A Chronology of Events Related to Marshall Space Flight Center

March 1945: The United States initiated Project Paperclip to recruit World War II German missile scientists in Europe.

Aug. 14, 1945: World War II ended with the Japanese surrender. A team of American scientists was dispatched to Europe to information and equipment related to German rocket progress.

August 1945: Approximately 100 V-2 ballistic missiles were shipped from Germany to the United States as a result of Project Paperclip.

Sept. 20, 1945: Wernher von Braun, who eventually became the first Director of the NASA Marshall Space Flight Center, arrived in the United States as a result of Project Paperclip. He was accompanied by six other key German rocket scientists.

Dec. 10, 1945: Another 55 German specialists arrived at Fort Bliss, Texas, and White Sands Proving Ground, Texas, where they were joined by the first seven German specialists headed by von Braun.

March 21, 1950: The U. S. Army ordered the transfer of the missile personnel headed by Von Braun from White Sands to Redstone Arsenal, Alabama.

April 1, 1950: The German missile personnel headed by von Braun began their move from White Sands Proving Ground to Redstone Arsenal in Huntsville, Alabama.

Aug. 20, 1953: Redstone missile No.1 was fired by Army. Redstone Arsenal personnel at AFMTC, Cape Canaveral, FI.

Feb. 1, 1956: The Army activated the Army Ballistic Missile Agency (ABMA) which grew out of its Guided Missile Development Division in Huntsville.

May 31, 1957: An Army Jupiter missile was fired 1,500 miles, limit of its designed range,

Oct. 4, 1957: Russia inspired the U. S. to new space efforts when it launched Sputnik I, the first earth satellite.

December 1957: The Von Braun group, under the Army Ballistic Missile Agency (ABMA), proposed an integrated missile and space vehicle development program including a booster capable of producing 1,500,000 pounds of thrust.

Jan. 10, 1958: Construction started in Huntsville on a test stand for a launch vehicle booster in Huntsville.

Jan. 31, 1958: The Von Braun team used an Army Jupiter-C rocket to launch Explorer I, the Free World's first earth satellite.

Oct. 1, 1958: The National Aeronautics and Space Administration (NASA) was created.

October 1958: After originally recommending that the United States build a new single-stage launch vehicle, ARPA recommended building a multi-stage launch vehicle capable of performing advanced space missions. This also meant building larger launch structures or redesigning existing ones at its Atlantic Missile Range in Florida.

December 1958: The first full-power H-1 engine firing occurred at the Rocketdyne facility in Canoga Park, California.

Jan. 8, 1959: NASA requested eight Redstone-type launch vehicles from the Army to be used in Project Mercury development flights.

Jan. 9, 1959: While development work continued on the H-1 engine, Rocketdyne focused on developing the F-1 engine, a larger single-stage engine that would power the first stage of the new multi-stage launch vehicle. The F-1 would burn liquid oxygen and RP-1, a kerosene-type fuel and generate approximately 1,500,000 pounds of thrust.

April 28, 1959: The first production H-1 engine (H-1001) had been delivered on schedule to ABMA.

May 26, 1959: ABMA successfully test fired the H-1 engine (H-1001).

May 28, 1959: Army Jupiter IRBM launched a nose cone carrying two living passengers-
Able, an American-born rhesus monkey, and Baker, a South American squirrel monkey.

June 5, 1959: Construction at Cape Canaveral for the Saturn Program began.

Oct. 21, 1959: President Eisenhower announced his decision to transfer a portion of ABMA's personnel, facilities, and missions to NASA.

Nov. 2, 1959: President Eisenhower announced his intention to transfer the Saturn project from the Army to NASA.

Nov. 18, 1959: NASA assumed technical direction of the Saturn project pending its formal transfer from the Army.

Jan. 18, 1960: The Saturn project was approved as a program of the highest national priority (DX rating).

Jan. 4, 1960: A mockup of the Saturn booster was installed in the ABMA test stand to check mating of the booster and stand and to test servicing methods.

Jan. 14, 1960: President Eisenhower directed the transfer of ABMA's Development Operations Division and its space-related missions to NASA. Formal transfer ceremonies at Huntsville later officially opened NASA's George C. Marshall Space Flight Center.

March 15, 1960: The George C. Marshall Space Flight Center, NASA's Huntsville Facility, was so named by Executive Order of President Eisenhower.

March 16, 1960: The executive order transferring the Saturn program to NASA became effective.

April 6, 1960: Four Saturn engines were successfully static fired for 7 seconds.

April 29, 1960: All eight engines of the test booster were successfully fired in an 8-second test

April 1960: NASA awarded Douglas Aircraft Company a contract to develop the second stage for the Saturn rocket.

May 1960: NASA announced that Rocketdyne had been selected to develop the high-thrust J-2 engine.

May 26, 1960: Assembly of the booster stage for the first Saturn flight vehicle began in Huntsville.

July 1, 1960: The Marshall Space Flight Center came into being as 4,670 Army civil servants became NASA personnel, and the U.S. Army Ballistic Missile Agency transferred 1,840 acres of arsenal land along with buildings, space projects and equipment.

Sept. 8, 1960: President Dwight Eisenhower visited the Marshall Center to dedicate the center in honor of Gen. George C. Marshall.

May 5, 1961: Alan Shepard rode into space aboard a Mercury-Redstone rocket designed by Marshall.

November 1961: The Saturn RL-10 engine, the first to burn the high-energy fuel hydrogen, passed its preliminary flight evaluation.

Oct. 27, 1961: The first Saturn vehicle flew a flawless, 215-mile ballistic trajectory from Cape Canaveral.

Sept. 7, 1961: NASA selected the Michoud Plant in New Orleans as the production site for Saturn rockets.

Oct. 25, 1961: NASA selected a 13,500-acre site known as the Mississippi Test Facility to conduct Saturn rocket tests.

During 1961: North American Aviation, Chrysler Corp., Boeing Co. and Douglas Aircraft Co. were selected as major Saturn hardware contractors.

April 25, 1962: The third Saturn I vehicle lifted Project Highwater, which ejected 30,000 gallons of ballast water in the upper atmosphere to test for the formation of ice crystals.

June 1962: Bids were requested for construction of a huge static test stand at Marshall to captive fire the Saturn V first stage booster.

Sept. 11, 1962: President John F. Kennedy and key members of government visited the Marshall Center for a first-hand look at the space effort.

June 1963: Some 1,200 Marshall employees moved into Building 4200, the center's new central laboratory and office building.

Nov. 27, 1963: Engineers conducted the first extended-duration firing test of the J-2 engine.

Dec. 3 and Dec. 5, 1963: Marshall conducted its first F-1 engine tests.

February 1964: Marshall completed assembly of the transporter for the huge Saturn V first stage.

March 24, 1964: Mrs. Lyndon B. Johnson made a one-day visit to Marshall.

July 21, 1964: NASA named its first large-scale scientific payload for the Saturn rocket, “Pegasus.” Marshall managed the micrometeoroid measurement project.

Sept. 30, 1964: Major construction was completed on Marshall’s Saturn V first stage test stand.

August 1965: All three stages of the 365-foot-tall Saturn V vehicle were captive tested for full durations in Marshall’s Dynamic Test Facility.

1966: The Marshall Center was assigned responsibility for the Apollo Telescope Mount project that would eventually be part of the Skylab space station.

Nov. 9, 1967: The first Saturn V vehicle was launched from the Kennedy Space Center, Fla.

March 1968: Workmen completed Marshall’s 75-foot-diameter Neutral Buoyancy Tank, an underwater testing facility that astronauts could use to simulate the weightless environment of space.

July 11, 1969: Marshall issued a request for proposal for the design, development, test and delivery of a manned lunar roving vehicle. Astronauts drove the lunar rover on the last three Apollo moon missions.

July 16, 1969: As its crowning achievement in the Apollo space program, a Saturn V rocket lifted the Apollo 11 spacecraft and three astronauts on their journey to the moon

1970: Engineers from Marshall and other NASA centers were already at work defining the requirements for the space shuttle main engine – the world's most sophisticated reusable rocket engine.

During the 1970s: As space shuttle development progressed, engineers reused many of the huge test structures originally designed as part of the Saturn launch vehicle program.

Jan. 5, 1972: President Richard M. Nixon announced plans for NASA to develop the space shuttle for routine access to space.

1972: Marshall was assigned responsibility for developing the propulsion elements for the space shuttle: the external tank, solid rocket boosters and the space shuttle main engines. Marshall also received responsibility for Spacelab, a versatile laboratory carried within the shuttle's cargo bay. Other center assignments included the upper stage boosters that would lift shuttle payloads into higher orbits.

1973: Saturn rockets launched Skylab, and Marshall had a vital role in providing the hardware and experiments. The Skylab space station was occupied in succession by three teams of three crew members. These crews spent 28, 59 and 84 days, respectively, orbiting the Earth and performing nearly 300 experiments.

July 15, 1975: NASA marked the final launch of a Saturn rocket. This time NASA launched a Saturn IB from the Kennedy Space Center. Earlier that day, a Russian Soyuz spacecraft lifted off its launch pad at a Soviet launch site carrying three cosmonauts. The joint mission was called the Apollo Soyuz Test Project. Rendezvous and docking of the two ships came on July 17, allowing astronauts and cosmonauts to conduct joint experiments and exchange national mementos.

1976: Marshall launched the Laser Geodynamics Satellite, or LAGEOS. Essentially a mirror in space, the 900-pound, 2-foot-diameter satellite was designed to precisely reflect laser beams from ground stations for extremely accurate ranging measurements. LAGEOS measured movements of the Earth's crust related to earthquakes, continental drift and other geophysical phenomena. The satellite was conceived and manufactured at Marshall.

April 1976: The first tests of the space shuttle main engines were conducted at the NASA-National Space Technology Laboratories at Bay St. Louis, Miss.

April 1976: An X-ray Test Facility, the only one of its size, was constructed at Marshall for verification testing and calibration of X-ray mirrors, telescope systems and instruments.

During 1976: Marshall managed several unmanned scientific payloads, including a Gravitational Redshift Probe. In addition, three Space Processing Applications Rocket missions were flown, and the Skylark X-ray telescope was launched from Australia.

July 18, 1977: The first firing of a solid rocket motor took place in Utah. The motor ran for about two minutes in what observers describe as a “near perfect” test. The motor was referred to as Development Motor-1.

Sept. 9, 1977: The first external tank rolled off the assembly line at Marshall's Michoud Assembly Facility in New Orleans.

1977-79: Marshall developed three High-Energy Astronomy Observatory (HEAO) spacecraft. NASA launched three of the unmanned scientific observatories into low Earth orbit. The missions focused on some of the most intriguing mysteries of the universe: pulsars, black holes, neutron stars and super nova.

March 18, 1978: The orbiter Enterprise arrived at Marshall for the Mated Vertical Ground Vibration Test series. Marshall engineers placed the Enterprise in the center's Dynamic Test Stand in order to critically evaluate the structural integrity of the vehicle.

1979: The Marshall Center sent to Kennedy Space Center the first external tank for the shuttle's first mission.

1980: Marshall engineers participated in numerous tests related to plans to launch the first space shuttle. During these early tests and eventually prior to each shuttle launch, engineers in the Huntsville Operations Support Center monitored consoles in order to evaluate and help solve any problems at the Florida launch that might involve the shuttle main engines, external tank or solid rocket boosters.

During the 1980s: NASA examined ways to construct large structures in space. Two experiments were extremely important. One was known as Experimental Assembly of Structures in Extravehicular Activity, or EASE. The other was called Assembly Concept for Construction of Erectable Space Structure, or ACCESS. Both experiments were simulated in Marshall's Neutral Buoyancy Simulator prior to flight.

April 12, 1981: A new era in spaceflight began on April 12, 1981, when Marshall-developed propulsion systems lifted the first space shuttle off the launch pad in Florida and into space. Marshall's responsibilities for improving the shuttle propulsion systems have continued throughout the shuttle era.

1983: Spacelab 1, managed by the Marshall Center, flew aboard STS-9 as both a test flight of the Spacelab module and an ambitious research mission, with 73 experiments in seven science disciplines.

Jan. 25, 1984: President Ronald Reagan, during his State of the Union address, said the United States should explore the new frontier of space and directed NASA to build a permanent manned space station.

Dec. 1985: The first phase of the space station was well under way with the design concept for the crew compartments and laboratories. NASA astronauts, at the Marshall Center's Neutral Buoyancy Simulator, practiced construction techniques they later used to construct the space station after it was deployed.

Jan. 28, 1986: Only 74 seconds after liftoff, the space shuttle Challenger, flight STS 51-L, exploded about 10 miles above Earth, killing all seven crew members.

1986: As a result of the Challenger accident, the Marshall Center began redesigning and testing the shuttle's solid rocket motor. Marshall had management responsibility for space shuttle propulsion elements, including the solid rocket booster.

May 27, 1987: The first full-scale test of the redesigned space shuttle booster since the Challenger accident was a success.

1987: NASA announced that Marshall engineer Jan Davis had been selected as a NASA astronaut.

During July 1988: A team of NASA scientists from the Marshall Center, the Lockheed Company and the University of Alabama in Huntsville announced the discovery of a new high-temperature superconductor.

Aug. 18, 1988: NASA announced that TRW Inc. had been selected for final negotiations leading to the award of contracts for extended definition and development of the space-based Advanced X-ray Astrophysics Facility, later renamed Chandra.
1988: Thirty-two months after the Challenger accident in 1986, the space shuttle returned to flight on mission STS-26. The redesign effort directed by the Marshall Center had involved an extensive test program in order to verify that the shuttle's solid rocket boosters were safe.

April 2, 1989: A launch attempt of the space shuttle Atlantis was scrubbed 31 seconds before scheduled liftoff because of a power surge on a pump that recirculates liquid hydrogen fuel for one of the space shuttle main engines.

May 1989: The space shuttle Atlantis crew successfully deployed the Magellan spacecraft for its rendezvous with Venus. The deployment relied on a Marshall-managed Inertial Upper Stage that accompanied the STS-130 mission.

April 24, 1990: NASA launched the Hubble Space Telescope. Developed by Marshall, the telescope was designed to see deeper into space than ever before. It was the product of a partnership between NASA, the European Space Agency, industry partners and the international community of astronomers.

June 20, 1990: President George H. Bush toured the Marshall Center and addressed employees.

June 27, 1990: NASA said that the Hubble Space Telescope, which had been plagued with problems, was discovered to have a flawed mirror, causing the $1.5 billion instrument to be “near sighted.”

1990s: Servicing missions continued on NASA's Hubble Space Telescope throughout the 1990s and after. Astronauts selected for these missions trained in the Marshall Center's Neutral Buoyancy Simulator. This facility provided the weightless environment encountered in space needed for testing and the practices of extravehicular activities, including those related to the Hubble Space Telescope.

June 29, 1990: A hydrogen leak similar to the one that scrubbed space shuttle Columbia’s mission in late May was discovered in the space shuttle Atlantis as it was being readied on the launch pad.

July 2, 1990: Marshall awarded a $42.6 million contract to Rockwell International for continued space shuttle systems engineering and integration services.

July 13, 1990: Engineers located two leaks in the space shuttle’s fuel line that they determined could be fixed and stated that flights would resume soon.

Aug. 13, 1990: NASA scientists released a photograph taken Aug. 3 by the Hubble Space Telescope that provided unexpected detail of a young star system determined to be 160,000 light years from Earth. After scientists corrected the flawed mirror problem with computer enhancement, the telescope revealed 60 of what were the youngest and heaviest stars known.

Dec. 2, 1990: Space shuttle Columbia on flight STS-35 was launched from Cape Canaveral, Fla., carrying the $150 million Astro-1 for a 10-day astronomy mission.

April 5, 1991: The Burst and Transient Source Experiment, aboard the Compton Gamma Ray Observatory, began a mission that would extend over the next nine years to study the phenomenon of gamma-ray bursts, although the detectors also recorded data from other exotic astrophysical objects.

1992: Astronauts onboard the space shuttle conducted microgravity experiments related to fluid physics, materials science, biotechnology, combustion science and commercial space processing.

Jan. 22, 1992: Managed by the Marshall Center, the International Microgravity Laboratory-1 went into space aboard the shuttle. The laboratory missions explored how life forms adapt to weightlessness and investigated how materials behave when processed in space.

1994: Scientists at Marshall funded a study related to urban heat islands in Huntsville and other metropolitan areas.

1995: NASA launched its second United States Microgravity Laboratory. USML-2 flew on STS-73. USML-2 activities were directed by NASA's Spacelab Mission Operations Control facility at the Marshall Center. Marshall's Fred W. Leslie served as payload specialist on the mission.

March 22, 1996: NASA launched STS-76 which docked to the Russian MIR Space Station and included two Marshall-managed crystal growth experiments. In addition, the mission included a Marshall-managed experiment designed to monitor the environment around MIR.

May 19, 1996: NASA launched STS-77 which included an improved version of a Marshall-managed crystal growth experiment, known as the Handcell Diffusion Test Cell experiment, and a Marshall-managed experiment to develop better semiconductors.

June 20, 1996:The Marshall Center had a lead role in STS-78 .The center was responsible for the Life and Microgravity Spacelab mission which would collect life sciences data to help prepare crews for longer duration missions.

Sept. 16, 1996: NASA launched STS-79 which included a Marshall study on soil behavior in earthquakes. The experiment was known as Mechanics of Granular Materials.

Jan. 15, 1997: NASA launched STS-81 which included a Marshall experiment to help engineers design better spacecraft to withstand the space environment, the Liquid Metal Diffusion experiment, and a Diffusion-controlled Crystallization Apparatus for Microgravity experiment.

Feb. 11, 1997: NASA launched STS-82, a second in a series of planned servicing missions to the Hubble Space Telescope. Prior to the mission, the STS-82 crew trained extensively including 168 hours in Marshall's Neutral Buoyancy Simulator.

May 15, 1997: NASA launched STS-84 included three Marshall protein crystal growth experiments.

July 1, 1997: NASA launched STS-9, a mission that included a Spacelab microgravity science research flight sponsored by the Marshall Center's Microgravity Research Program.

Aug. 7, 1997: NASA launched STS-85, a mission that include five microgravity science experiments managed by the Marshall Center.

Sept. 15, 1997: NASA launched STS-86, a mission that would include returning to earth four Marshall-managed experiments that were part of studies to understand contamination that spacecraft face in their orbiting environments.

Nov. 19, 1997: STSS-87 lifted off carrying the Marshall-managed fourth United States Microgravity Payload.

June 2, 1998: NASA launched its first Super Lightweight External Tank on STS-91.

Dec. 4, 1998: The U.S.-built Unity module was launched aboard the orbiter Endeavour. The International Space Station Node 1, or Unity, was designed as a connecting passageway to space station modules. It was manufactured by the Boeing Company at Marshall from 1994 to 1997.

July 23, 1999: NASA launched the Chandra X-ray Observatory developed by the Marshall Center. Chandra is the world's most powerful X-ray telescope.

Feb. 7, 2001: The International Space Station Destiny module was launched aboard space shuttle Atlantis on STS-98. It was built by the Boeing Company at Marshall under the direction of the Marshall Center.

2001: The Payload Operations Control Center at Marshall began round-the-clock operations in support of science aboard the International Space Station.

2002: The Marshall Center broke ground for a state-of-the-art Propulsion Research Laboratory, designed to serve as a leading national resource for advanced space propulsion research.

Jan. 22, 2003: The space shuttle main engines marked a significant milestone: the system surpassed one-million seconds of successful testing and launch firings during a successful flight acceptance test at NASA's Stennis Space Center near Bay St. Louis, Miss.

Feb. 1, 2003: The space shuttle Columbia accident occurred, claiming the lives of all seven crew members

April 2003: The National Space Science and Technology Center opened in Huntsville. The center would focus on space science, Earth sciences, information technology, optics and energy technology, biotechnology and material science.

2003: The Columbia Accident Investigation Board presented its final report on the causes of the space shuttle Columbia accident. The Marshall Center played a key role in ensuring space shuttle propulsion elements would perform safely in the future.

2004: NASA launched Gravity Probe-B, a relativity experiment developed at Stanford University to test two extraordinary predictions of Albert Einstein's general theory of relativity.

2005: NASA assigned the Marshall Center management responsibilities for the Ares I and Ares V launch vehicles.

Sept. 22, 2006: Solar-B, an international mission to study the sun, was launched from Japan. The Marshall Center managed development of the scientific instrumentation that NASA provided for the mission.

July 4, 2006: Space shuttle mission STS-121 marked a significant historical milestone in the shuttle's return to flight following the Columbia accident in 2003. As part of the mission, the STS-121 crew carried out testing of shuttle inspection and repair hardware and evaluated operational techniques and concepts for conducting on-orbit inspection and repair of the International Space Station.

2006: The J-2X engine was designed to power the upper stages of a new Ares I Crew Launch Vehicle and the Ares V cargo segment. The engine was designed as a stepped-up version of the hydrogen/oxygen-fueled Apollo-era J-2 engine.

2006: Marshall saw the shipment and launch of the oxygen generation system to the International Space Station, where the system will use water to generate breathable oxygen for crew members.

2008: The world's largest known welding machine of its type – capable of building major components of NASA's Ares I and Ares V rockets – was installed at Marshall. The friction stir welder offers rocket builders a modern welding technique by using forging pressure and frictional heating to produce high-strength bonds virtually free of defects.
2009: NASA's Ares I-X test rocket lifted off in 2009 from Kennedy Space Center for a two-minute powered flight. The test flight lasted about six minutes from its launch from the newly modified Launch Complex 39B until splash down of the rocket's booster stage nearly 150 miles down range.

2010: Mirror testing was under way at Marshall on the James Webb Space Telescope. The Webb telescope mirror will be the largest primary mirror ever assembled in space. The telescope will give scientists clues about the evolution of our own solar system, from the first light after the Big Bang to the formation of the universe