

Historian Corner

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Program Profile

The profiles included here are of the second two "dress rehearsal" crewed missions for the Apollo program (Apollo 9 and Apollo 10). There is also a short profile of a difficult month for Lockheed Martin (April, 1999).

Apollo 9 Mission

Launched: 03/03/1969 11:00:00 EST LC-39A

Splashdown: 03/13/1969 12:01:00 EST, Atlantic, USS Guadalcanal recovery ship

Saturn V AS-504 Launch Vehicle

Orbit: 118 nm at 32.5 degrees (numerous orbital



changes during mission)

Apollo 9 Crew -- Commander: James A. McDivitt (left), Lunar Module Pilot: Russell L. Schweickart (right), Command Module Pilot: David R. Scott (center) (Photo Credits: NASA)

The Apollo 9 mission came back to Earth orbit with the more mundane, but critical tasks of demonstrating key requirements for the Lunar Module and Command/Service Module, such as rendezvous and docking, backup abort procedures, and movement of the Saturn IVB into an earth-escape trajectory. The CSM main engine was fired five times during these maneuvers and the commander and LM pilot entered the LM and moved away from the command module. The LM ascent and descent engines fired for orbital change patterns to simulate lunar orbit rendezvous and backup abort procedures. A rescue maneuver for a "dead" LM was also performed.

Schweickart suffered from nausea for most of the mission, so some EVAs were truncated. All mission objectives were successful, however, including the earth landmark tracking. Two call signs were now required for Apollo missions due to two separate spacecraft.



Apollo 9 LM "Spider"

"Gumdrop" and "Spider" were not imaginative, but they worked for this first "full-up" mission.

Apollo 10 Mission

Launched: 05/18/1969 12:49:00 EST

Launch Complex LC-39B

Splashdown: 05/26/1969 12:52:53PST, Pacific, USS Princeton recovery ship

Saturn V AS-505 Launch Vehicle

Lunar trajectory and return with 31 orbits of the moon

CSM Call Sign: Charlie Brown

LM Call Sign: Snoopy



Apollo 10 Crew -- Commander: Thomas Stafford (right), Lunar Module Pilot: Eugene Cernan (left), Command Module Pilot: John Young (Center) (Photo Credits: NASA)

Apollo 10 was the true dress rehearsal of the Apollo 11 mission except for the actual landing, with all features of the CSM and LM checked out in lunar orbit.

This mission included rendezvous and docking maneuvers similar to those needed for an actual lunar landing. On the 12th lunar orbit, LM "Snoopy" undocked from CSM "Charlie Brown" and fired the descent engine, resulting in a 9.7 by 70.5 nm elliptical orbit; this was done over the first landing target of the Sea of Tranquility. The LM descent stage was jettisoned so that the ascent stage engine could be tested; after the jettison, the ascent stage gyrated in an uncontrollable fashion due to an error in the flight-plan checklist. Cernan and Stafford were able to regain control, then fired the main engine to gain altitude. RCS (Reaction Control System) thrusters circularized the orbit and the rendezvous "ballet" with "Charlie Brown" began and was successfully completed 106 hours into the mission.

The crew did detailed lunar landmark photography on the remaining orbits, then fired the CSM engine on the far side of the moon for their return to earth. This was the first mission with live color TV from space.



Apollo 10 CSM Lunar Orbit

The next issue of STAR will profile the Apollo 11 mission; the heritage company contributions for Apollo will also be highlighted.

References:

https://www.nasa.gov/mission_pages/apollo/missions/apollog.html

https://www.nasa.gov/mission_pages/apollo/index.htm

https://www.nasa.gov/mission_pages/apollo/missions/apollo10.html

<https://history.nasa.gov/afj/ap10fj/as10-image-library.html>

PROFILE BONUS - A VERY difficult month for Lockheed Martin:

If you look at the milestone list for April - June, 1999, you will see three failures in April. It started with the loss of the Titan IVB-27 mission carrying a DSP satellite. The failure was due to incomplete separation of the Boeing IUS upper stage segments due to mechanical interference. The DSP Satellite was stranded in a geo-transfer orbit. TIVB-27 was the first Titan launch since a spectacular failure during early ascent of TIVA-20 (the last TIVA) in August, 1998.

On April 20, Denver employees were shocked and many directly affected when the horrific Columbine High School massacre occurred. Twelve students and one teacher were murdered and the perpetrators committed suicide; many more were injured and the death toll was planned to be much higher.

On April 27, an LM Athena II commercial vehicle launched from VAFB failed because the payload fairing did not separate, resulting in the loss of the IKONOS-1 satellite (built by LM for Space Imaging). And the month ended very badly when Titan IVB-32, with a Centaur upper stage, failed to deploy the LM-built Milstar-3 satellite in the proper orbit; this was due to Centaur software parameter error that was missed by numerous tests and verifications. LM Work life was quite "interesting" after these failures and the Columbine tragedy, but we were not alone during this time. A Delta III upper stage failed on May 5, 1999, resulting in the loss of a Loral commercial satellite. This was prior to the ULA formation, so that launch is not listed in the milestones. Boeing only flew three Delta III vehicles, with two failures. In a rapid recovery, the first successful Titan IVB launch from VAFB occurred in May, 1999 (booster software processes were quickly cleared) and a Titan 23G mission flew successfully in June.

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. 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 considered unclassified. The events reflect milestone activity in the quarter previous to the release of the MARS STAR -- where appropriate, key press releases are also included; significant milestones are in bold. The order has been changed since the last MARS STAR to show decadal events under each month heading. There will be gaps if no events occurred in that decadal year for that month (e.g., no relevant milestones were found

for April, 1989 and April, 1979). The list is not intended to be all-inclusive.

NOTE: There is an addition to the last milestone list in the second quarter MARS STAR. Thanks to MARS member Ernie Berliner for pointing out the launch of SCATHA (MM) on January 30, 1979 on Delta 2917, LC-17B, CCAFS.

Events in April (10 to 60 years ago)

- 04/04/2009: USA-204 launched by ULA Atlas V 421, LC-41, CCAFS
- 04/09/2009: LM Press Release: Lockheed Martin Rolls out First THAAD Launcher in Camden, Arkansas
- 04/27/2009: LM Press Release: MILSTAR Constellation built by Lockheed Martin Achieves 50 Years of Combined On-orbit Operations
- **04/09/1999: DSP-19 launched by LM Titan IVB-27 (402/IUS), LC-41, CCAFS. IUS stages failed to separate (mission failure); last LC-41 Titan launch.**
- 04/12/1999: Eutelsat W3 launched by GD Atlas IIAS, LC-36A, CCAFS
- 04/15/1999: LM Landsat-7 launched by Delta II 7920, SLC-2W, VAFB
- 04/26/1999: Two LM Trident D5 missiles launched, ETR
- **04/27/1999: LM IKONOS-1 launched by LM Athena II, SLC-6, VAFB. Payload fairing failed to separate (mission failure).**
- **04/30/1999: LM Milstar-3 launched by LM Titan IVB-32 (401/LM Centaur), LC-40, CCAFS. Mission failure, Centaur software parameter error.**
- 04/13/1969: Classified launch by GD Atlas SLV3A/Lockheed Agena, LC-13, CCAFS
- 04/14/1969: RCA/GE Nimbus3 launched by Thorad-SLV2G-Lockheed AgenaD, SLC-2E, VAFB
- 04/15/1969: Classified launch by MM Titan IIIB-21, SLC-4W, VAFB
- 04/03/1959: Martin Titan I HGM-25A launched, LC-15, CCAFS
- 04/04/1959: Martin WS-199B Bold Orion II Launched, B-47, CCAFS
- 04/13/1959: Discoverer 2 launched by Thor DM-18 /Lockheed Agena-A, LC-75-3-4, VAFB
- 04/14/1959: GD Atlas SGM-65C launched, LC-12, CCAFS (failed)
- 04/20/1959: Lockheed UGM-27 AX Polaris launched, LC-25A, CCAFS

Events in May (10 to 60 years ago)

- 05/05/2009: USA-205 launched by ULA Delta II-7920, SLC-2W, VAFB
- **05/11/2009: STS-125 (Atlantis) launched, LC-39A, KSC; final servicing mission to the LM Hubble Space Telescope**
- 05/26/2009: LM UGM-133 Trident II D5 launched by Royal Navy
- 05/20/1999: LM Nimiq-1 launched by ILS Proton-K, 81/23 Baikonur, Kazakhstan
- **05/22/1999: Classified launch by LM Titan IVB-12, SLC-4E, VAFB (first VAFB Titan IVB)**
- 05/27/1999: STS-96 (Discovery) launched, LC-39A, KSC (SpaceHab, STARSHINE)
- **05/04/1989: MM Magellan Venus Orbiter launched by STS-30 (Atlantis), LC-39B, KSC**
- 05/04/1979: FLTSATCOM-2 launched by GD Atlas SLV 3D, LC-36A, CCAFS
- 05/28/1979: Classified launch by MM Titan IIIB/Lockheed Agena, SLC-4W, VAFB
- 05/02/1969: Classified launch by Thorad-SLV2G-Lockheed AgenaD, SLC-3W, VAFB
- **05/18/1969: Apollo 10 mission launched, LC-39B, KSC**
- 05/23/1969: VELA, Technology Demonstration launched by MM Titan IIIC-15, LC-41, CCAFS
- 05/04/1959: Martin Titan I HGM-25A launched, LC-15, CCAFS
- 05/08/1959: Lockheed UGM-27 AX Polaris launched, LC-25A, CCAFS
- 05/18/1959: Lockheed UGM-27 AX Polaris launched, LC-25A, CCAFS
- 05/19/1959: GD Atlas SGM-65-D launched, LC-14, CCAFS (failed)

Events in June (10 to 60 years ago)

- 06/02/2009: LM Press Release: US Air Force Awards \$1.5 Billion Contract to Lockheed Martin for SBIRS Follow-on
- **06/17/2009: LM Press Release: Lockheed-Martin Built GPS Satellites Exceed 100 Years of Combined On-Orbit Service**
- 06/18/2009: Lunar Reconnaissance Orbiter, LCROSS launched by ULA Atlas V 401, LC-41, CCAFS
- 06/27/2009: GOES-O (14) launched by ULA Delta IV-M+, LC-37B, CCAFS
- 06/10/1999: LM THAAD missile launched, WSMR, New Mexico

- 06/11/1999: Two LM Iridium satellites launched by Long March 2C, Taiyuan LC-1, China
- 06/20/1999: QuickSCAT launched by LM Titan 23G-7, SLC-4W, VAFB
- **06/14/1989: DSP-14 launched by MM Titan IVA (402/IUS), LC-41, CCAFS; Maiden flight Titan IVA**
- 06/06/1979: RCA DMSP-5D1 F4 launched by Thor DSV-2U, SLC-10W, VAFB
- 06/10/1979: DSP-11 launched by MM Titan 23C-13/MM Transtage, LC-40, CCAFS
- 06/27/1979: RCA NOAA-6 (A) launched by GD Atlas F, SLC-3W, VAFB
- 06/03/1969: Classified launch by MM Titan TIIIB-6, SLC-4W, VAFB
- 06/05/1969: OGO-6 launched by Thorad-SLV2G-Lockheed AgenaD, SLC-3W, VAFB
- 06/03/1959: Discoverer 3 launched by Thor DM-18 /Lockheed Agena-A, LC-75-3-4, VAFB (Agena failed)
- 06/06/1959: GD Atlas SGM-65-D launched, LC-13, CCAFS (failed)
- 06/08/1959 Martin WS-199B Bold Orion II Launched, B-47, CCAFS
- 06/12/1959: Lockheed UGM-27 AX Polaris launched, LC-25A, CCAFS (failed)
- 06/25/1959: Discoverer 4 launched by Thor DM-18 /Lockheed Agena-A, LC-75-3-4, VAFB (Agena failed)
- 06/29/1959: Lockheed UGM-27 AX Polaris launched, LC-25A, 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=2019>

<https://space.skyrocket.de>

<http://www.astronautix.com>

History on the Road

The second feature of "History on the Road" describes our 2018 visit to the Trinity site, located on White Sands Missile Range, New Mexico. **Future inputs for History on the Road are solicited from MARS members!**

As most of us recall from history, the first atomic bomb test occurred before dawn on July 16, 1945 in central New Mexico, in a remote northern location of the newly-established White Sands Proving Grounds (now White Sands Missile Range). The Trinity test was of a

plutonium-configuration bomb, similar to the "Fat Man" used at Nagasaki, Japan on August 9, 1945. The Manhattan Project developed two types of atomic bombs, a simple Uranium gun bomb, ("Little Boy" used at Hiroshima), and the more complex Plutonium bomb that required lens-shaped charges to create a core implosion. It was decided to test the Plutonium design before its use; the Plutonium core for the "Gadget" was fabricated at the Hanford reactors in eastern Washington. Several sites were evaluated for the test before settling on the New Mexico Proving Ground site.

Without the dawn of the nuclear age that began at Trinity and the subsequent Cold War nuclear arms races, the future of our predecessor companies would have been quite different. Because of this historical milestone, the needs quickly developed to create UGM (Underwater-Launched Guided Missile) and ICBM technology to carry nuclear payloads. The costs and infrastructure of developing ICBMs paved the way to a variety of launch vehicle families and established the Martin Waterton facility.

The Trinity site held its first public open house in September 1953 and became a National Historical Landmark in 1965. Advanced planning is required to visit the site, as it is only open to the public on the first Saturdays in April and October. Public events have also been held on major anniversaries of the test, but July is extremely hot in this region, so the spring and fall open houses are the best options for a visit.

We visited the site on October 6, 2018, coming from the north through the Stallion gate off Highway 380 (this is the self-drive option); if you come from the south (Alamogordo), you must meet up with a caravan to cross the Missile Range, although you can drive out of the Stallion gate on your own. It is recommended that you reserve a hotel well in advance of the open houses, either in Socorro, which is 22 miles northwest of the Stallion gate or in Alamogordo. The Stallion entry gate opens at 8:00 am on the days of the open house and closes at 2:00 pm (the site closes at 3:30 pm). A government-issued ID and car registration are required and no weapons are allowed. Arriving mid-morning avoids the longer lines at the gate. After entry, it is 17 miles to the Trinity Site. At the site, there is ample parking, port-a-potties, information kiosks, food and drink vendors, souvenir stands, a few test artifacts and the 1/4 mile gravel path to Ground Zero. Golf carts are available to transport disabled visitors. A stone obelisk was placed at the precise Ground Zero location in 1965, next to the remains of the test stand. The WSMR museum brings a full-scale model of "Fat Man" to the site and there are pictures along the fences depicting the test. Visitors to the site are also welcome to take a

bus to the historic McDonald Ranch house, where the plutonium core was assembled. A one-hour visit to the site results in an exposure of only 1/2 mrem (millirem) of radiation; a visitor who lives in Denver receives 47 mrems a year from Cosmic background radiation alone.

After your visit to the site, a small town close to the Stallion gate is San Antonio, New Mexico and it is a great place for a post-tour lunch. San Antonio has two competing taverns (Buckhorn and Owl Cafe) that each claim to have the "best" green chili cheeseburgers; we've tried both and the burgers are delicious. Visitors to Socorro on the day of the fall Trinity open house can also attend the open house at the Very Large Array (VLA) Radio Telescope facility, located 40 miles west of Socorro on Highway 60. Socorro has their Oktoberfest celebration that same fall weekend and the Albuquerque balloon festival usually occurs in early October. Plenty to see and do!

Visit

<https://www.wsmr.army.mil/Trinity/Pages/Home.aspx> for more information or to see if special events for the 75th anniversary are planned in 2020.

Here are three photos from our Trinity visit (photo credits, Steve and Barb Sande). The photos include the Trinity site plaque at ground zero, a green chili cheeseburger from the Owl Cafe (San Antonio, NM), and a view of the crater site.



Test Your Knowledge

Here is one brain-teaser question to test your knowledge. The quiz will be moved to the Facebook page in the future to save room in the MARS Star.

The LM-built Juno spacecraft arrived at Jupiter in July 2016. This spacecraft orbits the planet in an elliptical orbit; each Jovian orbit is ___ days [PLACE ELSEWHERE IN STAR Answer: 53 days. The original plan was for 14-day orbits, but a possible concern for valves on the spacecraft resulted in a much longer orbital duration. This extended the mission for 40 months]

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