

Historian Corner

By Barb Sande

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ANNOUNCEMENT!!

Another roundtable session will be scheduled in the May, 2022 timeframe (date and time TBD, using a Zoom meeting) to discuss the challenges associated with the Cassini mission processing and launch. The launch of the spectacularly successful NASA/JPL Cassini mission to Saturn celebrates its 25th anniversary on October 15, 2022 and I will write a summary article from the roundtable for the appropriate MARS STAR near that anniversary date. I would like participants who worked on: the Titan IV booster vehicle, the Centaur upper stage and the propulsion components and instruments built by our heritage companies for the Cassini spacecraft; we also want folks who supported the launch processing at CCAFS. If you were involved in this mission and want to participate in the roundtable, please send me an email and advise me of your preferred dates in May at barbsande@comcast.net. (Note: I will NOT be available from May 16-20, 2022 and I will likely schedule this in an afternoon session because of morning conflicts). More announcements will be made via email and on the Facebook MARS Associates page.

GENERAL ITEM OF INTEREST

I would like to remind readers of the history corner that it contains a section listing historical missions from 10 to 60 years ago for a three-month period for our heritage companies. If you scan through this section, it is interesting to note how the activity ramped up significantly in the last part of 1961, with many launches of Atlas and Titan ICBMs, launches of Polaris missiles and Pershing missiles, and nascent launches of satellites.

HISTORY ON THE ROAD

No program profile is on tap for this edition. The History on the Road is being revived as people start traveling again, with overviews of the interesting space collections at Kennedy Space Center Visitor Complex in Florida. In the last edition, I also noted that I would provide an overview of the Cosmosphere in Hutchinson, Kansas; that facility is currently undergoing a massive renovation project, so the overview is deferred to a future issue (and hopefully another visit to see the renovations).

Kennedy Space Center Visitor Complex

The Visitor Complex at Kennedy Space Center can be considered the “granddaddy” of space museums and exhibits, with enough displays and activities to keep a family busy for multiple days. The main complex, just outside the security gates to the KSC areas, is located on Space Commerce Way on Merritt Island, an easy drive from central Florida locations like Orlando, Cocoa Beach, Melbourne and Daytona Beach. I first visited the KSC visitor center in the summer of 1968 with my parents. At that time, it was a single building with a few displays and a book store, along with optional bus rides through KSC and CCAFS. My family repeated this visit in July, 1971, before seeing the launch of Apollo 15 (see the 2021Q4 MARS STAR Historian Corner). The center has grown since then to include many buildings and exhibits on-site (including the fantastic Rocket Garden) along with the Apollo/Saturn V facility north of the VAB (Vehicle Assembly Building), which is part of the regular bus tours. In recent years, a huge new facility was built to display the Space Shuttle Atlantis and the Astronaut Hall of Fame was moved to the complex after being located on Space Commerce Way near A1A (now part of the “Heroes and Legends” exhibit).

A map of the main facility is shown below:



MAP Courtesy KSC Visitor Complex (NASA)

Steve and I last visited the KSC Visitor Complex in January, 2020, coincidentally on the same day as the successful SpaceX Falcon 9 Crew Dragon Abort test (it was great to see a launch, then go enjoy this fabulous archive of space history). I have included a few pictures from that visit to KSC. The Complex opened later in the day due to the launch and we did not have a chance to see all of the exhibits and activities, but we did spend time at the Apollo/Saturn V facility (reached by the Tour bus) and also enjoyed the very moving experience

Visitors are then escorted through double doors to stand directly underneath the F1 engines at the aft end of Stage I; shock and awe are appropriate terms! Each one of these Rocketdyne engines was capable of over 1.5 million pounds of thrust, still the most powerful single combustion chamber liquid-propellant engines ever developed.



Five Stage I F1 Engines on Restored Saturn V
(Photo Copyright Steve and Barb Sande)

The 363-foot-tall Saturn V fills the space in this building and the stages are separated so that the engines on all stages can be seen. Along the sides are other displays, including the Command Module from the Apollo 14 mission (*Kitty Hawk*), an unused Lunar Module (LM-9), and an unused Command Service Module (CSM-119). The large artifacts are surrounded by interactive displays and support equipment, including a replica of the lunar rover. Another theater shows a simulation of the Apollo 11 lunar landing. A new exhibit, *Ad Astra per Aspera* (To the Stars with Difficulty), opened in 2017 to honor the fallen astronauts of Apollo 1; we missed seeing this when we visited the Apollo/Saturn Center in 2020.

The Apollo/Saturn V Center has a gift shop, cafeteria-style restaurant and visitors can go outside to the Moon Tree Garden and an adjacent viewing stand (Banana Creek Launch Viewing Area) that is used for pre-registered visitors wanting to view current SpaceX, ULA and soon-to-come Artemis launches. If you are in the vicinity, check the launch schedules and register early with the KSC visitor center. A link is provided at the end of the article. A scenic viewpoint at the waterside also allows for great photos of the Vehicle Assembly Building (VAB). The buses, now that they are running again, return visitors to the main visitor complex at regular intervals.



View looking down the Saturn V; Mission Patches at Right (Apollo/Saturn Center)
(Photo Copyright Steve and Barb Sande)



View of the VAB Outside Apollo/Saturn Center
(Photo copyright Steve and Barb Sande)

Space Shuttle Atlantis Exhibit

The buses returning from the Apollo/Saturn V Center conveniently drop off visitors near the huge (64,000 square foot) building that opened in 2013 to house and display Space Shuttle *Atlantis* and provide for other displays and experiences associated with the Space Shuttle Program. Outside the facility is a full-scale stack of two solid rocket boosters and the External Tank (for some reason, we neglected to stop and take pictures of this impressive outdoor display).

Visitors to the Space Shuttle building are brought to an upper level of the building using ramps or an elevator. A short movie has been created to talk about the design of a winged spacecraft that could return to Earth and

land on a runway. This is followed by a surround-sound experience in a large adjacent room showing shuttle launches and operations (great sound!!). Finally, a screen opens to show the forward end of the actual Orbiter Vehicle *Atlantis*. Most visitors are extremely moved by this experience, seeing the teary eyes (including both of us) and hearing the gasps among the crowd. The orbiter vehicle (OV-104) is hung from the ceiling and displayed at an angle of 43.2 degrees; the payload bay doors are open and the Canadarm is extended, a sight that was only seen in space until the end of the program.



Steve (at far left) is Moved by the Sight of Atlantis

(Photo Copyright Steve and Barb Sande)

Nearby, there is a full-scale replica of the Hubble Space Telescope. Ramps going down in the building go past the three main engines of the orbiter and through various displays of support equipment, early shuttle concept designs (including one that was considered using a Titan vehicle) and displays about ISS operations. At the bottom, you can get a good look at the thermal protection system. The Space Shuttle Launch Experience, using simulators to simulate a shuttle launch, is now part of the overall Atlantis exhibit and is also located on the ground floor.



Three RS-25 Space Shuttle Main Engines

(Photo Copyright Steve and Barb Sande)

Another area on the ground floor of the building is the "Forever Remembered" hall, with personal mementos provided by the families of the fallen 14 Space Shuttle astronauts, along with recovered pieces of both Challenger and Columbia. Viewing these mementos and remembering both of those failures so vividly brought more tears to our eyes.



Personal Memorabilia for Astronaut Rick Hubbard (Commander, Died on STS-107, February 1, 2003)

(Photo Copyright Steve and Barb Sande)

Summary

The KSC Visitor Complex is a must-see, even for veterans of launch vehicle and satellite programs who spent a lot of time at KSC and CCAFS, because there are always new and interesting exhibits and experiences. In a state filled with tourist destinations, KSC still attracts nearly 2 million visitors a year. We enjoyed our visit very much in 2020; after walking around the exhibits and the Complex, we were also happy that the venerable and popular Dixie Crossroads restaurant in Titusville was a short drive away!



Delicious Broiled Rock Shrimp at the Dixie Crossroads, Titusville

(Photo Copyright Steve and Barb Sande – yes, that is powdered sugar from the fritters on the table!)

Resources and Links

Kennedy Space Center Visitor Complex Main Website:

<https://www.kennedyspacecenter.com>

Information and registration for upcoming launches:

<https://www.kennedyspacecenter.com/launches-and-events/events-calendar/see-a-rocket-launch>

General Information about KSC Visitor Complex:

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

On This Date in History

This section has space 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. Occasionally, a major space milestone not accomplished by any of our heritage programs will be included due to its historical significance.

Events in October (10 to 60 years ago)

- 10/28/2011: Six Technology Demo/Research satellites launched by ULA Delta II 7920-10, SLC-2W, VAFB
- 10/05/2001: Classified USA-161 launched by LM Titan IVB (404), SLC-4E, VAFB
- 10/11/2001: Classified USA-152 launched by LM Atlas IIAS, LC-36B, CCAFS
- **10/24/2001: LM Mars Odyssey successfully achieves orbit at MARS (still operational as of 12/15/2021)**
- No events in 1991
- 10/13/1981: MM MGM-31A Pershing launched (two), Fort Bliss, Texas
- 10/21/1981: MM MGM-31A Pershing launched (two), Fort Bliss, Texas
- 10/31/1981: Classified launch, MM Titan III (23C), LC-40, CCAFS
- 10/17/1971: ASTEX launched by Thorad SLV-2G/Lockheed Agena-D, SLC-1W, VAFB
- 10/21/1971: RCA ITOS-B launched by Delta N6, SLC-2E, VAFB; **LAUNCH FAILURE**
- 10/23/1971: Classified launch, MM Titan III(24B), SLC-4W, VAFB
- 10/02/1961: GD SM-65E Atlas launched, LC-11, CCAFS
- 10/04/1961: Lockheed UGM-27 Polaris A2 launched, USNS Observation Island, ETR
- 10/05/1961: GD SM-65E Atlas launched, LC-13, CCAFS
- 10/07/1961: MM HGM-25A Titan I launched, LC-19, CCAFS
- 10/10/1961: MM MGM-31 Pershing I launched, LC-30A, CCAFS
- 10/13/1961: Discoverer 32 launched, Thor DM-21/Lockheed Agena-B, LC-75-3-4, VAFB
- 10/16/1961: Lockheed UGM-27 Polaris A1 launched, USS *Ethan Allen*, ETR
- 10/21/1961: Experiments launched by GD Atlas LV-3A/Lockheed Agena-B, LC-1-2, Point Arguello

- 10/23/1961: Lockheed UGM-27 Polaris A2 launched, USS *Ethan Allen*, ETR
- 10/23/1961: Discoverer 33 launched, Thor DM-21/Lockheed Agena-B, LC-75-3-5, VAFB; **LAUNCH FAILURE**
- 10/24/1961: MM HGM-25A Titan I launched, LC-20, CCAFS

Events in November (10 to 60 years ago)

- **11/26/2011: Mars Science Laboratory Curiosity launched by Atlas V 541, LC-41, CCAFS; maiden flight of Atlas V 541, largest rover to Mars at that time**
- No events in 2001
- 11/04/1991: Lockheed UGM-133 Trident D-5 launched, USS *Kentucky*, ETR
- 11/08/1991: Four classified payloads launched (USA-72, 74, 76, 77), MM Titan IVA-403A, SLC-4E, VAFB
- 11/11/1991: Lockheed UGM-133 Trident D-5 (four) launched, USS *Pennsylvania*, ETR
- 11/24/1991: STS-44 (Atlantis) launched, LC-39A, KSC; 6-person crew, DoD mission (DSP-16)
- 11/28/1991: Lockheed DSMP-11 launched by GD Atlas-E, SLC-3W, VAFB
- **11/12/1981: STS-2 (Columbia) launched, LC-39A, CCAFS; 2-person crew, technology demo satellites; second shuttle launch**
- 11/15/1981: Lockheed UGM-96 Trident I C4 launched, USS *Benjamin Franklin*, ETR; **LAUNCH FAILURE**
- 11/20/1981: RCA Satcom 3R launched by Delta 3910/PAM-D, LC-17A, CCAFS
- 11/03/1971: DCSC II A1/A2 launched by MM Titan III(23C), LC-40, CCAFS
- 11/02/1961: MM MGM-31 Pershing I launched, LC-30A, CCAFS
- 11/03/1961: Lockheed UGM-27 Polaris A1 launched (3), USS *Ethan Allen*, ETR
- 11/05/1961: Discoverer 34 launched, Thor DM-21/Lockheed Agena-B, LC-75-1-1, VAFB; **LAUNCH FAILURE**
- 11/08/1961: Lockheed UGM-27 Polaris A2 launched, USS *Ethan Allen*, ETR
- 11/09/1961: Lockheed UGM-27 Polaris A2 launched, LC-29A, CCAFS
- 11/10/1961: GD SM-65E Atlas launched, LC-13, CCAFS; **LAUNCH FAILURE**
- 11/15/1961: Discoverer 35 launched, Thor DM-21/Lockheed Agena-B, LC-75-3-4, VAFB
- 11/15/1961: MM MGM-31 Pershing I launched, LC-30A, CCAFS
- 11/18/1961: Ranger 2 (lunar test flight) launched by GD Atlas LV-3A/Lockheed Agena-B, LC-12, CCAFS; **LAUNCH FAILURE**
- 11/22/1961: MM HGM-25A Titan I launched, LC-20, CCAFS

- 11/22/1961: Samos 4 launched by GD Atlas LV-3A/Lockheed Agena-B, LC-1-1, Point Arguello; **LAUNCH FAILURE**
- 11/29/1961: GD SM-65F Atlas launched, LC-11, CCAFS
- **11/29/1961: Mercury-Atlas 5 launched by GD Atlas LV-3B, LC-14, CCAFS; Carried Enos the Chimp**
- 11/29/1961: GD SM-65D Atlas launched, LC-576B-2, VAFB
- 11/29/1961: MM HGM-25A launched, LC-19, CCAFS

Events in December (10 to 60 years ago)

- No events in 2011
- 12/05/2001: STS-108 (Endeavour) launched, LC-39B, KSC; seven-person crew, Raffaello MPLM logistics module, ISS Assembly
- 12/07/1991: Eutelsat 2F3 launched by GD Atlas II, LC-36B, CCAFS
- 12/15/1981: Intelsat V F-3 launched by GD Atlas SLV-3D/Centaur-D1AR, LC-36A, CCAFS
- 12/04/1971: Classified launched by GD Atlas SLV-3A/Lockheed Agena-D, LC-13, CCAFS; **LAUNCH FAILURE**
- 12/14/1971: Classified payloads (4) launched by Thorad SLC-2G/Lockheed Agena-D, SLC-1W, VAFB
- 12/20/1971: Intelsat IV F-3 launched by GD Atlas SLV-3C/Centaur-D, LC-36A, CCAFS
- 12/01/1961: GD SM-65E Atlas launched, LC-13, CCAFS
- 12/01/1961: MM MGM-31 Pershing 1 launched, LC-30A, CCAFS
- 12/06/1961: Lockheed UGM-27 Polaris A1 launched, LC-25A, CCAFS
- 12/07/1961: GD SM-65D Atlas launched, LC-576B-3, VAFB
- 12/12/1961: GD SM-65D Atlas launched, LC-11, CCAFS; **LAUNCH FAILURE**
- 12/12/1961: Discoverer 36 launched by Thor DM-21/Lockheed Agena-B, LC-65-3-4, VAFB; also launched OSCAR-1, first amateur-built satellite
- 12/13/1961: MM HGM-25A Titan I launched, LC-20, CCAFS
- 12/15/1961: MM HGM-25A Titan I launched, LC-19, CCAFS
- 12/20/1961: GD SM-65E Atlas launched, LC-13, CCAFS; Cosmic ray research
- 12/21/1961: GD SM-65F Atlas launched, LC-11, CCAFS; **LAUNCH FAILURE**
- 12/22/1961: Samos 5 launched by GD Atlas LV-3A Lockheed Agena-B, LC-1-2, Point Arguello; **LAUNCH FAILURE**
- 12/28/1961: MM MGM-31 Pershing I launched, LC-30A, CCAFS

Reference websites:

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

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

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<https://space.skyrocket.de>

<http://www.astronautix.com>

Next Edition

Be sure to check out the next History Corner where I profile the 60th anniversary of the Mercury/Atlas Friendship 7 flight of John Glenn. Coming soon: Apollo 16, 25th Anniversary roundtable of the Titan/Centaur Cassini launch, Apollo 17. 2023 will include a series about the Apollo/Skylab missions.

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