ULA Delta IVB-M+, SLC-37B, CCAFS
- 03/25/2010: Lockheed Martin Press Release: LM and ATK announce 2nd generation Athena Launch Vehicles
- 03/25/2000: LM IMAGE (Aurora research) launched by Delta II 7326-9.5, SLC-2W, VAFB
- **03/14/1990: INTELSAT 603 launched by Commercial Titan III, LC-40, CCAFS. FAILURE: Spacecraft separation not achieved. Satellite later rescued by STS-49 mission (see details above).**
- 03/03/1980: Classified launch, GD Atlas E/F-MSD, SLC-3W, VAFB
- 03/08/1960: GD SM-54D Atlas launched, LC-11, CCAFS
- 03/08/1960: Martin HGM-30A Titan I launched, LC-16, CCAFS (launch failure)
- 03/09/1960: Lockheed UGM-27 Polaris A1 launched, LC-25A, CCAFS
- 03/18/1960: Lockheed UGM-27 Polaris A1 launched, LC-25B, CCAFS
- 03/22/1960: Martin HGM-30A Titan I launched, LC-15, CCAFS
- 03/25/1960: Lockheed UGM-27 Polaris A1 launched, LC-25B, CCAFS

Reference websites:

<https://nssdc.gsfc.nasa.gov/planetary/chronology.html#2014>

https://en.wikipedia.org/wiki/Timeline_of_spaceflight

<https://www.ulalaunch.com/missions>

<https://news.lockheedmartin.com/news-releases?year=2020>

<https://space.skyrocket.de>

<http://www.astronautix.com>

Next Edition

Check back in the next MARS STAR for a program profile of the Hubble Space Telescope, celebrating its 30th anniversary in space in April, 2020!

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