

Historian Corner

By Barb Sande

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Program Profile

This issue profiles the third successful lunar landing mission (Apollo 14), which in early 2021 celebrated its 50th anniversary, and also examines the first mission of Apollo 14 Commander Alan Shepard on the first US manned spaceflight in May 1961.

Apollo 14 Mission Overview

Launched: 01/31/1971 21:03:02 UTC LC-39A, KSC

Splashdown: 02/09/1971 21:05:00 UTC, Southern Pacific, USS *New Orleans* recovery ship

Saturn V AS-509 Launch Vehicle

CSM (Command/Service Module) Call Sign: *Kitty Hawk* (CSM-110)

LM (Lunar Module) Call Sign: *Antares* (LM-8)

Crew: Commander Alan B. Shepard, Jr, LM Pilot Edgar D. Mitchell, CM Pilot Stuart A. Roosa

34 lunar orbits

Landing site: Fra Mauro Crater and Highlands (intended site for Apollo 13) – 3.54 degrees S, 17.47 degrees W lunar coordinates

Last "H" mission (Specific site, maximum two-day stay)

Connection to Lockheed Martin/ULA: The contributions of our heritage companies to the Apollo program were listed in the MARS STAR article about Apollo 11 in 2019



Apollo 14 Crew: CM Pilot Stuart Roosa, Commander Alan Shepard, LM Pilot Edgar Mitchell

Project Mercury and Freedom 7

The National Aeronautics and Space Administration (NASA) was established on October 7, 1958 and Project

Mercury was announced on December 17, 1958. These actions were in response to the Soviet Union and their launch of Sputnik on October 4, 1957. More than 500 test pilots were evaluated to find candidates for Project Mercury and 110 emerged from this initial evaluation; the candidates had to be younger than 40, possess a bachelor's degree or equivalent, and be less than 5'11" in height. The 110 candidates were split into three groups, with the most promising being in the first 35 (including Shepard). A briefing at the Pentagon described Project Mercury and asked for volunteers for the program; Shepard discussed this with fellow naval aviators Jim Lovell, Pete Conrad, and Wally Schirra and they all decided to volunteer, risking their established military careers.

The down-select process continued, with a pool of 32 candidates undergoing the grueling medical and psychological tests at the Lovelace Clinic in Albuquerque (depicted with great humor in the classic book and film "The Right Stuff") and at the Wright Aerospace Medical Laboratory. Although only six final candidates were desired, NASA Director Bob Gilruth could not make a decision, so seven were chosen (Shepard, John Glenn, Wally Schirra, Deke Slayton, Gus Grissom, Scott Carpenter and Gordon Cooper). Shepard was informed of his selection on April 1, 1959. The Mercury Seven, as they were dubbed by the media, were introduced to the public in Washington, then traveled to Cape Canaveral to watch the launch of an Atlas SM-65D, similar in configuration to the orbital launch vehicle being developed. That launch failed spectacularly, exploding a few minutes after liftoff (see the mission events in the MARS STAR historian column for 2019 Quarter 2 – May 18, 1959). Shepard was quoted as saying, "Well, I'm glad they got that out of the way".

The competition for the first Mercury flight among the seven astronauts was intense, but Shepard won the battle and was selected to be the first American into space on January 19, 1961. Delays in the program led to the very disappointing news on April 12, 1961 that the Russians had triumphed again, successfully sending Cosmonaut Yuri Gagarin into one orbit of Earth. The Atlas vehicle was also not ready for manned orbital flights, so a decision was made to use the Redstone for suborbital missions. After more delays, at last on May 5, 1961, Shepard entered his Mercury 7 capsule (Mercury-Redstone 3 Mission), dubbed Freedom 7, at 5:15 am ET. Annoying little problems kept delaying the launch, but it finally lifted off from LC-5 at Cape Canaveral at 9:34 am ET, with an estimated 45 million television viewers tuned in to see this historical event. The Mercury capsule was designed to allow manual control by the astronaut during certain portions of flight, so Shepard attempted orientation changes during ascent. Freedom 7 reached

a suborbital altitude of 116.5 miles and a maximum velocity of 5,180 mph and splashed down 15 minutes and 22 seconds after liftoff in the Atlantic Ocean.



Mercury/Redstone 3 (Freedom 7) Launch with Alan Shepard, May 5, 1961 (LC-5)

Americans had now touched space, although briefly, and Shepard was a national hero, receiving ticker tape parades, the Distinguished Service Medal and the Distinguished Flying Cross. President John F. Kennedy addressed a joint session of Congress on May 25, 1961, with the following goals set forward (from the JFK library archives):

“First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish. We propose to accelerate the development of the appropriate lunar space craft. We propose to develop alternate liquid and solid fuel boosters, much larger than any now being developed, until certain which is superior. We propose additional funds for other engine development and for unmanned explorations — explorations which are particularly important for one purpose which this nation will never overlook: the survival of the man who first makes this daring flight. But in a very real sense, it will not be one man going to the moon — if we make this judgement affirmatively, it will be an entire

nation. For all of us must work to put him there.”

The US had 15 minutes in space and the goal has been set to reach the moon with manned crews in less than ten years! It was galvanizing and created a shared purpose for the nascent NASA organization. Shepard supported the remaining Mercury missions as a CAPCOM and backup pilot and was designated to fly on Mercury-Atlas 10, a three-day orbital mission, but that mission was canceled in anticipation of moving to the Gemini program. Shepard was then selected to command the first crewed Gemini mission with Thomas Stafford, but in 1963 Shepard began getting episodes of extreme dizziness, nausea and severe tinnitus in his left ear. He finally reported the situation to Deke Slayton, Director of Flight Operations, and was diagnosed by NASA doctors with Meniere’s disease; he also had treatable glaucoma and a benign tumor on his thyroid that was excised. These conditions removed him from flight status and Gus Grissom and John Young flew the Gemini 3 mission.

In November 1963, Shepard became the Chief of the Astronaut Office and was responsible for astronaut training, coordinating mission planning and spacecraft design and overseeing the selection of the Group 5 astronauts in 1966 (including Roosa and Mitchell). He also invested in local banks and bought a partnership in a ranch outside of Weatherford, Texas, starting his journey towards a nice personal fortune. Shepard gained a notoriety during this time for being “difficult” to work with; his secretary had two photos of him (“Smiling Al” and “Icy Commander”) that were used on his office door to advise visitors of his temperament that day.

In 1968, Shepard found out from Tom Stafford about an experimental surgery that was being done by an otologist in Los Angeles to cure Meniere’s disease. He arranged to have the surgery performed (checking into the hospital under a pseudonym) and it was a success, allowing Shepard to be reinstated to flight status on May 7, 1969. Being Chief Astronaut obviously had its perks, and Shepard, working with Slayton, was assigned to command the Apollo 13 mission in 1970, replacing Gordon Cooper, who never flew again. Shepard asked for Jim McDivitt to be his LM pilot, but McDivitt, who had commanded Apollo 9, balked at the request, suggesting that Shepard did not have adequate training to be an Apollo mission commander. Stuart Roosa was assigned as the CM pilot and another rookie, Edgar Mitchell, was designated the LM pilot.

George Mueller, at NASA headquarters, turned down the crew assignment because he felt they were too inexperienced for the third mission. Jim Lovell, assigned to be commander of Apollo 14, agreed to swap missions

with Shepard and he took on the Apollo 13 mission, with Shepard and his crew now being assigned to the fourth "H" mission Apollo 14. The "Apollo 13" movie incorrectly attributes this decision to a flare-up of Shepard's ear problem; the real reason was the inexperience of the crew, as the surgery prevented any future problems with Shepard's Meniere's disease. Of course, as discussed in the last two MARS STAR articles, the Apollo 13 mission was a "successful failure", and the Apollo 14 mission was delayed until 1971 so that the various corrective actions could be incorporated on the stacked systems. The post-Apollo 14 biographical information for Alan Shepard is included at the end of the Apollo 14 mission overview, along with short biographies for Roosa and Mitchell. Their launch vehicle was finally stacked and rolled to pad 39A at KSC on November 9, 1970.

Apollo 14 Mission Overview

Apollo 14 launched on January 31, 1971 at 21:03:02 UTC, after a weather delay of 40 minutes. This was the first weather delay in the history of Apollo launches and it was due to tighter launch criteria following the lightning strikes on Apollo 12 during ascent. Before Apollo 14 could launch, numerous corrective actions and improvements were incorporated, many in the Command and Service Modules due to the Apollo 13 tank explosion to provide more wiring harness protections and redundancies. Other modifications would support the longer lunar exploration goals and correct the pogo oscillation problem noted on Stage II of the Saturn V for Apollo 13. The astronauts not only had their regular training, but Shepard and Roosa had to oversee the implementation of the corrective actions. The landing site was also changed to Fra Mauro from the Littrow crater (Fra Mauro was the original landing destination for Apollo 13). This change required more geology training; apparently, geology was not a favorite subject for Shepard and Mitchell, as the training was considered rather ineffective, although the landing site was considered crucial for selenologists.

The crew was also required to limit contact with other personnel and families for 21 days before the launch to avoid another last-minute crew changeout due to communicable disease exposure.

Heading to the Moon and A Docking Problem

After launch, the ascent and Earth orbit entry were nominal. Because of the later launch in the window, the mission would now be on a faster trajectory to the moon, making up time in flight. Because of this change, the mission timers were put ahead by 40 minutes and 3 seconds so that later events would take place at the times scheduled in the flight plan.

After the Translunar Injection (TLI) burn, the CSM separated from the S-IVB state of the Saturn V. Roosa performed the transposition maneuver to turn the CSM around to dock with the LM before the entire spacecraft separated from the stage. Roosa was aiming for a record on the least amount of fuel required for the docking. Alas, it was not to be, as he and the rest of the crew spent almost three hours trying to get the docking mechanism to activate.

The crew and Mission Control discussed options, including a possible EVA. Failure to dock the two spacecraft would abort the mission and likely end the Apollo program. Gene Cernan (backup crew commander) communicated an idea to Roosa to try the docking again with the docking probe retracted, using it as an alignment device to allow for very close approach of the vehicles using thrusters and hoping that the contact would trigger the docking latches. This finally worked (the sixth docking try) and the crew and controllers on the ground were thrilled to hear the rapid-fire sounds of the hard latching between the LM and CSM. The LM was extracted, and the SIV-B stage continued on its collision course with the moon, impacting three days later and setting off the Apollo 12 seismometer for over three hours. Analysis of the docking problem continued during the flight.

On February 4 at 81:56:40.70 elapsed mission time, the Service Propulsion Engine (SPS) on the SM fired for 370.8 seconds, putting Apollo 14 into a lunar orbit of 169 nautical miles by 58.1 nautical miles. This was later lowered to an orbit of 58.8 nautical miles by 9.1 nautical miles. The lower orbit was done to increase the amount of "hover time" during descent for LM *Antares*, as the Fra Mauro terrain was considered the roughest area yet for a landing and maneuvers during landing were likely.

Antares Separation and Two Serious Problems

Shepard and Mitchell separated from *Kitty Hawk* very early on February 5, 1971, and started their trajectory in *Antares* towards descent and landing. After separation, the LM computer began getting an ABORT signal from a faulty switch. Extensive communications and troubleshooting with the ground resulted in a theory that there was a solder ball loose in the switch, floating in and out and causing the intermittent condition and closing the circuit (tapping on the adjacent panel would make the intermittent condition go away temporarily). At the time this first occurred, it was not a true abort concern, but it could become significant after the descent engine fired, as the LM computer would believe the signal was real and initiate an auto-abort, causing the LM ascent stage to separate from the descent stage and climb back into orbit. Mission Control teams and software engineers at

the Massachusetts Institute of Technology (creators of the LM and CM guidance computer programs) jumped into action to find a workaround.

The guidance gurus at MIT/Draper Labs came up with a software “hack” to bypass the spurious abort signal. Testing revealed traps and unintended consequences that also had to be mitigated. Time was of the essence, as *Antares* was rapidly nearing the descent engine burn interface point. Mitchell had to hurriedly enter some numeric commands in the LM computer interface before the descent engine fired and then more commands (rapidly) after the firing. The hack required the system to ignore the abort signal during more than one upcoming critical routine (on descent and again on ascent; a real abort condition would be done manually)—gutsy and creative stuff done on the fly!

Shepard and Mitchell are now descending towards Fra Mauro and the second major problem occurs: The LM landing radar failed to lock automatically onto the lunar surface, depriving the LM computer of critical altitude and vertical descent speed indications. The astronauts cycled the breaker for the radar and fortunately reacquired a signal at 22,000 feet above the surface (mission rules required an abort if the radar was out at 10,000 feet, although Shepard probably would have tried to land anyway). With the radar data, the veteran naval pilot steered *Antares* to the most precise landing of the six missions that landed on the moon. Official landing time was 09:18:11 UTC on February 5.

Antares Surface Operations at Fra Mauro

Nearly five hours after landing, Shepard emerged from *Antares* on the first EVA at 14:42 UTC. He stated “And it’s been a long way, but we’re here” for his first words on the surface. CAPCOM Bruce McCandless answered back “Not bad for an old man.” Mitchell followed Shepard onto the surface shortly afterwards and spent his first steps worrying about getting back onto the ladder.

The Apollo 14 crew had a new piece of equipment called the Mobile Equipment Transporter or MET (it looked like a fancy golf cart). This was the only mission to use this equipment, as the Apollo 15-17 missions had rovers for moving away from the landing site. The astronauts spent EVA-1 planting the flag, deploying the ALSEP (Apollo Lunar Surface Experiments Package) and collecting nearby samples. The ALSEP on this mission had passive and active seismic experiments (using depth charges; not all charges functioned as intended), ion detectors, and charged particle experiments, as well as the Laser Ranging Retro-Reflector and the Lunar Portable Magnetometer. The astronauts were glad to

have the new Buddy Secondary Life Support System that would allow them to share cooling water if one of their PLSS (Primary Life Support Systems) should fail; the crew also had water packs in their helmets providing drinking water during their time on the surface. The first EVA lasted 4 hours, 47 minutes and 50 seconds.



LM Pilot Ed Mitchell poses with the US flag at Fra Mauro, February 5, 1971, First EVA

The second EVA began on February 6 at 131:17:05 elapsed mission time. Both astronauts set out with the MET to reach the rim of the nearby Cone Crater. The terrain was surprising uneven, with undulating ridges. Shepard and Mitchell were off-camera during this jaunt, which became an ordeal as they topped ridges expecting to see the crater only to see more rolling terrain in front of them. Landmarks from orbital photos were hard to distinguish on the surface. Mission Control became concerned for the length of the EVA and for their obvious physical exertions (high heart and respiration rates). They were told to abandon the journey to Cone Crater and gather samples and return to the LM, traversing to two more sites, F and G; it appears from Lunar Reconnaissance Orbiter photos many years later that they were within 65 feet of the Cone crater rim (the tracks of the MET could be seen from orbit).

Once they were back in the vicinity of the LM and within view of the television camera, Shepard performed a stunt he had been planning for several years. He modified the contingency sample tool, attached a Wilson six-iron golf club handle and pulled two golf balls out of a utility pocket on his EVA suit. He used an awkward one-hand form to connect with the golf balls, sending

them "miles and miles and miles"; enhanced footage years later showed they landed 24 yards and 40 yards from the "tee". The club handle was brought back and donated to the USGA Museum in New Jersey. The only photo of the actual golf drives was from television footage. The geologists on Earth were not happy with the golf game, given the poor results from the sample scavenging that Shepard and Mitchell did on the flank of Cone Crater (considered a crucial target for exploration). As the reader might recall, both astronauts were not good students during their geology classes and that translated to their attitudes during the mission. They did collect a total of 94 pounds of lunar samples, most of them being breccias (fragments of older rocks); it is estimated that the basalts from these breccias were formed over 4 billion years ago. One rock, Big Bertha, weighed almost 20 pounds and it was theorized that it was an Earth meteorite because of the granite and quartz content. Based on age determinations of the zircon in Big Bertha, this terrestrial rock is thought to also be over 4 billion years old, making it the oldest known Earth rock (and found on the moon!). Shepard and Mitchell closed out EVA #2 (total time 4 hours, 34 minutes, 41 seconds) and prepared for liftoff from the lunar surface.

During the two days *Antares* was on the surface, CM pilot Stuart Roosa performed the most extensive orbital analyses of the lunar surface to date, examining the Descartes Highlands for the Apollo 16 mission. Roosa was able to see *Antares* and its shadow on the surface and sunlight glinting off the ALSEP. At 18:48:42 UTC on February 6, 1971, the upper stage engine of *Antares* fired and docking with *Kitty Hawk* took place one hour and 47 minutes later (no docking concerns). Once the crew, equipment and samples transferred back to the CM, the LM was jettisoned and impacted the moon, setting off the passive seismometers left by Apollo 12 and 14.



Detailed Image of Antares (LM) on the surface at Fra Mauro - the uneven terrain and hazards are apparent in this photo.

Nominal Return to Earth

A 350-second trans-Earth injection burn took place at 01:39:04 UTC on February 7 (during the 34th lunar orbit). Tests were performed on the return flight on low and high oxygen flow rates in the CM, as in-flight EVAs were planned on Apollo 15 and later. During his rest periods on the return voyage, Mitchell conducted ESP experiments without NASA's knowledge, attempting to send mental images of cards to four people on Earth. Two of the four "recipients" got 51 out of 200 correct, with random chance being 40 out of 200.

Kitty Hawk splashed down in the south Pacific Ocean on February 9, 1971 at 21:05 UTC, approximately 900 miles from American Samoa. The crew was isolated in the Mobile Quarantine Facility on the USS New Orleans and transferred by flights to the Lunar Receiving Laboratory in Houston. The Apollo 14 crew was the last quarantined after the mission. An interesting aside: Roosa worked in forestry in his youth and took several hundred tree seeds with him on the flight (this was sanctioned). These were germinated and distributed around the world as commemorative Moon trees; many of these trees are still alive in various locations, including near NASA facilities.

Alan Shepard after Apollo 14

Shepard returned to his position as Chief of the Astronaut Office after Apollo 14. In July 1971, President Nixon appointed him as a delegate to the United Nations General Assembly (he served in this role three months). He was also promoted to Rear Admiral. He retired from

NASA and the Navy on July 31, 1974. Shepard spent his post-NASA days doting on his daughters and grandchildren and traveling with Louise. He served on the boards of many corporations, had an umbrella corporation for several business enterprises (Seven Fourteen Enterprises) and made a personal fortune in banking and real estate. Shepard was active in charitable organizations like Rotary and Kiwanis, was a fellow of the American Astronautical Society and the Society of American Experimental Test Pilots and helped create the Mercury 7 Foundation that provided scholarships to science and engineering students. He published a book (*Moon Shot: The Inside Story of America's Race to the Moon*), which is one of the references for this article. In 1996, he was diagnosed with chronic lymphocytic leukemia and passed away on July 21, 1998 in Pebble Beach, California; he was the second moonwalker to pass away (the first, Jim Irwin, will be discussed in the profile on Apollo 15 scheduled for later this year in the MARS STAR). Sadly, Shepard's widow Louise passed away from a heart attack shortly afterwards on August 25, 1998 and they were cremated together. Shepard received many awards and honors, including the Congressional Space Medal of Honor and memberships in Aviation, Space and Astronaut Halls of Fame. He had roads and buildings named after him in New Hampshire, Cocoa Beach, and other locations. On May 4, 2011, the USPS issued a first-class stamp in Shepard's honor, the first to depict a specific astronaut. "Smilin' Al" was a true space legend and was the only Mercury astronaut to walk on the Moon.

Edgar D. Mitchell Biography

Mitchell was born on September 17, 1930 in Hereford, Texas. He considered Artesia, New Mexico, to be his hometown. He first learned to fly at the age of 13 and was active in the Boy Scouts. Mitchell received a B.S. degree in Industrial Management from the Carnegie Institute of Technology and entered the U.S. Navy after graduation in 1952. He earned a second bachelor's degree in Aeronautics from the US Naval Postgraduate School and also earned a Doctorate in Science degree in Astronautics from MIT in 1964. He married Louise Randall in 1951 and they had two children; his relationships became "complicated" and he had an affair with a Playboy model (Sheilah Ledbetter) while married to his second wife Anita Rettig. He adopted Rettig's three children and had another child with Ledbetter, whom he married in 1989.

During his naval career, he completed flight training, transitioned to carrier-based jet aircraft and served aboard two aircraft carriers. He qualified as a research pilot and then served as Chief, Project Management Division for the Navy for the Manned Orbiting Laboratory

from 1964 to 1965 (remember that, Titan folks?). He was certified as a test pilot by the Air Force Aerospace Research Pilot School and was an instructor in advanced mathematics and navigation theory. He accumulated 5000 hours flight time during these years in the Navy.

Mitchell was selected in 1966 as part of NASA's fifth astronaut group. He was assigned to the support crew for Apollo 9, then designated as backup LM pilot for Apollo 10, putting him on the rotation for prime crew of Apollo 13. As noted in the earlier parts of Shepard's biography, the Apollo 13 crew was reassigned to Apollo 14. During the Apollo 13 crisis, he was part of the Mission Operations team and received the Presidential Medal of Freedom for his efforts. He served as LM pilot on Apollo 14 and took many photos that were considered superb examples from the Apollo gallery.

After Apollo 14, Mitchell pursued his interests in paranormal phenomena and ecology after retiring from NASA and the Navy in 1972. He became the founding chairman of the Institute of Noetic Sciences in Palo Alto, California and the Mind Science Institute in Los Angeles (linked to surreptitious activity with the CIA). Mitchell founded more research companies in Florida, where he moved in 1975. He passed away on February 5, 2016 in West Palm Beach, Florida (on the eve of the 45th anniversary of his lunar landing).

Stuart A. Roosa Biography

Roosa was born on August 16, 1933 in Durango, Colorado and grew up in Claremore, Oklahoma. He graduated with a BS in Aeronautical Engineering in 1960 from the University of Colorado Boulder (GO BUFFS! – my alma mater, too). He worked as a smokejumper for the US Forest Service in 1953 and was a graduate of the Aviation Cadet Program at Williams Air Force Base, Arizona, where he received his flight training commission from the USAF. He flew a number of different aircraft and was selected as an experimental test pilot at Edwards Air Force Base. He logged 5,500 hours of flying time in the Air Force.

Roosa was selected in the Astronaut Class of 1966 (Group Five). He was the CAPCOM during the Apollo 1 fire on January 27, 1967 and was on the support crew for Apollo 9. He was assigned to the Apollo 13, then Apollo 14 primary crew. After returning, he served as backup CM pilot for Apollos 16 and 17 and was assigned to the Space Shuttle Program until his retirement as a Colonel in the Air Force in 1976. Roosa worked in several industries after leaving NASA and became owner and president of Gulf Coast Coors in 1981. Roosa was married to his wife Joan (nee Barrett) for thirty seven years and they had three children. He passed away on

December 12, 1994 of pancreatitis; his wife passed away in 2007.

References for Apollo 14 article

Apollo Flight Journal: [https://history.nasa.gov/afj/Moon Shot: The Inside Story of America's Race to the Moon](https://history.nasa.gov/afj/Moon%20Shot%20The%20Inside%20Story%20of%20America's%20Race%20to%20the%20Moon), Alan Shepard, Deke Slayton (with Jay Barbree and Howard Benedict), Published by Turner Publishing Company, Copyright 1994 (Revised edition: *Moon Shot: The Inside Story of America's Apollo Moon Landings* – available at Amazon at this link <https://www.amazon.com/Moon-Shot-Inside-Americas-Landings/dp/1453258264>)

NASA Apollo Program: https://www.nasa.gov/mission_pages/apollo/missions/apollo13.html

Apollo 14 Mission Report: <https://history.nasa.gov/alsj/a14/A14MRntrs.pdf>

JFK Joint Congressional Address: <https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-to-joint-session-of-congress-may-25-1961>

Wikipedia Information about Apollo 14 and Crew: https://en.wikipedia.org/wiki/Apollo_14

Wikipedia Information about Moon Trees: https://en.wikipedia.org/wiki/Moon_tree

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 (2011, 2001, 1991, 1981, 1971, 1961). 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, with the exception of the Discoverer program (Corona). 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 list is not intended to be all-inclusive due to historical record inaccuracies.

Events in January (10 to 60 years ago)

- **01/20/2011: USA-224 launched by ULA Delta IV-Heavy, SLC-6, VAFB; First Delta-IV Heavy at VAFB**
- 01/30/2001: LM GPS IIR-7 launched by Delta II 7925-9.5, SLC-17A, CCAFS
- NO EVENTS IN JANUARY 1991
- NO EVENTS IN JANUARY 1981
- 01/21/1971: Classified program launched by MM Titan III(23)B, SLC-4W, VAFB

- 01/26/1971: Intelsat IVB F-2 launched by GD Atlas SLV-3C, Centaur-D, LC-36A, CCAFS
- **01/31/1971: Apollo 14 launched by Saturn V SA-509, LC-39A, KSC; third crewed lunar landing, program profile this issue**
- 01/06/1961: MM MGM-31 Pershing 1 launched, LC-30, CCAFS; **FAILURE**
- 01/10/1961: Lockheed UGM-27 Polaris A1 launched, USS *Robert E. Lee*, ETR; **FAILURE**
- 01/14/1961: Lockheed UGM-37 Polaris A1 launched, USS *Robert E. Lee*, ETR; **FAILURE**
- 01/20/1961: MM HGM-25A Titan I launched, LC-19, CCAFS; **FAILURE**
- 01/23/1961: GD SM-65D Atlas launched, LC-12, CCAFS
- 01/24/1961: GD SM-65E Atlas launched, LC-13, CCAFS; **FAILURE**
- 01/26/1961: MM MGM-31 Pershing 1 launched, LC-30A, CCAFS
- *01/31/1961: Mercury-Redstone 2 launched, LC-5, CCAFS with Ham the Chimp (historic event of interest)*
- 01/31/1961: Samos 2 launched by GD Atlas LV-3A Lockheed Agena-A, Point Arguello LC-1-1, California

Events in February (10 to 60 years ago)

- **02/10/2011: Lockheed Martin Press Release: Lockheed Martin Ships out First Orion Spacecraft**
- **02/15/2011: Lockheed Martin Press Release: Lockheed Martin and NASA Perform Spectacular Fly-by of Comet Tempel 1 (Stardust – NExT)**
- **02/24/2011: STS-133 (Discovery) launched, LC-39A, KSC; 6 crewmembers, ISS logistics, last launch of Discovery**
- 02/07/2001: STS-98 (Atlantis) launched, LC-39A, KSC; 5 crewmembers, ISS assemblies
- 02/27/2001: LM Milstar 2 launched by LM Titan TIVB/Centaur (401), SLC-40, CCAFS
- NO EVENTS IN FEBRUARY 1991
- 02/04/1981: MM MGM-31A Pershing (3 missiles), LC-16, CCAFS
- 02/17/1981: MM MGM-31A Pershing (3 missiles), LC-16, CCAFS
- 02/21/1981: Comstar D4 launched by GD Atlas SLV-3D, Centaur-D1AR, LC-36A, CCAFS
- 02/28/1981: Classified program launched by MM Titan III (24B), SLC-4W, VAFB – *This was the first launch for your historian on the Titan program after being hired in January, 1981!*
- 02/17/1971: Classified program launched by Thorad SLV-2H Lockheed Agena-D, SLC-3W, VAFB; **FAILURE** Booster engine
- 02/10/1961: MM HGM-25A Titan I launched, LC-20, CCAFS

- 02/16/1961: MM MGM-31 Pershing 1 launched, LC-30, CCAFS
- 02/17/1961: Discoverer 20 launched by Thor DM-21 Lockheed Agena-B, LC-75-3-4, VAFB; **FAILURE** spacecraft
- 02/18/1961: Discoverer 21 launched by Thor DM-21 Lockheed Agena-B, LC-75-3-5, VAFB
- **02/21/1961: Mercury-Atlas 2 launched by GD Atlas LV-3B, LC-14, CCAFS**
- 02/14/1961: GD SM-65E Atlas launched, LC-13, CCAFS

Events in March (10 to 60 years ago)

- 03/05/2011: X-37B/USA-226 launched by ULA Atlas V 501, SLC-41, CCAFS
- **03/22/2011: Lockheed Martin Press Release: First Lockheed Martin Built Milstar-II Spacecraft Marks 10 Years in Service**
- 03/08/2001: STS-102 (Discovery) launched, LC-39B, KSC; 7 crewmembers, Leonardo ISS module
- **03/08/1991: USA-69 launched by MM Titan TIVA (403A), SLC-4E, VAFB; First Titan IV launch at VAFB**
- 03/19/1991: Lockheed UGM-96 Trident C-4 launched (two), WTR Submarine (not identified)
- 03/16/1981: DSP F-9 launched by Titan III(23)C, LC-40, CCAFS
- 03/24/1971: Classified program launched by Thorad SLV-2H, Lockheed Agena A, SLC-3W, VAFB
- 03/01/1961: Lockheed UGM-37 Polaris A2 launched, USNS Observation Island, ETR
- 03/02/1961: MM MGM-31 Pershing 1 launched, LC-30A, CCAFS
- 03/03/1961: MM HGM-25A Titan I launched, LC-20, CCAFS; **FAILURE**
- 03/09/1961: Lockheed UGM-27 Polaris A2 launched, USNS Observation Island, ETR
- 03/14/1961: GD SM-65E Atlas launched, LC-13, CCAFS; **FAILURE**
- 03/15/1961: Lockheed UGM-27 Polaris A2 launched, LC-29A, CCAFS
- 03/16/1961: MM MGM-31 Pershing 1 launched, LC-30A, CCAFS
- 03/23/1961: Two Lockheed UGM-27 Polaris A1 launched, USS *Theodore Roosevelt*, ETR; **FAILURES**
- 03/23/1961: Two Lockheed UGM-27 Polaris A1 launched, USS *Theodore Roosevelt*, ETR
- 03/25/1961: GD SM-65E Atlas launched, LC-13, CCAFS; **FAILURE**
- 03/28/1961: MM HGM-25A Titan I launched, LC-19, CCAFS
- 03/30/1961: Discoverer 22 launched by Thor DM-21 Lockheed Agena-B, LC-75-3-4, VAFB; **FAILURE** booster
- 03/31/1961: MM HGM-25A Titan I launched, LC-20, CCAFS; **FAILURE**

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 the story of the first Shuttle launch, STS-1 (Columbia), which has its 40th anniversary in April 2021. Later this year, the Apollo 15 mission will be profiled using my personal memories of seeing the launch in 1971 and later meeting Astronaut Jim Irwin while I was in college. The History on the Road stories are suspended at this time due to the difficulty in traveling and visiting museums.

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